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Konya Plain Agricultural Lands

Salinization Problem, Causes and Solution Suggestions[1]

Halil Mesut BAYLAK[2]

Barış TAŞ[3]

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ABSTRACT

Due to the rapidly increasing world population, it is necessary to improve the lands that have been degraded and currently have production potential. It is inevitable that the greatest struggle of humanity for the future will be to combat the rapidly spreading degradation. It is imperative to change approaches and policies for sustainable agriculture. Basin management should not be considered as an idea aimed at protecting the hydrological services provided by the basin or minimizing or preventing groundwater effects, but as an integrated basin management.

A relationship has been established between excess water and agricultural product increase in the Konya plain for many years due to the irrigation culture, and even when surface water resources are insufficient, the use of underground water resources has increased day by day. So much so that irrigation is attempted with a well opened at almost every field. This situation causes the groundwater level to retreat to very deep depths.

The aim of the study is to examine the environmental impacts resulting from activities carried out to increase production in the Konya Plain, which is used as an agricultural production area, to identify the negative structural problems that occur and to offer solutions, thus contributing to the participatory approach proposal for sustainable basin planning. The material and data sources of the study consist of studies conducted as subject-field studies (articles, books, thesis, reports, notifications). The information obtained through the literature review was compiled and the environmental assessment of agricultural activity and soil-water use was emphasized, solution proposals were developed in the light of geographical principles, and suggestions for the sustainable development plans of the field were put forward.

Konya Ovası Tarım Arazileri Tuzlanma Sorunu, Nedenleri ve Çözüm Önerileri

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ÖZ

Dünya nüfusunun hızla artması nedeniyle bozulmuş ve üretim potansiyeli olan toprakların iyileştirilmesi gerekmektedir. İnsanlığın geleceğe yönelik en büyük mücadelesinin hızla yayılan bozulmayla mücadele olması kaçınılmazdır. Sürdürülebilir tarım için yaklaşım ve politikaların değiştirilmesi zorunludur. Havza yönetimi, havzanın sağladığı hidrolojik hizmetleri korumayı veya yeraltı suyu etkilerini en aza indirmeyi veya önlemeyi amaçlayan bir fikir olarak değil, bütünleşik bir havza yönetimi olarak düşünülmelidir.

Konya ovasında sulama kültürü nedeniyle uzun yıllardır aşırı su ile tarımsal ürün artışı arasında bir ilişki kurulmuş olup, yüzey su kaynakları yetersiz kaldığında bile yeraltı su kaynaklarının kullanımı her geçen gün

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[2] Dr., Ministry of Education, Konya/Türkiye, hmesutb79@gmail.com, Orcid: 0000-0002-6369-5765.
[3] Prof. Dr., Bakırçay University, İzmir/Türkiye,tas.baris@hotmail.com, ORCID:0000-0002-7469-9948

Anahtar Kelimeler:
Konya Ovası 1
Havza planlaması 2
Toprak Bozulması 3
Toprak tuzlanması 4.

artmaktadır. Öyle ki neredeyse her tarlada kuyu açılarak sulama yapılmaya çalışılmaktadır. Bu durum yeraltı su seviyesinin çok derinlere çekilmesine neden olmaktadır.

Çalışmanın amacı, tarımsal üretim alanı olarak kullanılan Konya Ovası'nda üretimi artırmaya yönelik yapılan faaliyetler sonucu ortaya çıkan çevresel etkileri incelemek, ortaya çıkan olumsuz yapısal sorunları tespit ederek çözüm önerileri sunmak, böylece sürdürülebilir havza planlaması için katılımcı yaklaşım önerisine katkıda bulunmaktır. Çalışmanın materyal ve veri kaynaklarını konu-alan çalışması olarak yürütülen çalışmalar (makale, kitap, tez, rapor, bildiri) oluşturmaktadır. Literatür taraması yoluyla elde edilen bilgiler derlenerek tarımsal faaliyet ve toprak-su kullanımının çevresel değerlendirmesi vurgulanmış, coğrafi ilkeler ışığında çözüm önerileri geliştirilmiş ve sahanın sürdürülebilir kalkınma planlarına yönelik öneriler ortaya konulmuştur.

INTRODUCTION

Every minute, 10 hectares of arable land in the world is degraded. 5 hectares of this is due to soil erosion, 3 hectares of soil salinization, 1 hectare of soil degradation processes, and 1 hectare of it is due to non-agricultural uses.

Due to the rapidly increasing world population, it is necessary to improve the lands that have been degraded and currently have production potential. It is inevitable that the greatest struggle of humanity for the future will be to combat the rapidly spreading degradation. Approaches and policies must be changed for sustainable agriculture.

Basin management should not be evaluated as a thought aimed at protecting the hydrological services provided by the basin or minimizing or preventing groundwater effects, but as an integrated basin management. This method reveals the necessity of considering local characteristics, natural resource use, and climate changes within the causality relationship. Instead of a soil and water planning approach focused on engineering works, needs and activities should not be ignored and participatory approaches should be used (Garipağaoğlu, 2017).

Comprehensive studies have been carried out to bring water to the Konya Plain since the reign of Abdulhamid II. The first official irrigation project of our country, the Konya Cumra Irrigation, was carried out between 1907-1914 for the Konya Plain, and with the project, the waters of Lake Beyşehir were transferred through a conveyance channel and 57,000 hectares of agricultural land were opened to irrigation. Within the scope of the Konya Cumra Project, which is the largest irrigation investment after GAP, the projects implemented by DSI to realize Konya's water dream were called "Konya Plains Projects", or "KOP" for short. The project, which consists of a total of 18 project bundles consisting of 14 irrigation projects, 3 drinking water projects and 1 energy project, where 1,100,000 hectares of agricultural land will be irrigated, and where it is understood that flood irrigation is not efficient in agricultural production with its small and fragmented land structure, and where the development of agricultural infrastructure and ensuring environmental sustainability for water saving purposes are important, has been developed and implemented. However, since it would be difficult for a region, especially a region with water insufficiency, to develop with agriculture alone and since coordination is required due to the implementation of existing projects by different institutions, a structure was needed to coordinate, monitor and evaluate project implementations in the region. All these show that a participatory approach was demonstrated with the KOP project. However, with each project, positive features cannot be valid in the entire field, and new problems manifest themselves in the short or long term. The Blue Tunnel Project is a study

where water transportation to the plain was taken as a step in this regard and added to the project later. While trying to eliminate a problem, another problem begins to manifest itself.

Therefore, it is important for the sustainability of the short and long term problem of the Konya Plain to be analyzed well, to identify and eliminate the problem and to increase the positive relationship between environmental impact assessment and human activities.

For many years, a relationship has been established between excess water and agricultural product increase due to the irrigation culture in the Konya Plain, and even when surface water resources are insufficient, the use of underground water resources has increased day by day. So much so that almost every field is tried to be irrigated with a well opened. This situation causes the underground water level to be drawn deeper.

The Konya Plain has semi-arid climate characteristics. There is a decrease of 10-25 mm compared to normal precipitation in the thirty-year period. The climate character is shifting from semi-arid climate type to arid climate type. Rainfall decreases towards the end of spring in the plain and decreases to almost zero levels in summer. 70% of the rainfall falls outside the plant growth period and does not receive regular and sufficient rainfall. Meteorological drought is increasing in the area. In addition to aridity, there is an alarming level of soil degradation as a result of almost all of the surface and underground water resources of the plain being directed to agricultural areas and the cultivation of crops with high water requirements becoming increasingly widespread. Soil degradation is defined as the decrease in soil quality as a result of salinization/desertification/concreting.

PURPOSE

The aim of the study is to examine the environmental impacts resulting from activities carried out to increase production in the Konya Plain, which is used as an agricultural production area, to identify the negative structural problems that occur and to offer solutions, thus contributing to the proposal for a participatory approach to sustainable basin planning.

METHOD-TECHNIQUE

The material and data sources of the study consist of studies conducted as subject-field studies (articles, books, thesis, reports, notifications). The information obtained through the literature review was compiled, and the environmental assessment of agricultural activity and soil-water use was emphasized, and solution proposals were developed in the light of geographical principles, and suggestions for the sustainable development plans of the field were put forward.

1.Location and Boundaries of the Field

Konya Plain is located in the Central Anatolia Region, southeast of Salt Lake and within the Konya Closed Basin. The lowest point of the plain is Aslım Location (975 m.), and the highest point is Alaaddin Hill (1080 m.) (Figure 1).

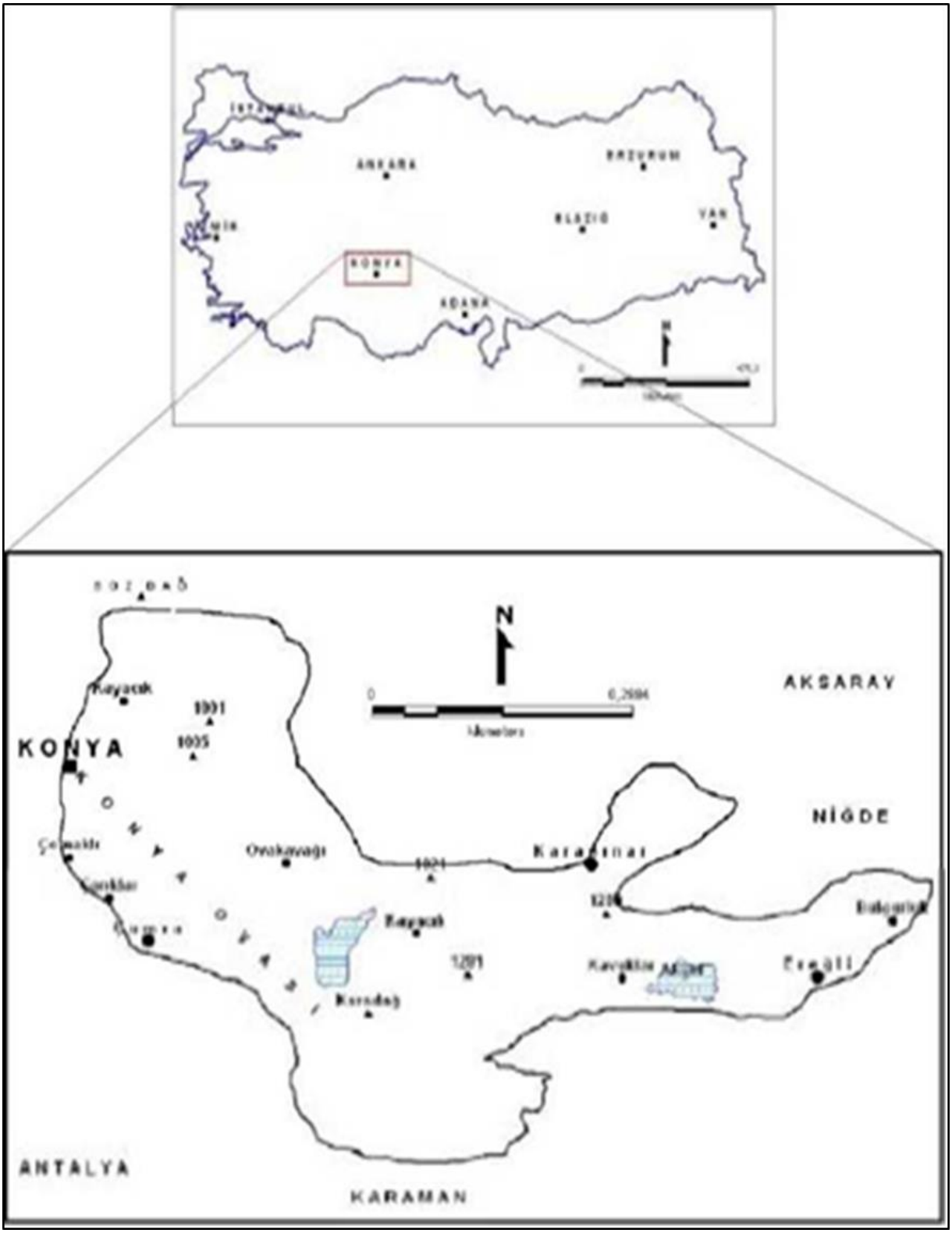
The Konya Plain extends 80 km in the N-S direction and 50 km in the E-W direction. The westernmost point of the plain is at 32 degrees 06’ N latitude. The 800 km2 Hotamış Plain (including the marsh), 700 km2 Karapınar Plain, 500 km2 Karaman Plain and 2500 km2 Ereğli Plain (including Ayrancı plain) are accepted within the Konya Plain (Başçiftçi et al. 2013;3).

2. Evaluation of Konya Plain in Terms of Soil

Soil is the source of life, the reason for existence of living beings. The place of such an important element of the geographical environment in planning is also indisputably special (Garipağaoğlu, 2017;89). In the Konya plain, in the areas where lake shores and temporary water deposits are located, sodium chloride, sodium sulfate, calcium and magnesium salts

accumulate on the soil surface and cause the formation of salty soils, which we call soloncak soils, in the plain. In addition, as a result of the accumulation of hygroscopic salts (calcium and magnesium chloride) on the surfaces, there are sabbah or kal soils. These soils absorb moisture from the air in the early hours of the morning and this soil turns into a muddy salt mixture, and the slippery and unnavigable land shows salinity in the form of spots. The groundwater level in the plain creates local salt accumulations due to the effect of the arid climate. Salty and gypsum soils have also formed in connection with the marshes. In general, salts are transported in the area by rivers, seeps and surface flows and the wind plays an important role. Alkaline soils are found in small amounts and with salinity in the lower middle part. While sulfate and chlorides are common in the eastern part of the plain due to marine sediments, chlorides are high in vertisol soils where the groundwater level is below 1.80 m in the west.

Figure 1. Konya Plain Location Map (Taken from Bozyiğit and Güngör 2011



The KOP region constitutes approximately 12% of Turkey's agricultural areas (3,021,542 ha), approximately 16% of irrigated areas (909,269 ha), and 21% of madas areas (835,665 ha). In 30% of the agricultural areas in the region, irrigated (including unlicensed wells) and in 70% (2,112,273 ha) dry farming is done.

The lack of rainfall in the region and the shift to plants that consume a lot of water but have high incomes have increased the pressure on groundwater use. The groundwater level in the region drops by around 3 percent each year. If the groundwater level continues to drop,

water extraction will no longer be economical after a certain depth. This situation creates the risk that a large portion of the currently irrigated areas will not be irrigated in the future. (KOP, 2013; 3)

3. Evaluation of Konya Plain in Terms of Water Potential

Konya plain has a total water surface area of 178,157 ha, 2,939 hm3/year surface water (66%), 1,508 hm3/year underground water (34%), with a water potential of 4,447 hm3/year. 94.1% of the total water surface area of Konya province consists of lakes and 2% consists of dams and ponds.

- Tuz Gölü => 44.1%
- Beyşehir Lake => 32.5%
- Hatamış Lake => 4.8%

Konya province's surface water potential is 2,939 hm3 per year. The 2 important sources that cause the increase in this potential are Göksu and Beyşehir Lake.

3.1.Groundwater Potential

Groundwater use in the Konya Plain began in the 1960s. At first, boreholes were opened by YAS (underground irrigation) cooperatives established through public and citizen cooperation, later they began to be opened by individuals alone, and groundwater use continued to increase. In addition to the need for water for agricultural production, the inadequacy of surface water resources in the plain, along with the increase in urbanization and industrial activities, has increasingly increased the use of groundwater. It has become the area where groundwater is used the most in Turkey (Table 1) (WWF Turkey 2014).

Name	Average Flow (h3/year)	Collection Rate
Konya-Çumra-Karapınar Basin	441	%29
Sarayönü-Kadınhanı-Ilgın-Yunak Basin	300	%20
Beyşehir-Seydişehir Basin	112,6	%7,5
Akşehir Basin	31	%2
Cihanbeyli-Yeniceoba Basin	62	%4
Altınekin Plain	74	%5
Others	487,4	%32,5
Total	1508	

Table 1. Konya Plain Groundwater Potential Distribution Rate.

The most common groundwater in the Konya Plain is aquifer formation Neogene aged lake limestones. In the Neogene, the Konya Closed Basin, which was an inland lake, rose with epeirogenic movements at the end of the Neogene and passed into the terrestrial environment. Therefore, the most common formations on the basin floor are limestone, krillstone, marl, etc. belonging to the Neogene. The Konya Basin, which was located in a terrestrial environment in the Pliocene, was covered with terrestrial sediments. These units, which are mostly in the sandstone conglomerate lithology, have low permiability. They are generally located on the edges of the basin. Lake sediments that show aquifer characteristics are generally located in the low floors of the plain floor. The Konya Plain aquifer formation is mesosaic limestones. It is possible to obtain groundwater from the cavities and cracks of these limestones. The waters in

the drainage area of the Konya Plain are medium salty and low sodium. In the middle of the plain, the salt ratio increases. It is high salty and low sodium. The area around Ereğli, in the northeast of the Konya Plain (in the Salt Lake Basin), has very high sodium.

4. Environmental Impact Assessment in Land-Water Use

The imbalance between the region's water resources and soil resources has deteriorated in recent years to the detriment of usable water potential, threatening agricultural and environmental sustainability. It is important to open many wells to benefit more from groundwater. In such places, the groundwater table is falling, wells are deepened to get more water and fossil waters with high lime and salt content are extracted. This situation pollutes the soil in irrigated agricultural lands and reduces the quality of agricultural products (Atalay 2016 ;253). This situation not only pollutes the soil, but also leads to barrenness and pollution of quality groundwater, thus impairing water quality.

In the region where the effects of global climate change are felt the most, considering the availability of usable water, it has become necessary to make a radical change in the agricultural sector in order to ensure sustainability in agricultural production. In order to ensure the effective use and sustainability of soil and water resources; consolidation of agricultural lands, completion of on-farm development services, rehabilitation of irrigation systems in irrigation union and irrigation cooperative areas with classical open channel irrigation systems, transition to on-farm pressurized irrigation systems, combating drought, erosion control and afforestation activities will be supported (KOP 2018;12).

As a result of intensive water use in agricultural activities as a result of human activities, water resources, especially marshes, are drying up. Drying marshes lead to new environmental problems. For example, the peat bogs exposed with the drying of the Ereğli reeds in the Plain are being uprooted by the local people and used as fuel. The uprooting of peat bogs causes the upper layers of the soil to disappear and the area to become desert in the long term (WWF Turkey 2014). With the drying of the reeds, salinization and wind erosion have occurred in the soil. Both factors negatively affect agricultural production.

The salinization of agricultural lands causes the salinized areas to remain outside of agricultural production. The slope of the lands in the Konya Plain is 3%. Inadequate surface drainage, high groundwater levels and unconscious irrigations resulting from the low slope have brought the salinity problem in the plain to serious dimensions. Although an effective measure was taken in this regard with the opening of the Main Drainage Canal in 1974, the salinization experienced around Karapınar is an example of this. Soil salinity is especially seen in arid and semi-arid climate regions, especially in areas with lack of drainage. If no precautions are taken and irrigation is carried out, salinization occurs much more quickly. With irrigation, soluble salts in the soil are carried upwards by capillarity and accumulate in the soil. Other causes of salinization include incorrect application of irrigation, lack of sufficient drainage or the presence of high amounts of soluble salts in irrigation water (Deliboran and Savran 2015).

The idea of “too much water - too much product” is widespread among farmers as well as technical staff. Excessive water applied not only causes an increase in irrigation costs, but also disrupts the air-water balance of the plant in the root zone, preparing the environment for the plant roots to rot. As a result, there may be a significant decrease in yield. In addition, even a first-class agricultural land can cause barrenness in areas where drainage is inadequate as a result of excessive irrigation water application. The salt concentration of the groundwater is of great importance in soil salinization (Direk et al. 2006: 82).

In the Konya Closed Basin, which has a semi-arid climate, in addition to the drought in recent years, the increase in the cultivation of agricultural products with high water

requirements has led to an increase in the number of thousands of deep irrigation wells in the basin. As a result, various problems such as lowering of the groundwater level and the formation of new sinkholes, as well as soil salinization, drying up of many marshes and springs, and falling levels of surrounding lakes arise.

There is a 14.3m drop in the groundwater level in the 33-year period (Bozyiğit and Tapur 2009;143). Groundwater level changes occur for various reasons. Meteorological, hydrological and geological reasons are the natural factors that create level changes. Water withdrawal from underground, especially for agricultural irrigation or drinking water needs, is seen as a human factor (Yılmaz 2010;152).

These changes in the aquifers located in the Konya plain and its surroundings have been observed to result in the use of water above the existing reserve in the basin, the decrease in water levels each year compared to the previous year, and the unconscious consumption of drinking and utility water by water consumers (Göçmez and İşçioğlu 2004). Groundwater dissolves the rocks it is in contact with and underground cavities are formed. As a result of the decrease in the groundwater level filling these cavities, the unbalanced surface plates collapse and karstic shapes that we call “sinkholes” are formed (Üstün et al. 2007 p.54). This situation emerges as a feature that threatens agricultural lands in the Konya plain (Bozyiğit et al. 2009:143).

The reasons for the change in groundwater levels that cause deterioration in soil structure can be roughly grouped under two headings:

1. Climate: In areas with a dry climate, the soil becomes saline, and due to insufficient rainfall, the salt in the soil cannot be removed.

2. Agricultural activities

5. Soil Salinity

Especially in arid and semiarid climate regions, soluble salts that are washed into the groundwater come to the soil surface with high groundwater through capillarity and accumulate on the soil surface as a result of evaporation (Ergene. 1982). Salinity, which causes adverse effects such as toxic effects on plants and creating water deficit, occurs when water leaks into the depths after excessive irrigation and rainfall, carries some minerals in the soil with it, and then moves upwards under the effect of capillarity and leaves the minerals in its content on the soil surface (Akgül, 2003). The main factors on soil salinization are Chlorine, Sulfate, Sodium, Magnesium and Calcium.

Soil salinization is one of the most important events of land degradation. In arid and semiarid regions, the main factors that reduce productivity in irrigated areas or rain-fed dry agricultural areas can be listed as waterlogging, alkalization and salinization.

Areas where soil salinity problems are seen:

a. Widely arid and semiarid regions

b. Intensively in coastal areas where seawater intrudes into the continent, especially in semi-humid and humid regions

c. Groundwater increases salinity to a large extent

d. Areas where groundwater with high salt content is used for irrigation purposes

5.1. Agricultural Irrigation and Environmental Interaction in Soil Salinity

Irrigation increases productivity in agricultural areas to a very significant extent. However, in addition to the benefits of water to the plant, it can also harm the soil on which irrigation is done. In some cases, as a result of uncontrolled irrigation activities, large agricultural lands can become barren, salty lands. Examples of such areas can be seen frequently in Turkey. (Yılmaz 2010;158).. One of the negative effects of salinization on agricultural activities is that salinized soils become unusable if the necessary reclamation works are not carried out in the future. With the accumulation of salts in the soil, productivity cannot be obtained after a certain period of time. With the decrease in productivity in the soil, plants can no longer grow. In such a case, the cultivated land is abandoned and left for non-agricultural use. (Yılmaz 2010;158)..

As a result of the opening of dry agricultural areas to irrigation, the part of the ions contained in the water that cannot be removed from the body with a suitable drainage system begins to accumulate in the soil, especially in arid and semi-arid regions. This also causes salinity and alkalinity problems in the soil (Bahçeci et al., 2008).

Environmental problems caused by irrigation seen in a farmer's agricultural land may seem insignificant. However, if these unconscious irrigations are applied by many farmers, a major environmental problem may arise. For this reason, irrigations should be monitored and evaluated in terms of environmental problems and measures should be taken to eliminate or reduce the problems. Environmental problems seen in irrigation mostly arise from the lack of an effective monitoring and evaluation system during the operation phase (Çakmak and Kendirli 2001:42).

The following measures should be taken in order to use irrigation with a sustainable understanding with the least harm to the environment and the most benefit are itemized in Çakmak and Kendirli (2001).

a. Determination of a management strategy that will provide effective project operation and maintenance: In terms of preventing excessive water use.

b. Training of the manager, operator and farmer

c. Technical solutions: In terms of problems related to drainage needs.

d. Establishment of an integrated regional plan covering basin planning, resource planning and environmental health planning: In order to identify the necessary measures in terms of quality and quantity and to eliminate potential environmental impacts.

5.2. Prevention of Soil Salinization

In the region where the effects of global climate change are felt the most, considering the availability of usable water, it has become necessary to make a radical change in the agricultural sector in order to ensure sustainability in agricultural production. In order to ensure the effective use and sustainability of soil and water resources; It is necessary to evaluate the use of soil-water balance and prevent salinization in the soil.

In order to solve the problem of salinization in the soil, first of all, an advanced drainage system must be established. Irrigation and drainage systems are activities that cannot be separated from each other and must be processed together (Yılmaz 2010;158). For this reason, drainage and irrigation systems must be established together in areas where irrigation is available.

Inappropriate water use and management prevents reaching possible potentials, causes high-productivity agricultural areas to be flooded, and increases salinity and alkalinity, causing agricultural lands to move outside their areas.

In the measures to be taken for soil salinization and its solution, the following issues should be examined/solved in a continuation of each other, and the priorities to be made should be in the planning:

• The management level of the soils should be improved by bringing uncultivated and potentially workable soils into agriculture.

• Economic incentives, input adequacy status, monetary resources, land management skills, water availability, changes from region to region in climate and soil characteristics should constitute the basic principle and general characteristic in the management, rehabilitation and diagnosis of salt-affected soils.

5.2.1. Planning regarding the Structure of Agricultural Lands

One of the factors affecting agricultural productivity and agricultural water use in Turkey is the small-scale and scattered structure of agricultural lands. (Parlak, 2010) These small, scattered and irregularly shaped parcels prevent irrigation planning, project design and the use of modern irrigation methods. It negatively affects agricultural productivity (Muluk et al., 2013). Land consolidation processes should be completed in order to eliminate these negativities.

5.2.2.Planning on Groundwater-Drainage

Drainage is an absolute necessity in salinity control. In areas where drainage is sufficient, accumulated salt must be removed from the root zone by washing. Washing should also be applied in conditions where it will not act as a source of salinity by raising the groundwater. Drainage, washing and more resistant plant selection practices should be carried out to prevent long-term salinity. Frequent irrigation, land leveling, adjustment of fertilization time and planting methods are helpful in salinity control studies.

5.2.2.1.Relationship Between Groundwater and Salinity:

As a result of high groundwater and unconscious irrigation, salty areas have formed in the plain. Especially in months when irrigation is intensive, groundwater rises (Çakmak and Kendirli 2001). The rise of groundwater to the plant root zone with capillarity disrupts the air-water balance in the soil against the air, carries salts to the upper layers or plant root zone and causes salinity and alkalinity problems. As a result of pores filling with water, cold and wet soil conditions occur, and accordingly, planting and harvesting processes are delayed; root cell division and proliferation slows down and thus root development cannot reach the desired level (Güngör et al. 1996; 295). For sustainable irrigated agriculture, the groundwater level must be constantly monitored and this level must be kept at acceptable values (Dinç et al. 2004).

5.2.2.2. Drainage System-Salinity Relationship:

Drainage systems can be constructed to ensure sustainable agricultural production. This goal can be achieved by designing and constructing systems that take into account all changing soil, plant, water and climate conditions and provide appropriate water and salt balance in the soil. For an appropriate water and salt balance in the soil, excess water must be removed from the root zone at the appropriate time and with an appropriate system. However, while removing excess water from the soil, short-term dry periods must also be taken into account. Otherwise, there may be more product losses due to water deficiency than those resulting from excess water. Excessive drainage in irrigated areas causes a decrease in water application efficiency, water insufficiency and therefore the reuse of drainage water in irrigation (Bahçeci et al. 2007;7). At this point, drainage water contains excess salt and emerges as a factor affecting soil salinization.

5.2.3. Water Potential Planning

Preventing the increase in groundwater use is an important situation that needs to be addressed in terms of soil salinization. For this purpose, the issues we have itemized regarding the amount of groundwater use in the planning should be included in the planning. Measures:

1. A large portion of farmers prefer the flood irrigation method due to low irrigation costs and not having sufficient knowledge about modern irrigation techniques. However, labor costs are high with this method and since water cannot be applied homogeneously to all plants, the yield is low. For this reason, there is a need for publication activities such as seminars, courses, etc. that provide significant water savings, namely irrigation methods, irrigation times.

2. In practice, the use of devices such as mercury tensiometers should be widespread, which will enable farmers to give up determining irrigation times by using plant appearance.

3. Instead of plant patterns such as sugar beet, beans, corn, squash and lettuce, where surface water is insufficient and groundwater resources are used for irrigation, farmers should be advised to grow plants with lower water consumption.

4. With the DSI underground measurement systems regulation, which entered into force with the Official Gazette numbered 27957, underground water banks should be documented and water withdrawals should be controlled.

5.2.4. An Effective Irrigation Method

When other methods are considered, the drip irrigation method brings some important advantages. Accordingly; it allows cultivation without creating stress on the plant with low water applications, minimizes water nutrient losses since it does not create surface flow and deep leakage, and provides irrigation opportunity in waters with high salt content (Ökten 2011 p.131).

Daytime irrigation should be prohibited with windy and rainy weather, and at least one "agricultural meteorology station" should be established in each district to correctly determine the water needs of plants. Drainage water should be recycled with natural treatment. Mulches should be used in combating weeds to prevent chemical pollution of underground water (KOP, 2013; 30).

5.2.4.1.Additional Water Application

Instead of expanding irrigation areas, additional water to be brought from other basins is primarily considered for artificial feeding purposes in order to restore the natural balance of underground water (KOP, 2013; 35).

Transporting water from outside the area should be removed from priority. Emphasis should be placed on the efficient use of existing resources, regulations regarding agricultural production and acceleration of land consolidation studies.

5.2.5.Agricultural Plants and Alternative Plant Application

When the water consumption values of the plants in irrigated agriculture in the Konya plain are examined, the precipitation-water use balance in the region is strikingly revealed. Because the water consumption required for many plants grown in the region to grow water is well above the annual precipitation average (Yılmaz 2010; 151). The development of agricultural products such as sugar beet, corn and sunflower, which have high irrigation needs, is increasing. Since the net water need cannot be met (Table 2), it causes excessive use of underground water.

	W	B	S	C	P	Su	Ve	A	K

	heat	arley	ugar Beet	orn	otato	nflower	getable	lfalfa	idney Beans
W ater Consu mption (mm)	4 41	4 20	8 25	6 85	6 05	61 5	75 0	1 200	5 35
N et Water Requir ement (mm)	4 00	3 50	7 05	6 30	5 40	50 0	70 5	1 000	4 80

Table 2. Water Consumption and Net Water Needs of Irrigated Plants in the Konya Plain (Toprak et al. 2008).

The plain crop pattern should be reviewed and especially the corn and sunflower production, whose cultivation areas have increased unplanned in recent years, should be re-evaluated.

Sweet-Sorghum, has a very low water requirement and low fertilization requirement compared to other similar products. On the other hand, since it is a plant with high adaptability to different climates and the ability to grow in low quality soil (Ökten 2011 p.136), the use of an alternative plant to sugar beet in the region will be an effective solution.

5.2.6. Contribution to Ecological Solutions

Forest green vegetation is an important element of the water method in the Konya plain with its soil and water retention feature. For this reason, afforestation studies in the plain are gaining importance.

False Acacia afforestation studies should be used as an important fact in providing water saving in the Konya basin. Factors such as the need to detect sands lost by transportation, afforestation of abandoned agricultural lands, abundant seed yield, vitality, excellent vegetative renewal ability, ability to detect free atmospheric nitrogen, wide range of uses of its wood, beekeeping that can be done by using its flower reveal the need to spread the use of false acacia (Ökten 2011 p.141).

5.2.7. Supportive Additive Application to Agricultural Soils

Salt (sodium) problems start in the soil due to reasons such as the natural structure of the soil, long-term agricultural activities, irrigation water, plant nutrients used, etc. The excessive salt problem threatens agricultural production. The product called Archer is used as a salt remover or soil conditioner in soils with salinity problems. This drug replaces the sodium element with the calcium element, freeing the sodium and moving downwards, removing it from the soil surface. 1.5-2 liters are used with dripping, and up to 5 liters are used in extremely salty soils.

5.2.8. Land Reclamation Studies

Partial or complete failures are observed in reclamation studies due to lack of proper diagnosis and use of incorrect methods. This situation causes loss of money and potential increase in plant production.

Conclusion and Recommendation

In light of the explanations we have made regarding the salinization problem observed in the agricultural lands of Konya Plain, we can itemize it under the following headings:

1. Since Konya Plain rose with epirogenic movements at the end of Neogene and passed to the terrestrial environment, aquifer formation caused it to be calcareous. This caused the soil and waters of the Plain to be salty.

2. The slope of Konya Plain lands is 3%. The low slope causes insufficient surface drainage and high ground water level.

3. Since Konya Plain has a semi-arid climate, it does not receive regular rainfall. Meteorological drought is increasing in the field.

4. Almost all of the surface and groundwater of the plain is directed to agricultural areas. This situation;

a. Water demand expands the crop cultivation area, which leads to soil degradation

b. Since it is insufficient to meet the water potential, it increases the tendency to supply water from other basins

c. It increases the tendency to groundwater. It appears as excessive irrigation or excessive use of groundwater in dry agricultural areas.

d. Marshes and reeds are drying up.

5. The plain is undergoing a rapid process in terms of industrialization. This situation;

a. It increases the use of agricultural lands for purposes other than their intended purpose and causes the soil structure to deteriorate.

b. Water and waste used in industrial facilities are directed to plain water resources and soils. This situation leads to changes in underground-surface waters and soil chemistry.

c. It creates high amounts of soluble salt in irrigation waters.

6. The population is increasing in the Konya Plain. This situation;

a. It increases the tendency towards agricultural lands.

b. It increases the tendency towards water reserves and consumes already scarce resources, increases basin water transportation and tendency towards groundwater.

c. Agricultural lands are evolving towards a small and fragmented structure.

d. It increases the idea of earning more income.

e. It leads to an increase in industrialization.

7. Low level of education of farmers and wrong irrigation methods increase salinization and the removal of peat bogs in the dried reeds and marshes and the destruction of the upper soil layer increase desertification in the long term.

In order to eliminate the problem of soil salinization in Konya Plain, the following issues should be re-evaluated as revised elements in basin planning.

• Farmers should be trained in irrigated areas

• Regular maintenance of the drainage network

• Establishment of in-field drainage systems

• Leveling arrangement studies for the field

- Development of land consolidation in the region
- Efforts should be made to reduce the share system
- Purchase of all or part of the water from users at its real price
- Selection of irrigation methods with high water use efficiency
- Production in accordance with the planned plant production pattern
- Regular monitoring of salt-affected areas
- Focus on sustainable land management

SOURCE

Akgül,H.,2003. Salinity. Journal of Agricultural Engineers No. 340.

Atalay,İ., 2016.Applied Geomorphology.Meta Printing Publishing House

Bahçeci,İ.,Tarı,A.F.,Dinç,N.,2007a.Usage Possibilities of Groundwater and Drainage Waters in Irrigation in Konya Plain Subsurface Drainage Systems. Selçuk University Faculty of Agriculture Journal 21(43):7-13.

Bahçeci,İ.,Tarı,A.F. and Dinç N. 2008b. Prediction of Controlled Drainage Irrigation Efficiency and Its Effect on Soil Salination with Saltmod in Konya Plain. Harran University Faculty of Agriculture Journal, 12 (2): 69-77.

Başçiftçi, F,Duduran, S.S.- İnal, C.2013.Mapping of groundwater levels in Konya Closed Basin with Geographic Information System (GIS). Electronic Journal of Mapping Technologies 5(2):1-5

Bozyiğit,R.,Güngör,Ş.,2011. Soils and Problems of Konya Plain. Marmara Geography Journal 24:169-200.

Bozyiğit,R.,Tapur,T., 2009. Effect of Groundwater on Sinkhole Formation in Konya Plain and Surroundings. Selçuk University Social Sciences Institute Journal.

Çakmak,B.,Kendirli,B.,2001. Water Table and Salinity Problems in Konya Plain Irrigation. Journal of Agricultural Sciences. 7(4):41-47.

Deliboran, A., Savran, Ş., 2015. Soil Salinity and Plant Resistance Mechanisms to Salinity. Turkish Scientific Reviews Journal 8(1):57-61.

Dinç,N.,Bahçeci,İ.,Tarı, A.F.,2004. Temporal Change of Groundwater Levels in Closed Drainage Systems Established in Konya Plain. E-article. Internet Access Date 16.04.2019.

Direk, M.,Acar, B., l-Gül,A., 2006. Social Assessment of Groundwater Use in Agriculture in Konya Plain. Proceedings Book of TMMOB 1st Water Policies Congress.

Ergene,A.,1982. Soil Information. Atatürk University Faculty of Agriculture Publications.

Garipağaoğlu,N.,2017. Regional Planning and Spatial Planning Approaches in Turkey. Yeditepe Publishing House.

Gungor,Y., Ersözel,A.Z.,Yıldırım,O.1996. Irrigation. Ankara University Faculty of Agriculture Publications No:1443

Goçmez,G.,İşçioğlu,A. 2004. Groundwater Changes in Konya Closed Basin. Proceedings Book of 1st National Groundwater Symposium:19-28.

Kurunç,A.,2018. Irrigation Systems Usage Techniques Lecture Notes. Internet Access Date

15.04.2019 http://aves.akdeniz.edu.tr/.

Muluk, Ç.B, Kurt, B., Tural A., Türker A., Çalışlar M.A, Balkız E. Gümrükçü, S.Songül G., Zeydanlı, U.,2013. Water Status and New Approaches in Water Management in Turkey: Environmental Perspective. Inner World and Sustainable Development Association-Nature Conservation Center

Ökten,S.,2011.Environmental problems caused by water management policies in Konya Basin and general solution-oriented studies. Süleyman Demirel University Visionary Journal 3(5):124-147.

Parlak, Z.,2010. Creating a livable countryside "Land Consolidation" Internet Access Date 19.04.2019.

Toprak,R.,Süheri,S.,Acar,B.,2008. Konya Basin in Terms of Climate-Agricultural Drought-Irrigation and Environment Interaction. Konya Closed Basin Groundwater and Drought Conference Proceedings Book:67-76.

Üstün,A.-Tuşat,E.-Abbak,R.A 2007. Monitoring of Groundwater Withdrawal and Possible Results in Konya Closed Basin with Geodetic Methods. III. Engineering Measurements Symposium Proceedings Book:52-61.

Yılmaz,M.,2010. Environmental Problems Caused by Groundwater Level Changes in Karapınar Surroundings. Ankara University Journal of Environmental Sciences 2(2):145-163.

Reports

Today's Water in Konya Report. 2014. WWF Turkey.

KOP Action Plan and KOP Region Public Investments. 2018.2017 IV. Period Monitoring Report.

Kop Region Water Supply Proposals Report from Outside the Basin.2013. Republic of Turkey Ministry of Development KOP Region Development Department Presidency

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Use Of Irısh Forest Ivy To Improve Quality Of Lıfe

Halil Mesut BAYLAK[1]

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ABSTRACT

The technological elements we have developed to make our lives easier in our modern life make us feel like they are hostile to the environment, tend to become concrete, and keep us away from the natural environment. As humanity, we are all aware of this. Another fact that we are aware of is the unintentional harm that occurs with the use of technology. As human beings, we always try to minimize these damages. Some of these studies are successful, some are unsuccessful. In this regard, the environmental phenomenon that disturbs us the most is visual and impact damage.

At the TMMOB Geographic Information Systems congress in 2023, when spatial analysis of air pollution parameters was made with GIS, it was revealed that they showed accumulation in certain areas. Therefore, our activities, which occur as a requirement of modern life, lead us to the conclusion that pollutants accumulate in certain areas in cities and this creates pollution islands and related heat islands.

We offer an ecological solution to the problem of this age, where air pollutants accumulate and heat islands and concretion appear, in line with the understanding of responsibility and to increase the visual and air quality of modern life. With our project, we aim to make our environment look beautiful and to eliminate or at least reduce some of the harms of technological elements that make our lives easier.

When you look at the cities built by people, the houses they build to live in and the roads they build for transportation, construction, concrete and asphalt appear as civilization. What we lack is expressed as our aesthetic understanding . Then, we can make the highway sections, which we describe as sunken or bridged, more aesthetic. While doing this, we will increase our quality of life and evaluate the environment in accordance with the concept of sustainability.

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ÖZ

Modern hayatımızda hayatımızı kolaylaştırmak için geliştirdiğimiz teknolojik unsurlar çevreye düşmanmış gibi hissettiriyor, betonlaşmaya meyilli hale getiriyor ve bizi doğal ortamdan uzaklaştırıyor. İnsanlık olarak bunun hepimiz farkındayız. Farkında olduğumuz bir diğer gerçek ise teknolojinin kullanımıyla oluşan istemsiz zararlardır. İnsanlar olarak bu zararları her zaman en aza indirmeye çalışırız. Bu çalışmalardan bazıları başarılı, bazıları başarısızdır. Bu bağlamda bizi en çok rahatsız eden çevresel olgu görsel ve darbe hasarlarıdır.

2023 yılında yapılan TMMOB Coğrafi Bilgi Sistemleri kongresinde hava kirliliği parametrelerinin CBS ile mekânsal analizi yapıldığında belirli alanlarda birikim gösterdiği ortaya çıkmıştır. Dolayısıyla modern hayatın bir gereği olarak ortaya çıkan faaliyetlerimiz bizi kirleticilerin şehirlerde belirli alanlarda biriktiği ve bunun da kirlilik adaları ve buna bağlı ısı adaları oluşturduğu sonucuna götürmektedir. Hava kirleticilerinin biriktiği, ısı adalarının ve betonlaşmanın ortaya çıktığı bu çağın sorununa, sorumluluk anlayışıyla ve modern yaşamın görsel ve hava kalitesini artırmak için ekolojik bir çözüm sunuyoruz. Projemizle çevremizi güzelleştirmeyi

[1] Dr., Ministry of Education, Konya, hmesutb79@gmail.com, Orcid:0000-0002-6369-5765.

Hava Kirliliği 4
Dikey Bahçe 5.

ve hayatımızı kolaylaştıran teknolojik unsurların zararlarını ortadan kaldırmayı veya en azından azaltmayı hedefliyoruz.

İnsanların inşa ettiği şehirlere baktığınızda, içinde yaşamak için inşa ettikleri evler ve ulaşım, inşaat, beton ve asfalt için inşa ettikleri yollar medeniyet olarak karşımıza çıkıyor. Bizim eksiğimiz ise estetik anlayışımız olarak ifade ediliyor . Daha sonra, batık veya köprülü olarak nitelendirdiğimiz otoyol kesimlerini daha estetik hale getirebiliriz. Bunu yaparken yaşam kalitemizi artıracağız ve çevreyi sürdürülebilirlik kavramına göre değerlendireceğiz.

INTRODUCTION

The technological elements we have developed to make our lives easier in our modern life make us feel like they are hostile to the environment, tend to become concrete, and keep us away from the natural environment. As humanity, we are all aware of this. Another fact that we are aware of is the unintentional harm that occurs with the use of technology. As human beings, we always try to minimize these damages. Some of these studies are successful, some are unsuccessful. In this regard, the environmental phenomenon that disturbs us the most is visual and impact damage.

The increase in demand for natural resources and the increase in pressure on these resources along with population growth and industrialization have revealed the need to question the continuity of global wealth and production-consumption activities (2). At this point, instead of evaluating the continuity of the development of societies only in economic terms, a more comprehensive evaluation that includes economic, social and environmental elements has begun to be made. Thus, the multidimensional concept of "sustainability" was introduced (3).

At the TMMOB Geographic Information Systems congress in 2013, when spatial analysis of air pollution parameters was made with GIS, it was revealed that they showed accumulation in certain areas. Therefore, our activities, which occur as a requirement of modern life, lead us to the conclusion that pollutants accumulate in certain areas in cities and this creates pollution islands and related heat islands.

We offer an ecological solution to the problem of this age, where air pollutants accumulate and heat islands and concretion appear, in line with the understanding of responsibility and to increase the visual and air quality of modern life. The study aims to both make our environment look beautiful and to eliminate or at least reduce some of the harms of technological elements that make our lives easier.

AIM

To propose an ecological solution to the health, visual and technical problems caused by air pollution islands in our cities where we live our modern lives. The main purpose of our project is to create a living space with increased quality of life and aesthetically enhanced environmental appearance around the concept of sustainability.

METHOD AND TECHNIQUE

The factors that cause air pollution, its negative consequences and solution suggestions are discussed around the principles of geography science, the causes and effects of air pollution caused by motor vehicles, which is one of the polluting factors, are investigated, a literature

review is made to eliminate air pollution, and within the scope of the information obtained, the pollutants in the area where air pollution is concentrated are investigated. It consists of methods, techniques and applications in which ideas are developed and visuality is changed to reduce the savings in quantity.

FİNDİNGS-DİSCUSSİON

In his article in 2003, Elkoca (2003) divided the sources of air pollution into three: industrial establishments, urban residences and vehicles. In his work, Müezzinoğlu (1987) expressed the sources of air pollution in cities as anthropogenic sources.

Various projects are being developed to reduce these factors that endanger our lives. One of these is the article published in the İnönü University Art and Design magazine in 2016, emphasizing the increase of ecological approaches in architecture along with sustainability and revealing the contributions of roof gardens to urban life. It has been shown that the urban heat island effect can be reduced by 10 degrees Fahrenheit with roof gardens. Then we can apply this understanding to bridges and sunken outputs.

According to the air pollution 2023 report, the number of air pollution hours exceeding the World Health Organization limit value in Konya is 740 hours, and the number of air pollution hours exceeding the air quality assessment and management regulation limit value is 439 hours. In these pollution values, the share of motor vehicles from anthropogenic sources and the number of trees for their removal are evaluated as in table 1, table 2 and table 3**.**

Vehicle Type	Number of Vehicles in Türkiye	Konya Province Number of vehicles	Proportional Amount (%)
Truck	838.718	35.291	%4,2
Van	3.642.625	111.152	%3
Minibus	478.618	10.557	%4,3
Motorcycle	3.102.800	102.704	%3.3
Tractor	1.838.222	83.754	%4,5
special purpose	60.099	1.799	%3
Car	12.035.978	330.672	%2,7
Bus	221.885	5.834	%2,6
Grand total	22.218.945	681.763	%3

Table 1: Comparative number of vehicles in Turkey and Konya with CO2 consumption (2023).

The average CO2 pollutant rate of the vehicles whose numbers are given in Table 1 is evaluated in Table 2.

Fuel Type	Average CO2 Value	Total Vehicle Brand	Overall Average
Gasoline	7578	36	210,5
Diesel	5837,5	33	176,9

Table 2: Average CO2 emission amounts of vehicles on a total brand basis.

Considering the data in Table 2, the number of trees required to clean these pollutants is as shown in Table 3.

Fuel Type	Average CO2 Consumption (kg/15,000km)	Number of Trees to be Planted	Total Vehicle Brand Type	Average Number of Trees
Gasoline	2904,1	22	9	2,4
Diesel	1901,071	21	9	2,3

Table 3: Amount of trees to be planted depending on CO2 emission value.

A single vehicle turns the 15 m3 of clean air that a person needs daily into dangerous air in just 10 minutes.

Pollutants in exhaust gases are;

- Carbon monoxide (CO)
- Particulate matter (soot, dust, grains, etc.)
- Hydrocarbons

Tables 1, 2 and 3 show us that the emission pollutants from motor vehicles in Konya cause pollution in our cities, and the roads, bridges and sinkholes built for motor vehicles make the city soulless in the form of empty concrete structures, so a solution is needed for this. The solution lies in an ecological solution that will both improve aesthetics and eliminate pollutants. This is also in Irish Ivy.

According to Şahin (2014), taking into account the extreme habitat conditions and natural risks of plants, the approach of our country's plant species with the same templates should be abandoned and decisions should be made according to the variability in the components of local conditions and habitats. According to Çolak (2001), it is necessary to protect biodiversity, to secure important ecological processes and life-protecting systems, to constantly take into account the principle of continuity in benefiting from the ecosystem, and to fulfill the purpose of the "world strategy" in nature conservation. We too; In the light of this information, we can prevent the damage of polluting elements by preserving the aesthetic texture caused by transportation, which is a necessity of our lives, with Irish ivy, which consumes carbon and can survive with drip water, which we think will be sustainable and

increase the quality of life, and whose damage to concrete elements is prevented by stopping its root development with irrigation (Photo 1-2).

Foto 1. An example applied to a highway overpass.

Foto 2. A developing example applied to a highway overpass.

The architect of vertical gardens is Frenchman Patrick Blanc. Tüfekcioğlu (2010) states that the vertical garden architecture consists of 3 parts, and the PVC sheet construction provides stabilization and the roots are kept fixed in the area, which is made waterproof, and watered with a drip irrigation system. He stated that the plants do not suffer from water shortage with the drip irrigation system and do not damage the wall. He stated that vertical gardening can be easily implemented and can remain evergreen even as long as artificial lighting is applied.

CONCLUSION

No matter how ordinary the appearance, looking at cities gives a special pleasure. The image of the city in each individual's mind is different from himself. The appearance of cities and the image elements in people's minds are important. It should be important that the place be permanent in the mind, and the spaces and buildings should be in integrity. In other words, the identity and structuring integrity of the city is an important phenomenon for visual city elements (4).

When you look at the cities built by people, the houses they build to live in and the roads they build for transportation, construction, concrete and asphalt appear as civilization. What we lack is expressed as our aesthetic understanding (1). Then, we can make the highway sections, which we describe as sunken or bridged, more aesthetic. While doing this, we will increase our quality of life and evaluate the environment in accordance with the concept of sustainability.

We can list the results we will obtain by applying Irish Ivy as follows:

1. Pollutant gases caused by traffic density increase temperatures. The green areas and vegetation created have a temperature-lowering effect. Plants first absorb heat throughout the day and then remove heat through evaporation (5).

2. By combining urbanization with our aesthetic understanding, we can bring soul to cities.

3. Awareness will be raised to carry out studies and evaluations at the regional level in order to reduce the emission amounts of gases that cause greenhouse effect (global warming), which is the main source of climate change.

4. It will create aesthetic difference and beauty as it will reduce the monotony due to the density of buildings in the city center.

5. We will prevent the formation of heat island caused by emission pollutants.

REFERENCES

Aksu, C.2011 “Sustainable Development and Environment” GEKA action plan.

Akyürek,Ö.-Arslan, O.-Karademir,A.2013.Spatial Analysis of SO2 and PM10 Air Pollution Parameters with Cbs. TMMOB Geographic Information Systems Congress

Aytin, B.K.-Ovalı, P.K., 2016. Contributions of Roof Gardens to Urban Life. İnönü University Art and Design Magazine.

Çolak, Alper Hüseyin.2001.”Nature Conservation in the Forest (Concepts, principles, strategies, precautions)”, General Directorate of National Parks and Hunting-Wildlife, Ankara.

Elkoca, E. 2003. Air Pollution and Its Effects on Plants, Atatürk University, Faculty of Agriculture Journal 34(4) page 367

Göçen, İhsan.2011. Eco-Efficiency Approach to Carbon Dioxide (CO 2) Emissions of Land Transportation Vehicles. E-article.

Güçlü, Kamuran.1993.”Increasing the Green Texture on Highways”, Atatürk University Faculty of Agriculture Journal 24/1, Erzurum.

Han, Ergün-Kaya, Ayten Ayşen.2008.”Development Economics Theory and Policy.” Nobel Publications 6th edition.

Air Pollution Report.2023. TMMOB Chamber of Environmental Engineers.

Keleş, N.2017.”Reflections” e-book.

Kuşçu Şimşek, Çağdaş-Şengezer, Betül.2012. “The Importance of Green Areas in Reducing Urban Heating in the Istanbul Metropolitan Area”. Megaronjournal volume 7, issue 2.

Lynch, Kevin.2016. “City Image”, Türkiye İş Bankası Cultural Publications. 6th edition.

Müezzinoğlu, A. 1987. Principles of Air Pollution and Control 9 Eylül University publications Publication number: 0908.87.

Şahin, Abbas.2014.”The Effect of Vertical Distribution of Tree Species and Habitat Factors in Planning Forest Resources: Uludağ Example”.2. National Mediterranean and Environment Symposium.

Tüfekcioğlu, İrem.2010 “Gardens that Defy Gravity”, Geo-Turkey Magazine 12/10.

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Proposal for a Methodological Approach to Cultural Geomorphology Studies [1]

Halil Mesut BAYLAK[2] Tevfik ERKAL[3]

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ABSTRACT

In addition to determining, using and developing the advantages provided to human life by the formation of landforms and effective processes, addressing and solving the problems they cause is rapidly progressing. The way to examine the spatial distribution and changes of landforms with social problems and to find solutions should also be evaluated within this scope. Especially during the last two centuries, people have made an increasingly important impact on material transfer and changing landforms on earth, primarily through agricultural activities, mining and quarrying, and the construction of cities and roads.

With the study, the research methodology to be used in cultural geomorphology studies was established and a study technique addressed in four sections was determined. Within the scope of the suggestions, a mixed research method was used in the study. The geographical features of the research area were obtained using the quantitative research method. The data were subjected to meta-analysis and the definition of the area was carried out. Land observation and evaluation were made with the progressive and regressive research method study, and the existence of cultural areas and needs were revealed. With the help of the qualitative research technique, the theory of the concept of cultural geomorphology was developed, hypotheses were created, interpretations and generalizations were made.

Kültürel Jeomorfoloji Çalışmalarına Metodolojik Bir Yaklaşım Önerisi

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ÖZ

Arazi şekillerinin oluşumu ve etkili süreçlerin insan yaşamına sağladığı avantajların belirlenmesi, kullanılması ve geliştirilmesinin yanı sıra, bunların neden olduğu sorunların ele alınması ve çözülmesi de hızla ilerlemektedir. Arazi şekillerinin mekansal dağılımını ve değişimlerini toplumsal sorunlarla birlikte inceleme ve çözüm bulma yolu da bu kapsamda değerlendirilmelidir. Özellikle son iki yüzyıldır insanlar, öncelikle tarımsal faaliyetler, madencilik ve taş ocakçılığı ile şehir ve yolların inşası yoluyla, yeryüzündeki malzeme transferi ve değişen arazi şekilleri üzerinde giderek daha önemli bir etki yaratmışlardır.

Çalışma ile kültürel jeomorfoloji çalışmalarında kullanılacak araştırma metodolojisi oluşturulmuş ve dört bölümde ele alınan bir çalışma tekniği belirlenmiştir. Öneriler kapsamında çalışmada karma araştırma yöntemi kullanılmıştır. Araştırma alanının coğrafi özellikleri nicel araştırma yöntemi kullanılarak elde edilmiştir. Veriler meta-analize tabi tutulmuş ve alanın tanımı yapılmıştır. İlerici ve gerici araştırma yöntemi çalışması ile arazi gözlemi ve değerlendirmesi yapılmış, kültürel alanların varlığı ve ihtiyaçları ortaya konulmuştur. Nitel araştırma tekniğinden yararlanılarak kültürel jeomorfoloji kavramının teorisi geliştirilmiş, hipotezler oluşturulmuş, yorum ve genellemeler yapılmıştır.

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[2] Dr., Ministry of Education, Konya/Türkiye, hmesutb79@gmail.com, Orcid: 0000-0002-6369-5765.
[3] Prof.Dr., Çankırı Karatekin University, Çankırı/Türkiye.erkaltevfik@gmail.com. Orcid: 0000-0003-4435-7864

Entrance

The subject of cultural geomorphology is the landforms created by humans, whose origins and purposes are extremely different and constantly expanding. In a broader sense, it is the observation of the effects of landforms formed by natural processes or artificially on the physical environment.

On the transformations carried out by humans on the natural environment; Vitousek et al. (1986) presented a study on the fact that we have converted 40% of the forests in the world's habitable land mass into agricultural areas for agricultural activities in more than 20 years. Similarly, Ibisch et al. (2016) presented research on the land forms fragmented by the complex road network connecting cities or the ever-increasing population, for resource search and use. In addition, Winemiller et al. (2016) conducted important studies on the examination of changes caused by cultural activities with studies revealing the effects of the change processes in river basins and drainage systems due to the construction of dams that are underway or ongoing.

Szabo et al. (1993) emphasizes that human intervention, which is diversified directly and indirectly, on natural systems has intensified, and therefore almost every part of the physical environment is exposed to human impact. This intervention on the existing geomorphic system needs to be analyzed with a comprehensive approach and defined with a logical research goal. Today, human impact on the formation or development of landforms has become equal to other factors. Sherlock (1922) stated that a 7 cm deep layer was removed from a 30.5 km³ wide area of approximately 13.3 cm deep and the material was transferred to the territory of Great Britain, and Holdgate (1982) stated that 3x〖10〗^12 t of soil and rock mass was transported annually on Earth. This value is more than twice the annual total discharge of rivers, which is 2.4x〖10〗^10 t, according to Judson (1968). However, although all human activities change the appearance of the environment, not all of them can be considered as a subject of geomorphology. For example, high-rise buildings in residential areas affect the appearance of the environment. Because they create a contrast in terms of their size and features, but they do not fall within the scope of geomorphology. However, mounds and hills formed in ancient settlement areas are geomorphological elements.

1.The Concept of Cultural Geomorphology

There is still no definitive classification in scientific database and practical applications in geomorphology research. For this reason, a general definition accepted by everyone regarding the term geomorphology has not been established. The academic definition summarized as the changes in the solid outer shell of the earth as the main subject can be shortened as the scientific explanation of landforms and the processes that affect them. This explanation is the database development paradigm that is tried to be created for geomorphology in geography science (Mostafaei and Moshiri 2013, p.148). In recent times, determining settlement/application locations for civil, military and industrial projects or scenarios and practical application steps of settlements have increased the importance of geomorphology. Even ensuring its representation in three spatial areas (marine, coastal and soil geomorphology)

has led to the development of the rights and authorities of geomorphology (Drieu, 2006, p.1). In order to help develop these rights and authorities, it is necessary to evaluate all the concepts stated so far and to define and examine the relationship between geomorphology and humans in new approaches by going beyond this. This is the development of the concept of "cultural geomorphology" as a new idea in the development of a new field in geography based on the analysis of the elements that interact with each other. Geomorphology and human interaction at the environmental scale are best studied in environments with strong geomorphological traces of environmental changes and where human activity has been present for a long time (Knight and Harrison, 2013). On the other hand, cultural geomorphology is a discipline that studies the geomorphological components of a site that embody both a cultural presence of the natural environment and its interactions with the geological heritage. Geomorphology and the anthropogenic relationships that act as influences present a mutually integrated perspective (Sahariah et al., 2013). This perspective;

a. Geomorphology is a component of the geomorphological heritage (Geomorphosite) of a region.

b. It is the geomorphological context that changes with the components of some cultural activities of a region.

These perspectives address the cultural definition of the physical environment and conceptualize the natural environment that is being changed by human activities as a "cultural geomorphology area". In addition to the degradation of the natural environment by human interaction, these perspectives are much more suitable for understanding and adapting to human landscape interpretations. Considering these perspectives, the concept tries to discover the current situation of the areas that have developed with the adaptation of humans to geomorphology in terms of the protection of the cultural natural environment.

The characteristics offered by the natural environment take on a cultural dimension with the observation phase as the first step and offer a study object with strong educational effects to establish a new relationship between humans and nature (Panizza and Piacente, 2009). Therefore, it creates more awareness and sensitivity towards the concept of natural environment and culture and responsible and active participation in sustainable development (Wimbledon et al., 1996). The environment should be considered, understood, protected and evaluated as a cultural asset that can be evaluated in all its aspects. It is important to understand the environmental components and the evolution of the environment in depth and to choose the right protection and management initiatives.

1.1.Cultural Geomorphology Research

Humans have started to create their own cultural environment on the natural environment by adopting a settled life. As their knowledge accumulation increased, their needs have also increased and diversified and they have transformed into a structure that will put more pressure on nature, and the increasing pressure with the Industrial Revolution has gained momentum today. Humans have started to show their effect on the process directly or indirectly by increasing their effect on nature in proportion to the width of their cultural environment. They have benefited from the cultural area in the most way, this benefit has accelerated the formation on morphometry or has affected the formation by creating new morphological conditions foreign to the natural environment and has initiated new process formations.

For example; geomorphological unit is interrupted as a result of the land being split during highway construction. In the face of the new formation, the deformation process is triggered on the surface where the slope is created and the formation of new morphological units begins to make itself felt with the effect of the geological structure. Another example is the abandonment

of settlement areas. The settled units now completely become a pile and form an elevation (artificial hill). These mounds create new habitats or erosion surfaces specific to that area. In other words, even if interrupted, the process has started and continues.

The study of cities in the historical process has shown us that in the formation of landforms with geomorphological processes in these urban environments, human-induced areas often develop in natural processes.

High areas, unique climate and geographical conditions, rocks used as building materials and quarries have revealed settlements both in the open and underground. Changes in hydrographic networks such as excavation of elevations, filling of pits, terracing of slopes, construction of dams on streams, diversion of stream mouths or changing of their beds in these natural areas are examples of interventions that have continued until today in the areas where these ancient settlements began. In addition, advances made for defense or trade on the coasts, artificial lands collected, ruins formed, collapses or reconstruction in shallow cavities guide us in understanding the impact of humans on natural processes. Brandolini et al. (2019) defined this intervention as "human-driven processes over centuries" and emphasized that these processes represent the current outcome of each landform from multiple activities with "contrasting geomorphological" effects.

Coke (1976), Cooper et al. (2018) and Crutzen (2002) refer to the time when human impact on Earth and its geological record dominates natural processes as the "Anthropocene". Therefore, cultural geomorphology studies that require current understanding and evaluations in the theory and practice of this subject can address the definition of "Anthropocene".

Geomorphological research in the created cultural environment requires careful observation of the topography in this area. Information obtained from sources such as historical and geographical information and archaeological and geochronological (drilling records) is necessary to determine, map and express the chronology, including landforms that emerged or changed as a result of human activity. Therefore, the aim of geomorphological research in the cultural environment can be listed as follows:

a. To reveal geomorphological features that have an effect on the beginning of settlement and development in the following process.

b. To detect artificial landforms formed by human influence.

c. To evaluate the effects of human intervention on the geomorphological process.

d. To define current geomorphological assessment scenarios in different study cases.

Brandolini et al. (2019) determined that Anthropocene landscapes shaped by human-induced processes have been exhibited in Mediterranean coastal cities since approximately 3000 BC and especially in recent years, and that these human-induced geomorphological units constitute four main geomorphological change categories as drainage network changes, changes in the coastline, excavation and filling in slopes/valleys and streams/coastal plains, and artificial underground caves. Brown et al. (2017) mentioned that these process change categories should be evaluated as spatial and temporal changes "Anthropocene geomorphology", and Zalasiewicz et al. (2019) as "Anthropocene".

With cultural development, life, which was initially limited by the presence of waterways and topographic barriers, has turned to suitable areas with increasing demand with development, and has brought about various processes affected by humans, including reclamation works, flattening or erasing the topography, and filling of depressions. As a result, local sedimentation processes have become suppressed by anthropogenic proliferation and accumulation, which have higher growth rates, and have become activities that reveal mobility

with opposing geomorphological effects. The geomechanical properties of the soil are compromised by the diffusion of layers, reduce the resistance of the natural structure, and create underground voids, paving the way for the risk of collapse. Therefore, it has become necessary to determine the relationship between the functional use of the land for natural dynamics with an interdisciplinary study, and to identify and map the interaction of natural and human-induced processes with risk reduction measures for sustainable development.

As a result of all these evaluations; "What is the scope of cultural geomorphology, is it the study of man-made landforms?" questions should be asked. Of course, it is not only man-made landforms but also the estimation of the results of the disturbed natural balance, the interpretation of their beneficial or harmful effects and their explanation with an interdisciplinary approach, unlike environmental determinism. Protection of the environment is the promotion of the implementation of socio-economic tasks and the rendering of human-natural environment interaction meaningful. The cultural environment created by humans is in an area where natural processes are active and therefore will logically try to defend itself against these forces. However, this effort is aimed at preventing, reducing or destroying geomorphological processes. This situation is also an intervention in geomorphological evolution. It will either weaken or increase the process or cause it to change shape (Planation). Geomorphological development, defined as the lowering-flattening appearance resulting from the effect of erosion, is evaluated with the concept of planation. Sometimes, the structural activity it presents provides perfect harmony with nature and contributes to the functionality of natural components. Then the issue of protection will emerge. The complexity of human activity also causes thematic complexity of cultural geomorphology. Therefore, the discipline needs a clear systematization. In this context, Goudie (2007) explains planation with the example of filling a valley with debris and flattening a sand dune. He emphasizes that human intervention can be effective in both erosion and accumulation processes, and that this process, which occurs within the definition of planation, must be addressed.

Hale (1961), in his approach to systematize human activity based on its direct or indirect effects, includes direct effects (excavation, etc.) that lead to clearly identifiable results, and less identifiable indirect effects (acceleration of sedimentation) within the systematic scope of cultural geomorphology. Here, the following question immediately comes to mind: "Is the landform formed as a result of direct effects the clear purpose of human action or an inevitable effect?" In short, is it a primary or secondary landform? Szabo (1993) looks at this question in terms of its benefits to humans and gives the following example:

"Agricultural terracing on slopes is a primary landform, since the change in the slope character is beneficial to production. However, the accumulation of useless material in mining activities is a secondary landform." (Szabo, 1993)

1.1.1.Research Stages in Cultural Geomorphology Studies

The physical geography elements of a region and interventions made by humans on natural elements are the first source of information about geomorphology. The five stages mentioned by Panizza and Piacente (2008) in revealing the relationship between geomorphology and culture are recompiled for the study area and presented as research stages.

Stage 1: It can be expressed as the definition stage. It consists of the analysis of the structure of the study area and the expression of geomorphological evolution.

Stage 2: It can also be defined as the observation stage. It is the determination of interventions made by humans on geomorphology through cultural activities. It is based on field work.

Stage 3: It can be explained as the evaluation stage. Analysis of the cultural geomorphological area affected by geomorphological hazards and exposed to risk due to this in the study area. It is based on the evaluation of the data obtained through field work.

Stage 4: It is the modeling stage. It is the application of field risk analysis with progressive and regressive methods. This stage is the modeling of the effect of the use of cultural geomorphological assets on the natural environment and environmental impact. Stage 5: It can be summarized as the planning stage. It is the encouragement of correct action with positive returns in terms of both protection and improvement in terms of socio-economic aspects, where the correct management of the cultural geomorphological area cannot be separated from the knowledge of integration with the environment. It is the cataloging of "cultural geomorphosites" within the concept of geomorphological heritage.

2.Methodology in Cultural Geomorphology

Some studies conducted to evaluate the effects of human activities on geomorphological features show us that sediment is transported by “cultural denudation” at a higher rate than geological erosion on morphometry. A comparison should be made with denudation and sediment data in cultural lands, which is referred to as the “Geomorphological Footprint of Man” (Candrero et al., 2006). The perception of danger originating from the geomorphic footprint seems to be related to a growth (GDP) at local, national or global levels. Because increasing population, need, and use of technology cause geomorphic change affecting the sensitivity of the natural environment, acceleration of landscape evolution rates, and increase in geomorphological hazards. It is necessary to present a proposal to stop this geomorphic change and to regress the tendency to increase geomorphic disaster formation. Applied geomorphology, which is an extension of process geomorphology, addresses the effect of the geomorphological process on humans and humans on the process. Process geomorphology, which presents various models in the evaluation of this situation, contributes to the examination of the alarming problems accompanying human impact on the land. Therefore, the presentation of process geomorphology data and the conceptualization of human activity in the cultural geomorphological environment as cultural geomorphology should be the main theme. Cultural Environment: Concrete environments that are shaped according to the needs that form the basis of human lifestyle and social relations, and that display the production activities and consumption patterns in a simple manner. These environments become interesting with the rational interpretation of the qualities of geography and climate. They reveal their own characteristic features.Some studies conducted to evaluate the effects of human activities on geomorphological features show us that sediment is transported by “cultural denudation” at a higher rate than geological erosion on morphometry. A comparison should be made with denudation and sediment data in cultural lands, which is referred to as the “Geomorphological Footprint of Man” (Candrero et al., 2006). The perception of danger originating from the geomorphic footprint seems to be related to a growth (GDP) at local, national or global levels. Because increasing population, need, and use of technology cause geomorphic change affecting the sensitivity of the natural environment, acceleration of landscape evolution rates, and increase in geomorphological hazards. It is necessary to present a proposal to stop this geomorphic change and to regress the tendency to increase geomorphic disaster formation. Applied geomorphology, which is an extension of process geomorphology, addresses the effect of the geomorphological process on humans and humans on the process. Process geomorphology, which presents various models in the evaluation of this situation, contributes to the examination of the alarming problems accompanying human impact on the land. Therefore, the presentation of process geomorphology data and the conceptualization of human activity in the cultural geomorphological environment as cultural geomorphology should be the main theme. Cultural Environment: Concrete environments that are shaped according to the

needs that form the basis of human lifestyle and social relations, and that display the production activities and consumption patterns in a simple manner. These environments become interesting with the rational interpretation of the qualities of geography and climate. They reveal their own characteristic features.

Human beings carry out activities to sustain their lives by adapting to geomorphological elements that shape the natural environment. Thus, they create their own “environmental impact area”. New developments occur with human adaptation to the factors on the development of geomorphology and the elements that occur as a result of these events. As a result, all these interactions/changes create the natural environment. The results that emerge and their causes have positive or negative effects. Therefore, revealing the clear reflection indicators of human activities that affect geomorphological features in topography constitutes the main subject of cultural geomorphology. Analyses aimed at presenting concrete data are important in explaining the formation and development processes of geomorphological features.

Today, it can be evaluated that the impact of humans on nature and the impact of other geomorphological factors have the same importance. However, it is almost insignificant to compare the force exerted by humans with the forces of tectonic movements, volcanic activities and earthquakes, which are considered as the internal forces of the Earth. It would be a mistake to measure the human effect only based on the effect of external forces such as winds, glaciers, rivers, waves and currents. Because sometimes, topography can show more and faster activity and leave behind the forces that affect this process. The rapid increase in population eventually brings greater demands. In order to meet these demands, man begins to cultivate the earth much more. In fact, the population growth rate, which will continue a little faster in the future, emerges as a process.

For this purpose, changes in the control of the geomorphic system or the forces applied to this system depend on the balance between the affecting and affected forces in the "natural environment sensitivity concept" (This concept was proposed by Brunsden and Thomas in 1979). This balance refers to the direct effect on geomorphic processes, not on the characteristics of the environment (Thomas and Allison, 1993). As Brunsden (2001) stated, geomorphological evolution and material are formed by time and space changes resulting from the relationships between humans and the natural environment. Processes such as transportation, quarries, mining, ponds, settlement activities, agricultural activities, etc. provide direct or indirect effects on this evolution. Cultural geomorphology, on the other hand, presents an approach analysis to these relationships. This analysis is related to the dynamic factors affecting the natural environment evolution. The main subject of cultural geomorphology is to reveal the representation of the clear reflections of human activities affecting geomorphology in topography.

In order to understand cultural geomorphology, a methodology needs to be constructed regarding how the data will be produced and where the parameters will be placed in the morphological equation. In this context, the main basis of the cultural geomorphology methodology is to provide a clearer and more understandable expression with calculable models and mathematical formulas that will enable process analysis in terms of the functioning of the cultural process in the sample area and the development of geomorphological features.

In this context, as a first study:

1/25,000 scale topography and geology maps and 10 m resolution DEM data, satellite images and orthophotos should be analyzed in ArcGıs pro software to produce detailed data of the field (digital elevation model, geology, slope, river network, etc.). Satellite and orthophoto images should be used in mapping spatial change, and geomorphology and cultural geomorphology maps should be produced by supporting them with field observations.

As a second study:

In order to interpret the effect of human activities on the processes affecting geomorphological features and the units formed in the research field and its surroundings, the mathematical algorithm should be created using the "Potential Anthropogenic Geomorphology Index (PAJİ)" development and perception degree parameters created by Nir (1983). While the development degree reveals the human impact, the perception degree expresses the threats originating from human-geomorphological processes.

In order to reveal the relationship between geomorphological features and human activities, the PAJI formula given below can be used:

$$I=Up+DI/2x1/100x(Kc+Kr)$$

I: Potential anthropogenic geomorphology index

Up: Population rate

DI: Illiteracy rate

Kc: Climate type (Köppen)

Kr: Relief value

In order to evaluate the results of the formula above, Nir (1983) graded the parameter values between 0-1. If the result is less than 0.30, the effect size contains a low risk in terms of anthropogenic activities. If it is between 0.30-0.50, it indicates that the efforts to prevent problems can be evaluated, if a value greater than 0.50 occurs, it indicates that the anthropogenic geomorphology condition effect creates a problem to a large extent and that measures should be taken quickly to prevent problems. If the value is greater than 0.75, it can be concluded that the problems and risks of anthropogenic origin in the field are very high (Erkal, A. 2018, p.54).

PAJI parameters are considered to be a controversial source due to their inadequacy in fully explaining anthropogenic geomorphology conditions (Uzun, 2020, p.322). The fact that the relationship between anthropogenic conditions in the field and the illiterate population or the city/neighborhood population is very low and the levels of benefiting from technology, human desires and economic desires are at different levels cause an increase in anthropogenic pressures. The PAJI formula is preferred only in expressing the anthropogenic situation due to the presence of other factors that cause geomorphology to be re-evaluated in certain situations.

In the evaluation of geomorphological systems as shape and process structures, process-shape systems that interact with humans are considered as control systems. Rivers that are taken under control, protective structures against sea effects, coasts and organized caves can be given as examples of these systems. From this point on, except for the structure, humans affect topography or events within the scope of their developing knowledge and technology on process and time phenomena. Now, humans are an important factor of the Davis formula.

The geomorphological evolution of the natural environment is determined by the changes in landforms caused by erosion. Denudation-sedimentation is a strong determinant in the shape difference. This steady state causes the evolution to proceed at more or less constant rates. The rate of geological material transfer is accelerated by human activities directly and intentionally through excavation-deposition activities. Lu (2005) states that excavation and deposition activities indirectly cause material transfer, sediment supply and land evolution by developing natural processes. The activity becomes interpretable by modeling the evolution systematics of the field geochronologically. For modeling, it is necessary to access data with 3D laser imaging or sedimentation analyses of deformation and to create the model.

Since the time when humans started to engage in agricultural activities, they have exhibited some negative behaviors on the environment: consuming, destroying and polluting… This transformation and ongoing change has accelerated even more with the Industrial Revolution. The increase in the number of population continues, industrial activities are changing, developing and increasing with the developing technology. All these developments increase the pressure and threat on the natural environment. The activities that humans have put forward in the face of nature in order to adapt to the characteristics of nature or to continue living together have provided the formation of a cultural environment. People create a significant source of wealth with an effective feeling and a strong element towards these areas, explaining and introducing the living spaces they have created. People have conceptualized culture in order to convey their experiences and to ensure that the acquisitions they have gained are used to shed light on the future. Culture is important not only for the values possessed but also for providing opportunities for the learning and development of future generations. People leave cultural elements as a legacy for reasons such as protecting the natural environment they live in by keeping the beautiful feelings they experience alive. For this reason, it is important that the concept of cultural heritage is defined as "all material elements and intangible values created by previous generations and believed to have national and universal importance".

The culture of civilization is the sum of the products that occur by human activities disrupting or processing nature. Each element that embodies the cultural environmental characteristics of a region and the results of the interactions it presents is a cultural heritage. Based on this statement, the destruction in the natural environment has accelerated with the rapid increase in the population today. Great importance has been given to developing behavior at the international level against these threats. Ultimately, it has led to the emergence of the idea of environmental protection and natural heritage. In the face of the destruction and destruction of nature, the protection of the natural environment has become mandatory, the awareness of “cultural and natural heritage” has been created, and it has been agreed that the protection of values is a common problem of all societies/nations/states.

The research question “Can a geomorphological process caused by human activities in the natural environment be evaluated?” constitutes the main basis of cultural geomorphology studies. Within the framework of this basic question, is it possible for “change” to be defined and accepted by the geomorphology discipline, what is a “cultural geomorphological area”, what should be taken into consideration when evaluating, is there a counterpart to the concept of “culture” in the natural environment? Answers are sought to sub-questions such as.

The sub-hypotheses of cultural geomorphology research include the ability to apply cultural change to geomorphology in a historical perspective, to contribute to the equation between humans and the environment from a geomorphology discipline perspective, and to evaluate “Why should we build a geopark?” within the scope of the concept of “protection” for existing risks and dangers in the cultural geomorphological field (Baylak and Erkal, 2020).

3.Conclusion and Recommendation

It is necessary to define the geomorphological features that occur in the natural environment as a result of the culture created by humans, to establish the research methodology, to determine the subjects of interest, to reveal the research principles and evaluation methods, to explain the interdisciplinary approach and to determine its place as an applied geomorphology sub-discipline. The third stage is to evaluate the components of geomorphology in a geographical area as a cultural element and to examine their interactions. Cultural geomorphology elements, namely cultural geomorphosites, should be selected and evaluated, the cultural dimensions of landforms should be addressed and scientifically verified. In this context, the main methods of Cultural Geomorphology can be briefly stated as follows:

a) Geomorphological analysis: Obtaining quantitative and qualitative data to evaluate the hypsometric and lateral organization of the land surface and the morphological characteristics of geomorphosites. Here, structural and formal features and slope angles, etc. can be expressed. To evaluate the relationship between different environmental components and geological and geomorphological features.

b) Stratigraphic approach: To reveal geochronological data in order to reveal deformations occurring in the environment.

c) Paleogeographic analysis: To understand the origin and geological history of the components of geomorphosites.

d) Cultural geomorphosite definition: To interpret the effect of cultural environment activities on the development of structural features of geomorphosites.

e) Perceptual approach of cultural geomorphosites: To analyze educational and aesthetic perceptions.

The main research materials required for the use of the methods listed above are; remote sensing data (satellite images, multispectral data, SRTM etc.), 1/25,000 scale topography and digitized maps according to their subjects, geochronological evolution sections and morphometry analyses and field research data.

REFERENCES:

Baylak, H.M. ve Erkal, T. In critique of history, concepts and approaches on “why should we make geoparks?. American Research Journal of Humanities & Social Science, 3(12): 06-22/ 2020.

Baylak, H.M. Cultural Geomorphology of Kilistra (Gökyurt) Region, Konya. Çankırı Karatekin University, Institute of Social Sciences, 2023.

Brandolini, P., Cappadonia, C., Luberti, G.M., Donadia, C., Stamatopoulos, L., Maggio, D.C., Faccini, F., Stanislao, C., Vergari, F., Paliaga, G., Agnesi, V., Alevizos, G. and Monte, D.M. “Geomorphology of the anthropocene in Mediterranean Urban Areas”. Progress in Physical Geography (SAGE), 1:34/2019.

Brown, A.G., Tooth, S. and Bullard, J.F. The geomorphology of the anthropocene: Emergence, status and ımplications. Earth Surface Processes and Land-forms, 42:71-90/2017.

Brunsden, D. A critical assessment of the sensitivity concept in geomorphology. Catena, 42: 99-123/2001.

Cooke, R.U. Urban geomorphology. The Geographical Journal, 142 (1):59-65/1976.

Coper, A.H., Brown, T.J. and Price, S.J. Humans are the most significont global geomorphogical driving force of the 21 st century. The Anthropocene Review, 5(3): 222-229/2018.

Crutzen, P.J. Geology of mankind. Nature, 415: 23/2002.

Erkal, A. (2018). Anthropogeomorphological studies in Körfez District (Kocaeli). Bilecik Seyh Edebali University, Institute of Social Sciences, Department of Geography, Unpublished Master's Thesis, (Bilecik:2018).

Goudie, A.S. The human impact on the environment. 6th edn. Blackwel,Oxford 10 J. (England:2007).

Hale, G.A. The origin, nature and distribution of agricultural terracing. Pacific View Point, 2:1-40/1961.

Ibisch PL, Hoffman MT, Kreft S, Pe'er G, Kai V, Biber-Fredenberger L, DellaSala DA, Vale MM, Hobson PR, and Selva N. A global map of roadless areas and their conservation status. Science, 354(6318): 1423–1427/2016.

Knight, J. and Harrison, S. A land history of men: The ıntersection of geomorphology, culture and heritage in Cornwall, Southwest England. Applied Geography, 42: 186-194/2013.

Lu, X.X. Spatial variability and temporal change of eater discharge and sediment flux in the Lower Jinsha Tributary: Impact of environment changes. River Research and Applications, 21 (2-3): 229-243/2005.

Mostafaei, S. and Moshiri, S.R. Human culture and how it can be affected by geomorphology. UJRSET, 2(3): 148-152/2013.

Panizza, M. and Piacente, S. Geomorphology and cultural heritage in coastal environments. Geogr. Fis. Dinam. Quat., 31 (5): 205-210/2008.

Panizza, M. and Piacente, S. (2009). Cultural geomorphology and geodiversity. In: Reynard, E., Coratza, P., Regolini-Bissig, G. (Eds.), Geomorphosites. Pfeil Verlag, Munchen, pp. 35-48.

Shakouie, H. Philosophy of geography. Gitashenasi Publication, (Tahran:1995).

Sherlock, R.L. Man as Geological Agent. nSpencer,JE. (Witherby, London:1922).

Szabo, J. A Tarsadalom Hatasa a Földfelszinre (Social in pact on the Earth's surface). In: Borsy, Z. (ed.). A Halanos Termeszetföldrajz (Physical Geography);500-518. (Budapest:1993).

Uzun, M. Anthropogenic Geomorphology in Dilderesi Basin (Gebze-Dilovası): Changes, dimensions and effects". International Journal of Geography and Geography Education (IGGE), 41: 319-345/2020.

Vitousek, P. M, Erlich, P.R, Erlich, A.H. and Mason, P.A. Human appropriations of the products of photosynthesis. BioScience, 36: 368–373/1986.

Wimbledon, W.A.P. National site election, a stop on the road to a european geosite list. Geologica Balcanica, 26: 15-27/1996.

Winemiller, K.O. Balancing hydropower and biodiversity in the Amazon, Congo, and mekong: basin-scale planning is needed to minimize impacts in mega-diverse rivers". Science, 351: 128–129/2016.

Zalasiewicz, J., Water, C.N. and Williams, M. The anthropocene as a geological time unit. Cambridge University Press, pp. 382/2019.