EXAMINING THE LYCIAN SITES BY USING GIS

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
ARCHAEOMETRY

JANUARY 2006

Approval of the Graduate School of Natural and Applied Sciences

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ABSTRACT

EXAMINING THE LYCIAN SITES BY USING GIS

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January 2006, 120 pages

This study investigates the relationship between the ancient settlements (in Lycia) and physical environmental parameters including topography, rock and soil types using GIS. Modern settlements are also included in the study to analyze if the response has changed to these parameters from past to the present. The databases created in the study include three topographic attributes (elevation, slope and aspect), rock type, soil type, ancient settlements and modern settlements. Analyses performed in the study involve distance and density analyses of ancient and modern settlements, morphological analysis, distribution of ancient and modern settlements within the rock and soil types, and visibility analysis of ancient settlements.

Results of the analyses suggest that the ancient sites are located on the east, southeast, south facing and flat surfaces at slope values of 0 to 13 degrees within the elevation range of 0 to 1000 m. The average distance between the cities is 7 km preferably located over alluvium or limestone rock types with the soil types having thickness more than 20 cm.

A set of decision rules are derived from the ancient settlements using above mentioned data layers to predict location of unknown settlements. This analysis indicated a few locations along the Mediterranean coast.

Key words: Lycia, GIS, morphology, rock, soil

ÖZ

CBS KULLANILARAK LİKYA YERLEŞİMLERİNİN İNCELENMESİ

Aydın, Ervin Kenan
Yüksek Lisans, Arkeometri Bölümü
Tez Yöneticisi: Prof. Dr. Vedat Toprak

Ocak 2006, 120 sayfa

Bu çalışma, antik yerleşimlerle bu yerleşimlerin sahip olduğu topoğrafik, kaya ve toprak tipleri gibi fiziksel ve çevresel parametreler arasındaki ilişkileri incelemekte ve henüz lokasyonları belli olmayan antik Likya yerleşimleri için lokasyonlar önermektedir. Bu çalışmada modern yerleşimler de dahil edilerek zaman içinde bölge insanlarının yeni yerleşim kurarken dikkate aldıkları parametrelerin değişip değişmedikleri belirlenmeye çalışılmıştır. Çalışmada kullanılan veritabanı üç topoğrafik değer (yükseklik, eğim, bakı), kaya türü, toprak türü, antik yerleşimler ve modern yerleşimleri içermektedir. Çalışmada, antik ve modern yerleşimler için uzaklık ve yoğunluk analizi, morfoloji analizi, her iki yerleşim için de kaya ve toprak türlerinin dağılım analizi ve görülebilirlik analizi yapılmıştır.

Bu analizlerin sonuçları antik yerleşimlerin doğu, güneydoğu ve güney yönlere dönük olduğunu, eğimi 0-13 derece arasında kalan düzlüklere kurulduğunu, ve yüksekliklerinin 0-1000 m arasında değiştiğini göstermektedir.

Yerleşimlerin birbirleri arasındaki ortalama uzaklıkları 7 km'dir. Ayrıca daha çok alüvyonlu veya kireçtaşlı kaya tipleri ile kalınlığı 20 cm'den daha fazla olan toprak türleri tercih edilmiştir.

Bu analizlerin sonucunda bazı kurallar belirlenmiş ve tüm Likya bölgesi için bu kurallar uygulanarak yerleri bilinmeyen antik yerleşimlerin lokasyonları tahmin etmeye çalışılmıştır. Bu analizlerin sonucunda Akdeniz kıyısında bazı lokasyonlar belirlenmiştir.

Anahtar kelimeler: Likya, CBS, morfoloji, kaya, toprak

ACKNOWLEDGEMENTS

I would like to express my very special thanks to my supervisor, Prof. Dr. Vedat TOPRAK, not only for his endless support but also for his kindness and patience. From him, I have learnt much more than science...

And also, I would like to thank to my TNT friend, Deniz GERÇEK, for her valuable guidance and support.

Moreover, I would like to thank to the following people;

my dear FAMILY,
my love Aslı Ahsen TÜREDİ
my pal Alper DİNÇER
my colleque Ferhat AKÇİN
my friends in ERK-IT
my instructors in ARCHAEOMETRY department

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Lycia has always played an important role in the Anatolian history not only because of its beauty but also its ports which are important gates to Mediterranean Sea. At the history, most powerful civilizations have fought against each other to rule the land of Lycia but they have never been completely successful.

Lycia had a wide spread of culture and a deeper lifestyle than other civilizations that got jealous about them. It is said that many of the Greek gods were exported to Greece from Lycia which were taken from the culture of Hittites. Artemis and Apollo were born in Lycia; Zeus, the father of gods, fell in love with Leto, the mother of Apollo and Artemis. Hera, the jealous wife of Zeus, followed Leto and prevented her giving birth to the children whom belong to Zeus. Finally Leto gave birth to Apollo and Artemis in Patara in Lycia. (Barışcan, 1997)

Today the region is very popular with its beautiful beaches and archaeological background. The Lycia Land; Teke Peninsula, is one of the most touristic regions in Turkey.

1.1 Purpose and Scope

The main objectives of this study are: 1) to quantify the relationship between the physical parameters surrounding the ancient settlements and 2) to predict possible locations for unknown ancient Lycian settlements.

For the first objective three basic parameters are used. These are morphological setting of the settlements, the rock type and the soil type in which the settlements are located. Other parameters that can affect the location of the settlements are left out of the scope of the study. The main reason for this is the lack of the data for other parameters. For example, the water data is not used because 1) the water provided by the springs is not known, 2) for known springs the discharge (which is again not quantified) should be taken uniform that will lead into wrong results, and 3) the streams are not classified as “permanent” or “seasonal” and their discharges are not known. Therefore, water data at its present state can not be used for analysis.

For the second objective, the decision rules to locate an unknown ancient settlement will be derived from the common characteristics of the settlements that exist in the database used in this study.

Modern settlements are also included in this study to investigate the nature and the intensity of the change occurred in the region since the ancient times. They are not, however, considered in the determination of the decision rules to predict the unknown ancient settlements.

The study is primarily based on the compilation of the data available in the literature. There is no field study carried out to collect the data or to verify the data, particularly, for the ancient settlements. The reason for this is that, the purpose of the study is not to contribute data for the Lycian region but rather to develop a method that will examine the relationship between the data layers using GIS. It is also not a local study concentrated on a specific site. The highest benefit from this study could be obtained by its combined consideration with the previous studies about Lycia.

1.2 Location and General Characteristics of Lycia

Lycia is located in the south west part of Anatolia, between the Gulf of Fethiye and Gulf of Antalya, which is known as Teke Peninsula today. The south of the line from Antalya to Köyceğiz in the peninsula is called Lycia. Historically, Pamphylia was located on the northeast, Phyrgia and Pisidia on the north, and Caria on the west of the region as seen in the Figure 1.1 (Tüner, 2002).

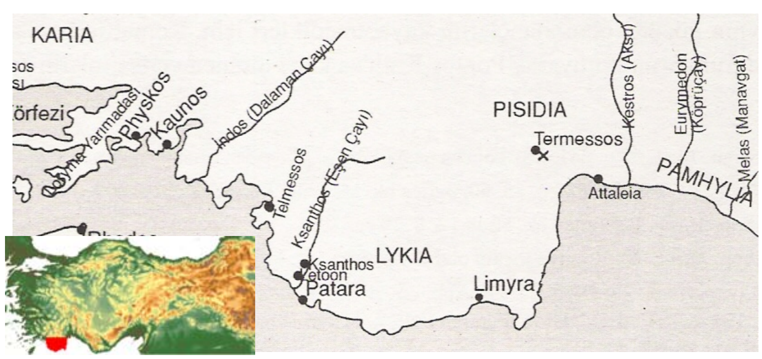


Figure 1.1 Location map of the study area.

Lycia is a small country that has few large plains. Three important mountain chains that lie along northeast-southwest direction affected the landscape of the area. These mountains are called from west to the east Boncuk, Akdağ and Beydağları involving Tahtalı Mass. They actually form the Toros Mountain's western part besides forming narrow plains. The highest mountain of the area is the Kızlar Sivrisi of Beydağları with its 3086 meters height on the south.

Rivers starting from these mountains flow towards south and they form alluvial plains suitable for agriculture and residence. The abundance of these plains and forest products contribute to the richness of the midland Lycia population, whereas marine trade is more important in coastal areas (Takmer, 2002).

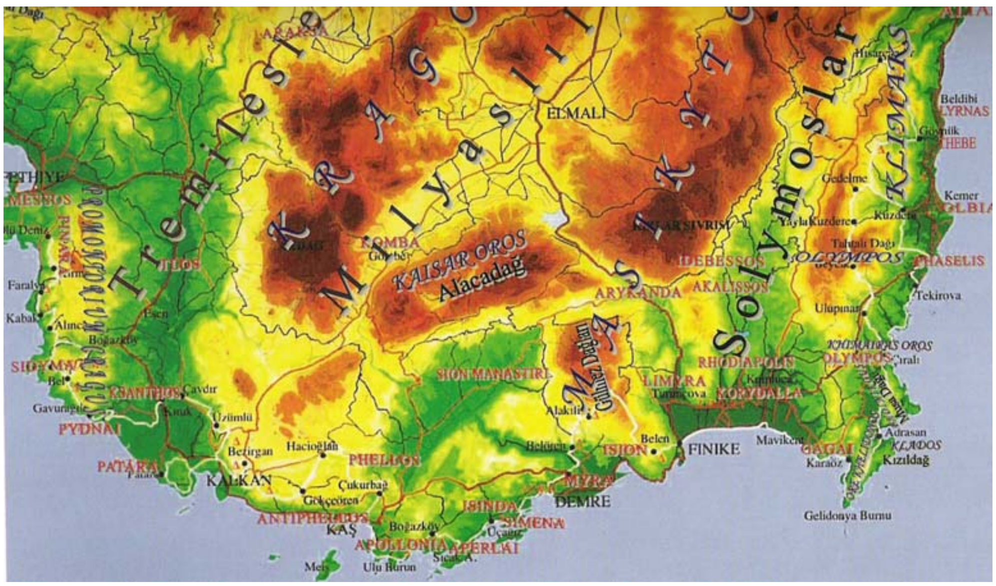


Figure 1.2 Geographical map of the study area.

Agriculture and marine trade were the two most important income sources of Lycia. Additionally, Telmessos wine was very famous and was exported to Italy. Most probably in the ancient times, Podalia Plain (Elmalı Ovası) was as rich as it is today. Xanthos valley was the center of cereal. The only industry known in that period was the mohair production used for manufacturing of clothes. Sponges found around Antiphellos area were believed to be good quality (Tüner, 2002).

The climate is typical Mediterranean climate with very hot summers and rainy winters. Temperature goes below 5 °C very rarely in winter. Vegetation is typical to

Mediterranean region due to the climate, where there are citrus trees in lower altitudes and pines and spruce in high altitudes.

Rivers, lakes and springs play an important role in Lycian geography, because of high mountain chains and heavy rainfall. There are mainly three rivers. Alakır River in eastern Lycia that formed the Alakır valley that lies between southern Telmessos in the north and Gagai and Finike nearby the coast. Eşen River (Xanthos) that comes from the Seki Plain, where the important cities of Middle Lycia began, forms Eşen Valley that lies till Patara. In western Lycia, Dalaman River (Indos) is a border line between Lycia and Caria, and formed a long and deep valley. To the north in Milyas, Akçay river (Aedesa) feeds Elmalı Valley. Most of them were used in trading, fishing and harboring in the ancient period. Less than thirty water sources from Lycian times still exist today (Onur, 2002).

The capital city of Lycia was Xanthos, which is famous for its heroic wars and lies close to Xanthos Valley. Population in ancient Lycia is believed to have been 200.000. Even the population today is not very high due to the mountainous structure of the region.

Lycians were always different from the other civilizations in ancient Anatolia. Lycians, who were very fond of their freedom, did fight back to foreigners who wanted to invade the region. It was the last civilization to be conquered by the Roman Empire in the Asia Minor. They had their own language and special characteristics, which has not been completely deciphered yet.

Herodotos claims that Lycians came from Crete. Lycians appear in Greek Literature with Iliada of Homer. It is said that they came from far Lycia and Xanthos of Anaphor and fought on the same side with the Trojans in the famous Trojan War.

Their most important contribution to history is the federation they established, the importance of which increased in 167 B.C. According to the rules of the federation, each Lycian settlement had the “polis” status. These cities were administered by the public and a committee formed by civil servants chosen in public meetings. They made their own law and they tried to be self sufficient as much as possible. They were dependent upon the ruling power (eg. Hellenistic Kingdom) in foreign affairs. They had to pay tax and provide land and sea power to the ruling power. The city tried to settle its local, economical and social matters itself independently (Akdoğu and Ebru 2002).

The western world learned Lycians from the Roman historian Strabo. The famous French writer and government system philosopher Montesquieu praised the federal structure of Lycia in his book “De L’Esprit Des Lois” (About Spirit of Rules) in 1748 and showed it as a model for “Republique Federative”. Lycian federal government system was used as a propaganda tool in 1787, during a campaign of American Federal State Constitution (Lehmann, 1983).

Pliny says that there were about 70 cities in Lycia, but later this number decreased to 36. However, the settlement ruins found shows that the number was much more. Strabo says that there were 23 cities, which had rights to vote in the federation in 100 B.C. The most important cities, Xanthos, Patara, Pınara, Phaselis, Myra, Tlos and Olympos had 3 votes, less important cities had 2 votes, and the smallest ones had 1 vote. Taxes were also shared using the same system. Lycian Federation survived during the Roman Empire period as well. According to Strabo, war and peace decisions were done by the Empire, but domestic decisions, law and security were maintained by the Federation itself.

Graveyards, the most important and famous structures of Lycia dates beyond Alexander the Great. Most of them are well protected and even remain today without much destruction. It is known that in ancient history the ancestors were highly respected. The writings on the graves usually aimed to prevent thieves from damaging the graveyard and sometimes included curses (Bean, 1998).

1.3 Software packages used

Following software packages are used during the study

Software	**Purpose**
TNT Mips 6.8	Digitizing and Analysis
Mapinfo 7.5	Digitizing and Analysis
Global Mapper	Generating Visibility Analysis
Microsoft Excel	Building Charts
Macromedia Freehand 8	Drawing figures
Golden Surfer	Generating density maps
Adobe Photoshop	Organizing Pictures

1.4 Organization of the thesis

Rest of the thesis is organized as follows:

- Chapter 2 describes and introduces GIS used in the archaeological studies.
- Chapter 3 is a review on literature of Lycia.
- Chapter 4 describes the data used and created in this study.
- Chapter 5 explains the analyses and their results obtained in this study. This part is the main pat of the thesis in which a model is developed and the results are obtained. Prediction of the sites are made also in this chapter.
- Chapter 6 discusses the various aspects of the thesis including the data used and the results obtained.
- Chapter 7 summarizes the main conclusions reached in this study.
- Appendices modern settlement data (Appendix A), results of distances between ancient and modern settlements (Appendix B), between ancient settlements (Appendix C), and between modern settlements (Appendix D).

CHAPTER 2

GIS IN ARCHAEOLOGICAL INVESTIGATIONS

Geographical Information Systems (GIS) became a widely used technology in the recent years which can be used in all disciplines from forestry and sewerage management to flood control (Wheatley & Gillings, 2002). GIS can be considered a general discipline so that it can be adapted to every specific field very easily from planners to geographers, economists to archaeologists. A common definition of the term can be made as "an information system designed to work with data referenced by spatial or geographic co-ordinates and involves powerful set of tools for collecting, storing, retrieving, transforming, and displaying spatial data from the real world for a particular set of purposes" (Burrough, 1986; Star and Estes 1990; Wheatley and Gillings, 2002).

Marble (1990) examines Geographical Information Systems by dividing into some application areas;

1. Data Entry: While translating raw spatial data, data entry handles all of the related tasks.

2. Spatial Database: It stores spatial, topological and attribute data and maintains links with external database systems.

3. Manipulation and Analysis: makes spatial analysis and modeling.

4. Visualization and Reporting: Shows the results and analyses the maps in text form.

The main difference of Geographical Information Systems compared to the other mapping and drawing systems is the spatial database. It holds a collection of spatial data which are organized in group of layers so that each group of data holds different characteristic of study area.

Working with such kind of layers is very efficient while using lots of kinds of data sets. For example, a typical map shows all roads, rivers, lakes on the same sheet, whereas a Geographical Information System collects data in the form of group of layers so that roads, rivers and lakes are resembled on different layers. While roads are situated on one layer, rivers are on another and lakes are on another layer. This kind of simple working with layers leads to easy data handling, editing, analyzing and problem solving.

2.1 GIS in Archaeology

Archaeologists have been aware of the importance of spatial data in archaeology for a long time. In 18th century, precise maps and plans were produced and locations of the finds were marked on these maps and plans. Although these marks can be considered as precise for those days, they had some errors which affected archaeological researches in a very bad way. However, there was no way to reduce such kind of errors during those days.

Over the last 40 years, the quality of the spatial data that has been collected, increased enormously by the help of the new surveying techniques and equipments but these techniques remained insufficient in detailed work.

Scurry (2003) claims that model integration in GIS researches started in 1993. According to him between 1986 and 1992, only 42 studies were carried out but between 1993 and 2001 the number increased to more than 250. Today, GIS based applications are wide spread and they cover various fields including;

- Atmospheric and Global Climate Change
- Hydrology and Water Quality
- Species and Habitat Suitability
- Landscape Ecology and Biodiversity
- Natural Resource Management
- Land Use and Infrastructure Planning
- Land Use Change
- Topography and Geomorphology
- Hazard and Impact Assessment
- Agriculture and Soil Erosion
- Archaeology and related fields

In the recent years, due to the development in computer software and hardware technology, the use of GIS was also considered by most archaeologists. Global Positioning Systems and Total Stations are now used instead of traditional techniques and these tools make archaeological researches much easier. Although recent applications are sophisticated examples of GIS, the earliest ones were not more than simple mapping exercises. According to Woywitka (2002), many contemporary archaeological GIS examples do not contain a spatial analysis component and these undertakings are commonly criticized for not realizing the “full analytical power” of GIS.

In Turkey it is difficult to say that GIS has been commonly used in Archaeology. At most sites, still traditional techniques are being used. Most of the archaeological data obtained still stay local and is difficult to access.

2.2 Prediction of Ancient Settlement Locations by Using GIS Methods

Settlements are not distributed randomly on earth, instead some locations were preferred by people to live and some were not. People chose the locations of their settlements according to the environmental and cultural conditions that they have faced.

Some of the soil types are preferred more than the other soil types. Climate and vegetation gets important in such kind of preferences as well as being close to water resources, topography and the rock types of the area to settle. For the new settlements, sometimes able to be seen from distance locations are advantage and sometimes this is a very big disadvantage, for example, against the pirate treats.

The information about all of these factors forms up the thematic layers that will be used in GIS approach in this study. After analyzing the whole area by means of these thematic layers, some other potential locations will be identified which are suitable to settle. It is possible that ancient people identified and used these suitable locations to settle in the history, so that by identifying these locations, some other ancient settlement locations will be identified.

The acceleration in the speed of modern computers and sophisticated calculations in GIS leads to such kind of studies to grow rapidly. In the recent years, lots of studies were done about the prediction of the ancient settlements by using GIS as a tool.

Today, processing the pre-known data of the ancient settlements and using this information to find the locations of other ancient settlements by using GIS methods is known to be predictive model in archaeology. According to Reid (2003), predictive models are some kinds of maps that show the probability of the pre-found archaeological materials varying over the whole landscape.

Empiric correlative models work by correlating the locations of a sample of sites with environmental features and forecasting the locations of other, unknown sites in areas that are similar environmentally (Kohler and Parker 1986)

It is a very big necessity to identify, protect and manage the increasingly threatened resources in a cost-effective and a useful manner (Duncan and Beckman 2000) and a fraction of the millions of sites in the new world has been discovered till now (Warren and Asch, 2000).

According to White (2002), primarily in Europe and to a lesser extent in North America, GIS has been used by archaeologists to study site catchments, trade networks and migration, borders, as well as many other uses.

In the recent years, the research in the field of prediction of archaeological settlements increased greatly. However, such a study has not been conducted in Lycia. This study will be the first one and hopefully will lead to some other similar studies.

Dolanski (1997) claims that there are two types of modeling used in archaeological site prediction: deductive and inductive. In deductive model, the archaeologists have preexistent theories and assumptions about specific site locations. These potential sites can be weighted by archaeologists according to these theories. In inductive model, archaeologists have observations and the model depends on statistical analysis. Potential sites are defined at the final stage of these analyses. These two types of modeling are distinct, but they are both used by archaeologists.

Tilton (1998) attempted to identify areas likely to contain Fremont and Late-Prehistoric Period Archaeological Sites in Utah's West Desert using GIS. The study indicated that the location of Late-Prehistoric and Fremont Period archaeological sites were influenced from the environmental variables such as elevation, slope, relief, distance to water, and distance to pinon pine. These variables were then used to predict similar sites. At the final stage of the map, high, intermediate and low probability areas were detected that might have contained archaeological sites.

Premo (2001) presented a predictive archaeological model of Late Archaic Period site locations in the Tucson Basin using multiple logistic regression and GIS. The statistical results of the regression analysis indicated that three environmental variables, elevation, path distance to "reliable" water sources (streams), and path distance to arable landforms, influenced Late Archaic Period site placement. The spatial results highlighted Tucson Basin land parcels that were likely to contain Late Archaic Period sites based on empirical relationships between known site locations and environmental variables in surveyed areas.

Krist (2001) used multi-criteria/multi-objective predictive models constructed within a GIS to predict the location of archaeological sites. It is claimed that, such models often lack explanatory power and are unable to identify the range of behaviors occurring at the archaeological sites they locate. Making use of the multi-criteria/multi-objective decision support tools found within the GIS environment, the research presents a model for simulating behaviors resulting from the decisions hunter/gatherers make about resource use and settlement placement. Thus, the model is able to predict what types of sites or activity areas should be expected within a region based on a hypothesized hunter/gatherer adaptive strategy.

Whitley (2000) examines a small part of the complex cultural system manifested by prehistoric and historic hunter-gatherer groups in the Greater Yellowstone Region of Wyoming, Idaho, and Montana. A model has been constructed to define the motivations underlying the decision of selecting new settlement locations. Accordingly, the model can be applied both to prehistoric and ethnographically known groups within the context of changing ecological, economic, social and political situation.

Premo (2001) predicts the late archaic site locations in the Tucson Basin by using GIS. The results showed that elevation, distance to water sources and distance to landforms influenced Late Archaic Period site locations.

White (2002) shows how GIS can be used to map changing prehistoric site attractiveness over time. The study deals with spatio-temporal archaeological site prediction which is much more difficult to build compared to non-spatio temporal archaeological site prediction models.

Woywitka (2002) draws the attention to the archaeological site location data that form the primary data source for many archaeological GIS applications including database management, locational analysis and site predictive modelling. Using a sample of archaeological site location data from the Cypress Hills region of southeastern Alberta, archaeological GIS applications are examined from a data quality perspective, assessing the suitability and effects of archaeological site location data use in GIS. This assessment of the ambiguities and compatibilities between archaeological site data and the requirements/limitations of GIS provides another approach with which site predictive models and other archaeological GIS applications can be refined.

Reid (2003) developed archaeological site predictive models in three watersheds in the south and southwest of the Trinidad (Cipero, South Oropouche and Restnorth) on the basis of GIS weights of evidence. The models are based upon weights of evidence analysis of prehistoric archaeological sites and their areal association with themes such as landform, relief, soils and land capability. The study suggests that archaeological sites are likely to be found in areas with hilly relief, land capability characterized by either fairly good land or land unsuitable for agriculture due to slope and/or water limitations, upland landforms and in areas with "free internal drainage soils" along the south coast of the island.

Scurry (2003) showed that the environmental parameters like soils, slope and aspect influenced the archaeological site locations in the South Carolina Coastal Plain. The analyses also indicated that these parameters were useful to identify potential site locations for not only a specific period, but also, valid for all period sites for the region and used as a general site location model for the Coastal Plain.

Branigan (2003) analyzed Alvord Region of the Northern Great Basin by using GIS, after examining the archaeology of the region within the context of the current archaeological records. This study is a good example to illustrate how GIS may be able to shed new light on previous work from a landscape perspective. The results show that hunter/gatherers in this region did not perceive its landscape just as a simple economical fabric, instead the other important options were considered as well and these options affected people deeply while locating their settlements.

Williams (2004) claims that incorporating archaeological data into catchment analysis is an effective strategy to develop regional models of prehistoric site selection and settlement patterns. He applied the model to the Upper Trinity River Basin of North Central Texas. GIS software is used to build the site catchment areas for archaeological sites and to implement multivariate statistical analyses of physical and biological attributes of catchments.

Bond (2004) uses Historical Resources Impact Assessment reports and interviews with archaeological experts to analyse the development and use of predictive models in northeastern Alberta. Although the models in general result in the discovery of hundreds of archaeological sites, a carefull examination indicate that certain mistakes occur in the outputs. The mistake occurs particularly if the previous site location data are used because the previous survey methods used to locate sites and are therefore biased. Therefore, areas other than those considered to have high potential for archaeological resources have been neglected. By neglecting low and moderate potential areas, the results cannot be critically evaluated. The research recommends that post-impact assessments or monitoring of the area during developments could improve our understanding of low and moderate potential areas.

McClenahan (2004) examines the archaeological, ethnographic, and environmental record bearing on the lifeways of the people of the central Alaska Penninsula during the past 1,000 years. The primary focus is on creating and testing predictive models of subsistence-settlement behavior of the inhabitants of the Penninsula, in order to determine which location model or models have value for predicting habitation sites on the central Alaska Penninsula.

CHAPTER 3

REVIEW OF LITERATURE ON LYCIA

3.1 History of Lycia

According to the Hittite sources, Lycians were one of the oldest inhabitants of Anatolia whom they called "Lukka" meaning Lycians. In the middle of 14^{th} century B.C, Lycia was conquered by Hittites. Around the same time, Egyptian sources show that "Lukka" are "the people of sea" (Önen, 1997). The earliest settlement in Lycia from the Early Bronze Age (2600–2200 B.C) was discovered near Elmalı by Mellink in 1963. It is certain that Lycians fought together with Troy in Trojan wars in 12^{th} century B.C, under the leadership of Sarpedon. Their heroic fight became a legend in Anatolia.

> "I have come a long way from here to help
> I have come from the distant Lycia and the eddying Xanthos,
> where I settled my dear wife, child and
> enough business and personal effects
> to make the poor and destitute salivate in ancientipation.
> Once again, I have taken the Lycians into battle
> Look, and you will see me out in the very front" Sarpedon (Akşit, 2002)

These words belong to Sarpedon, the leader of Lycians, when tried to encourage Hector, the Prince of Trojan during the Trojan wars.

After the Lydians were defeated by Persians in the year of 546 B.C, an army was sent to Lycians under the command of Harpagus. Lycians fought against Persians with a heroic way in Xanthos and instead of being captured they decided to commit a mass suicide.

> "We have turned our homes into graves and graves our homes,
> Our homes, destroyed, our graves plundered
> We climbed the highest peaks and burrowed underground,
> We remained underwater,
> They came and found us, burned and destroyed us,
> We, who have preferred mass suicide for the
> sake of our mothers, our women and our dead
> We left behind a pyre of people to this earth, a
> pyre that doesn't burn out and won't do so in
> the future." (Akşit, 2002)

However, Persians treated Lycians with respect so that Lycians were able to rule their land. Later, Lycians sent a large number of ships to conquer Greece to help Persian navy in 480 B.C. During the war between Athenians and Persians, Persians were defeated and the Athenians founded the Delian League. Lycia contributed to the confederacy but could not be a member for a long time, because Athenians were defeated by Sparta and Lycia was ruled by Persians again.

In the year 333 B.C, Alexander the Great conquered most of the Lycian cities. After the death of Alexander the Great, one of his generals, Ptolemy, declared himself as the king of Egypt. He dominated Lycian cities and started to Hellenize them. During this period, Lycian language changed to Greek and their culture was fully adopted.

In 189 B.C, Lycia was taken by the king of Syria, but afterwards he was defeated by the Romans with the help of Rhodians. Lycians never accepted the domination of Rhodians and fought them until 167 B.C. In this year, their independence was given back by the Roman Senate because of the mutual good relations. This period was the most powerful period for the Lycian Federation when 23 cities united together including Tlos, Xanthos, Pınara, Patara, Myra and Olympos each of which had three votes. In addition to these cities, Anthipellos, Aperlae, Arycanda, Candyba, Cyaenai, Limyra, Phellos, Rhodiapolis, Sidymae, Telmessos, Araxa and Podalia were the members of this federation.

The good relations between Federation and the Romans lasted until Brutus came to region who tried to raise money for his struggle with Romans. Lycia refused to pay Brutus, who in return destroyed Xanthos. Under the control of Emperor Claudius, Lycia became a part of the Roman Empire and this gave Lycia more power and wealth.

In the 4th century A.D, the decline began because the province was divided by Diocletian. The Arab raids in 7th century A.D destroyed the Lycian cities.

3.2 Archaeological Studies in Lycia

The importance of Lycia was understood during the 17th century and after these years, archaeologists, especially from Germany, France and Austria, started to come to Lycia to learn more about the region. These archaeologists started surveys and excavations in the region immediately, and around 1970's, Turkish archaeologists and epigraphists started their studies in the region. Afterwards, firstly in Arykanda and Telmessos, these Turkish scientists submitted scientifically recognisable papers.

Xanthos is the first settlement excavated scientifically in Lycia. In 1950, Demargne started the excavation here.

Patara is the second ancient settlement that was excavated completely by Turkish archaeologists in Lycia. During these years, Archaeology Department and Lycia Research Center was founded in Akdeniz University (Antalya).

A monument called “Stadiasmus Patarensis”, was found in Patara in 2002 and has a special importance not only for the Turkish scientists but also for the whole world. Locations of the settlements were written by the unit of stadiasmus on this monument so that it still has a deep attraction for the archaeologists dealing with Lycia.

Choma is one the most important settlements for Lycia which was firstly surveyed and then excavated by Özgen (Özgen, Öztürk, Kaptan, 1999). It is going far back to the beginning of 3000 B.C and as Özgen declared in “Excavation Results Symposium” in Ankara, it was settled till the end of Early Byzantine Age.

Besides Choma, Semahöyük, another very important settlement in Lycia, dates back to Calcolithic period was excavated by Mellink.

It is almost certain that some other settlements were present besides Semahöyük and Choma in Lycia in the prehistoric times. Some artifacts were found near Fethiye which belongs to the Calcolithic period and Bronze Age. Although Lycia is thought to be rich with its prehistoric and protohistoric period settlements, it is a very big disadvantage that the excavations for these periods are still very rare.

Although many settlements have been excavated till now, it is hard to give detailed information about the GIS usage during these works. In most of the publications of these excavations, a little explanation was found about GIS work done. Most of these excavation studies stay local, and it would not be wrong to say that there is no research done till this study, handling ancient Lycian settlements together.

3.3 Ancient Settlements in Lycia

During the history, many of settlements were built by the people in Lycia according to their needs. Some of them remained locally, however others grew much faster due to their increasing importance.

The total number of the ancient settlements compiled during this study is 78. However some of these ancient settlements are not considered in this study due to the reasons explained in the data chapter. The whole list of ancient settlements that are compiled in this study can be found in data chapter. A short description of the settlements that are included in this study is given below;

Fig 3.1 Map of ancient settlements in Lycia region

1. Telmessos (Fethiye): Telmessos is situated in the close vicinity of Fethiye. Ancient money found in Telmessos belonging to the 5th century B.C is strong evidence that history of Fethiye stands back till that time (Umar, 1999).

2. Karymlassos (Kayaköy): There is not much information about the history of Karymlassos, which is situated 8 km southwest of Fethiye. Many artifacts belonging to pre-Hellenistic and Hellenistic period were found in Karymlassos (Umar, 1999).

3. Pınara (Minare): Pınara ruins are close to Minare Village of Eşen Town of Fethiye. There is not much known about its history. Menekrates from the neighbouring city of Xanthos, who lived in the 4th century B.C, tells that Pinara was built by people who left Xanthos due to high population. According to Strabo, Pınara was an important city in Lycia and had 3 rights to vote (Umar, 1999).

4. Tlos (Kale-Asar, Düver): The ancient city of Tlos is close to Kemer village of Fethiye and is established on Eşen River valley. According to Strabo it was one of the 6 biggest cities of Lycia. Being on the trade routes at the earlier times, Tlos became an important city of Lycia. Later, with the changing economic geography, the city lost its importance. The city maintained its existence throughout the middle ages (Umar, 1999).

5. Xanthos (Kınık): Xanthos, situated in Kınık village between Fethiye and Antalya, was one of the most important settlements in Lycia region. Famous for its heroic support to Troy in the Trojan War, the city had been the political and religious capital for a long time. Homeros, the famous historian, tells much about Xanthos and Xanthosians in Iliada and gives information about Sarpedon and his important role in the Trojan War.

Although Xanthos was founded around the Second Millenium B.C, it is believed to be settled permanently only after 8th century B.C (Bayburtluoğlu, 2004). Findings from Xanthos were carried to British Museum by Sir Charles Fellows in 1838. The most important historic event in Xanthos known today is the heroic defense against famous Persian leader Harpagos in 546 – 545 B.C. During this war, Xanthosians burned their wifes and children with their valuable goods after understanding that they were about to lose the war. After burning their families, they came up together and attacked the huge Persian army to die. At the end of the war, all the population in Xanthos was destroyed except only 80 families out of the city borders who survived this terrible war (Umar, 1999).

In 167 B.C, Lycian Federation was built and Xanthos got a very important place in this federation with other important Lycian cities like Pınara, Patara, Tlos, Myra and Olympos. These most important cities had three votes in the federation, unlike Isinda, Apollonia and Aperlai had right to one vote each. Moreover, Idebessos, Akalissos and Kormos, three settlements together had one vote in total. In Sulla period, settlements in Kybiratis region were accepted to have two votes. It should be noted that during the Lycian Federation, founded by Lysanias and Eudemos, Xanthos was the political and religious capital of the whole Lycian region (Bayburtluoğlu, 2004).

6. Letoon (Bohsullu): Letoon was situated near Kumluova village in Eşen, Fethiye. It was a religious center more than a settlement, and served all Lycian settlements.

Archaeological studies have been carried out by French archaeologists at the site since 1950 (Bayburtluoğlu, 2004).

7. Patara (Gelemiş): Patara is set on the way between Fethiye and Finike and is very close to the Ovagelmis Village of Kalkan City. Herodotos tells about Patara while explaining the famous Apollo temple but he does not give any detailed explanation about its history. Additionally Strabo mentions Patara. The city was an important marine city of Lycia and it has been excavated by Prof.Dr.Fahri Işık since 1990's. Recent findings prove that the history of city goes back to 2000 B.C and they provide lots of information on Lycia. The monument called "stadios or milliarium lyciae" carrying emperor Cladius' statue shows the distances of other cities to Patara (Bayburtluoğlu, 2004).

8. Antiphellos (Kaş): Antiphellos means "opposite of Phellos", which is actually the case. Today it is called Kaş. There is no information about Kaş's ancient history however the ruins found in 1952 show that it was an unimportant and small settlement in 4th century B.C because it was very close to Phellos. Later on, this situation had changed; Antiphellos became a developed place because of its important port, while Phellos became unpopular (Umar, 1999).

9. Tyberissos (Tirmisin): This city is close to Çevreli Village between Kaş and Demre. There is no information about its history (Bayburtluoğlu, 2004).

10. Teimoussa (Üçağız): Teimoussa is around Üçağız Village. According to an inscription found there, it was a village rather than a city. There is no significant evidence around that area (Umar, 1999).

11. Istlada (Hayıtlı): There is no information on the history of Istlada, which was located in Kapaklı Village of Southeastern Hoyran (Bayburtluoğlu, 2004).

12. Kyaneai (Yavu): This ancient village lies 30 km west of Kaş and 20 km east of Demre. Pausanias gives interesting information about a pool and a spring source. According to legend, who ever drinks the water from these sources, gains the ability to forecast the future. There is not much information on the history of Kyaneai (Bayburtluoğlu, 2004).

13. Trysa (Gölbaşı): Trysa was set around Yavu between Kaş and Kale. It is known that the city has a history till 5^{th} century B.C. An important archaeological monument, Heroon, which was discovered in 1841 by Austrian Schönborn, was carried 866 meters with wooden sleds towards the shore by Otto Berndorf in 1882-1883. Today, whole Heroon is being exhibited in Vienna Museum. Trysa is another city with little information about it. It was captured by Limyra chieftain Perikle in the 4th century B.C. In the 2nd century, Trysa was one of Lycia Federation cities (Bayburtluoğlu, 2004).

14. Myra (Demre): The ancient settlement Myra is now Demre village of Antalya. The city has no important historical event. It was not even mentioned on ancient inscriptions at all. The most important information to tell about Myra is that St. Nicholas church is there. The church was built in the early Christian period and restored in 1043 by Emperor IX Constantine. It is believed that St. Nicholas was buried inside the church (Bayburtluoğlu, 2004).

15. Andriake (Çayağzı): Andriake was the exterior district of Myra rather than a city in Lycia. Andriake, which was known as port of Myra at that time, developed and gained city status (Umar, 1999).

16. Limyra: The ancient city of Limyra was located 4 km northeast of Finike. It was a port city in ancient times, set on the south foot of 1700 m high Tocak Mountain next to a very fertile plain used for agriculture today. This plain was part of the sea at that time. There is little information about the history of Limyra. According to the information gathered from inscriptions, the origin of the city goes back to 5th-6th century B.C. Lycian Perikles' name is found on Limyra currencies that belong to 4th century (Bayburtluoğlu, 2004).

17. Rhodiapolis (Hacıveliler): Rhodiapolis, which is in Hacıveliler village on the way from Kumluca to Fethiye, is called Eski Hisar (Old Castle) today. According to the ancient writer Theopompos, this city was founded by Amphilokhos after the Trojan War. He was the leader of pre-Hellens who moved to the Mediterranean coast after the war. He gave his daughter's name, Rhodia, to this unimportant and small city (Bayburtluoğlu, 2004).

18. Korydalla (Kumluca): This city is near Kumluca. There is not enough information about its history and not many ruins are recovered (Bayburtluoğlu, 2004).

19. Gagai: Gagai was set east of Finike Bay, 10 km northeast of Kumluca, close to Adrasan Foreland. A kind of valuable stone called Gagas was extracted here in the ancient times. This stone is not extracted any more, and actually the exact location of it is still being searched. Like it happened to Korydalla, Gagai ruins were also removed and used for the construction of new structures. Because of this reason, there is not much left from the city (Bayburtluoğlu, 2004).

20. Olympos (Çıralı): Olympos, which is between Antalya and Finike, close to Ulupınar, is a naturally protected zone and very popular among international young tourists. Evidence indicates that Olympos was found in the Hellenistic period. It is also claimed that there can be an older settlement. It began to use its own coins in the late 2nd century B.C and joined to Lycia Federation. Olympos was one of the six cities that was important and had three votes in Lycia Federation in 2nd century B.C. In the 1st century B.C, it became a way port of pirates. After a commander called Servilius Isauricus Vulso from Rome defeated Zeniketes, the leader of pirates, in 78 B.C Olympos joined Rome. Pirates caused Olympos to be taken out of Lycia Federation. The most glorious time of Olympos city was in the 2nd and 3rd centuries B.C (Bayburtluoğlu, 2004).

21. Kormos (Karabük): Kormos is near Gödene, on the east side of Alakır River. It formed a *“sympoliteia”* together with neighbour cities Idebessos and Akalissos while under the rule of Rome (Umar, 1999).

22. Akalissos (Asarönü): It was a small settlement near Idebessos in ancient times. It was also the head of *Sympoliteia* formed together with Idebessos and Kormos. This city was a member of Lycian Federation (Bayburtluoğlu, 2004).

23. Idebessos (Kozağacı): It was very close to Akalissos and Kormos which together formed a federation. The location of the settlement is 20-25 km from Kumluca, around Alakır River. Few of its ruins belong to the Hellenistic period and most of them belong to Roman times (Bayburtluoğlu, 2004).

24. Phaselis (Tekirova): Phaselis is in the middle of western Antalya Bay, close to today’s Tekirova village. It was a rich and important city. It went under the Persian rule in the 6th century B.C. Phaselis was rescued by commander Kimon from Athens in 469 B.C and so, the city joined to Delian League by the leadership of Athens. It was taken by Persians again before it was rescued by Alexander the Great in 333 B.C. The leader of pirates, Zeniketes, ruled the city for a while. This caused the city to be punished by Romans and become unpopular which was once known as rich and glorious (Bayburtluoğlu, 2004).

25. Isinda (Belenli): The ancient settlement Isinda is close to Belenli Village in Kaş. It was a small settlement that is not mentioned in ancient sources at all. Isinda was similar to the settlements Apollonia, Soura and Trysa and it was ruled by a family which was not very strong. According to three grave monuments in Lycian language, it is certain that Isinda had houses before the first half of 4th century B.C. It was part of the Lycian Federation in 2nd century B.C, when the federation was first established. (Bayburtluoğlu, 2004)

26. Apollonia (Kılınçlar): Apollonia was set on Sıcak Peninsula and very close to Kılınçlı village. In Lycia, Apollonia, Aperlai, Simena and Isinda were small settlements very close to each other. Because of this reason, these 4 settlements formed a federation called Tetrapolis, meaning “four city”. In the 2nd century B.C, Apollonia joined the Lycia Federation together with these settlements and had 1 right to vote (Bayburtluoğlu, 2004).

27. Phellos (Felen): Ancient settlement Phellos is located 5 km from town of Kaş. According to the information gathered from ancient sources, the settlement existed till the Middle Ages. By the time Roman Empire collapsed, the settlement lost its popularity and was plundered (Umar, 1999).

28. Kandyba (Çataloluk): Ruins of Kandyba is 13 km from northern Kaş. It is next to Çataloluk village of Kaş. According to Umar, Kandyba was an unimportant settlement. The most remarkable thing about it is the red paints of Lycian inscriptions on a stone monument which are still visible (Bayburtluoğlu, 2004).

29. Arsada (Arsa): These ruins are around Arsa village of Kemer town of Fethiye. Arsada remained as a minor settlement throughout history (Umar, 1999).

30. Islamlar: Islamlar village, which was set between Elmalı and Kaş, 3 km from Akçay is 15 minutes away from the only rectangular construction on its top. The construction most probably belongs to a Heroon but there is no detailed information about its history (Bayburtluoğlu, 2004).

31. Semahöyük: Semahöyük, a site from the Early Bronze Age is in the area called Karataş about 10 km east of Elmalı Town on Elmalı Plain. Structures and graves from the Early Bronze Age were found. Lots of artifacts were recovered since 1963, when the excavations began under the leadership of Prof. Dr. Machteld J. Mellink (Umar, 1999).

32. Sidyma (Dodurga Asarı): Sidyma is one of the ancient settlements that Sir Charles Fellows recovered during his Lycia excursions between 1838 and 1840. This settlement is in Dodurga village of Eşen town of Fethiye. The history of the settlement starts even before the 1st century B.C. but its name is not mentioned in historic sources (Bayburtluoğlu, 2004).

33. Aperlai (Sıçak): Aperlai is by the sea in the south of Kılıçlı village, on Sıcak Peninsula. All the ancient remains of Aperlai date to the Roman period (Umar, 1999). It is certain that Aperlai formed a sympoliteia together with Simena, Apollonia and Isinda (Bayburtluoğlu, 2004).

34. Cadianda (Üzümlü): The ancient settlement Cadianda is located 3 km south of Üzümlü village of Fethiye. It has a main road with temples on each side. Additionally, it has city walls, stadium, Roman bath, graves, mausoleums and theaters (Umar, 1999).

35. Nisa (Sütleğen): Nisa is on the way between Elmalı and Kaş after Sinekçi Beli and close to Sütleğen. It is a small settlement which is not mentioned in any ancient work. Indeed, it is one of the most unknown and unvisited ancient places. Nisa has a structure that surrounds three sides of the settlement securely and has city walls on the north side. Although there is nothing known about its history, it is certain that the settlement existed in the Hellenistic period (Bayburtluoğlu, 2004).

36. Oinoanda: Incealiler village is reached by the Fethiye Kızılcadağ Korkuteli road. Oinoanda, which is 1 hour from Incealiler, is a quite old settlement dating back to 2000 B.C according to Bayburtluoğlu (2002). It became part of the *Tetrapolis* lead by Kibyratis and had two votes like other three settlements in the *Tetrapolis*. According to Strabo, it accepted to be ruled by Rome seamlessly. According to the surface survey reports by Dr. Hall and Dr. Smiths and the writings of Oinoanda's famous philosopher, Diogenes the settlement's history does not go back to the times before the Hellenistic period. Part of the people of Oinoanda supported Brutus after the murder of Caesar, and some did not (Bayburtluoğlu, 2004).

37. Araxa (Örenköy): This settlement's ruins are in Ören Village of Kemer Town of Fethiye in Muğla. In spite of the fact that the history of the settlement is quite dark, it is known that it had wars with its neighbouring settlements Boubon and Kibyra in the 2nd century B.C which implies settlement's history goes back to that date. The place is just at the intersection of Caria, Lycia, Phrygia and Pisidia (Umar, 1999).

38. Simena (Kaleköy): The ruins of Simena are around Kale Village opposite of Kekova Island. The road to Simena is quite difficult but it is reached easily from the sea. The settlement is sometimes being referred to as the "sunk city" because, some of it is under the sea. Here is one of the rare places that Ottoman, Byzantine, Roman and Lycian periods can be seen together (Bayburtluoğlu, 2004).

39. Arykanda (Arif): Arykanda is 40 km north of Finike, next to Arif Village. The name « Arykanda » means « the place next to the high rocky spurr. It is believed to be a name dating to 2000 B.C (Bayburtluoğlu, 2003) Although Arykanda was mentioned in the ancient sources, the location of the city was discovered by Charles Fellow in 1838. The history of Arykanda is not very well known but, it is known that, it goes as early as the Hellenistic Period. The artifacts found in Arykanda belong to Hellenistic and Roman Periods (Umar, 1999). During the Roman Period (B.C 200-300), although Arykanda always had one vote, it grew up enourmously and started to compete with the biggest settlements in Lycia such as Xanthos, Pınara, Tlos, Olympos, Myra and Patara which had three votes each (Bayburtluoğlu, 2003).

40. Pydnai (Özlen): This glorious fortress has sometimes been called Kydnai, and sometimes Pydnai. It is close to Özlen district of Karadere Village of Eşen, Fethiye. The ruins are still visible and the city walls are still magnificent. (Umar, 1999)

41. Hoyran: Hoyran is nearby Yavu Village, between Kaş and Demre. Umar (1999) mentioned that it had only 9 houses after her visit to the settlement in 1999. The ancient ruins are on a hill. There is an Acropolis surrounded by city walls and two monumental stones and one monumental grave (Umar, 1999).

42. Soura: Soura is very close to Demre. Its history goes back to the 4th century B.C. There are stone graves, other ruins and monumental graves in Soura. There are also sarcophagi from Rome period. Additionally, there is a Temple of Apollo here. The spring still runs which is mentioned by the ancient authors of Kumluk (Bayburtluoğlu, 2004).

43. Arneai (Ernez): Arneai is next to Ernes Village of Finike in Antalya. It was a minor settlement in Lycia and we do not have much information about it (Umar, 1999).

44. Choma (Hacımusalar): Choma is close to Hacımusalar and Sarılar Villages that are 15 km south of Elmalı. Some maps –such as turkish roads map published by Yapı ve Kredi Bankası in 1996- indicate that Choma was settled not in southwestern of Elmalı but in the place of Eskihisar Village in northwestern of Elmalı. However, according to Umar (1999); six of the inscriptions found by Harrison in 1963 around the area of Hacımusalar – Sarılar contains the name of Choma. This definitely gave the answer to the question of where the Choma people lived (Umar, 1999).

CHAPTER 4
DATA

This chapter explains the data sets used in this study. A total of five data sets are used during the studies which are: topographic data, rock data, soil data, ancient settlement data and modern settlement data. For each data set first a raw data is obtained from different sources and is processed for the final set to be used in the analysis.

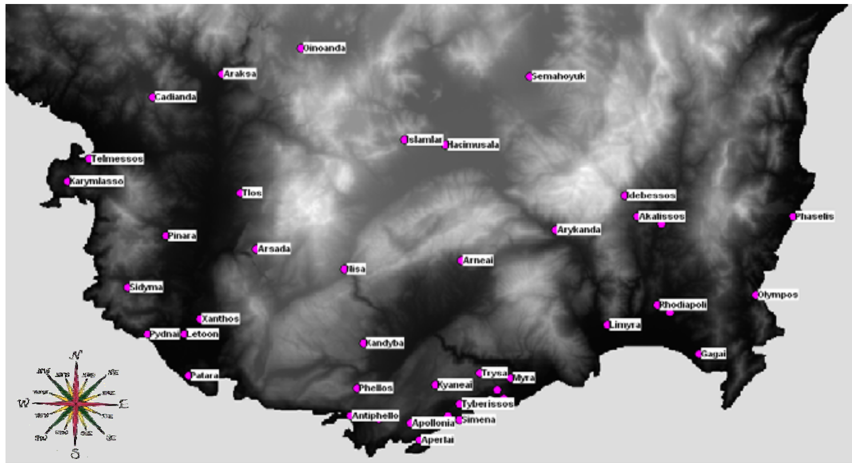
4.1 Topographic Data

Topography is a three-dimensional representation of the Earth’s surface on a two – dimensional surface including contour lines showing topographic features like mountains, plains, canyons and plateaus which are seen from overhead looking to ground. In this study, SRTM (Shuttle Radar Topography Mission) topographic data are used to identify elevation, slope and aspect values of the Lycia region. SRTM is an international project pioneered by NGA and NASA used to obtain elevation data on a near-global scale to generate the most complete high-resolution digital topographic database of the earth. SRTM, with 90 m pixel resolution and 16 m vertical accuracy, was taken during the 11 day flight with the Space Shuttle Endeavor in the year of 2000 (NASA SRTM, 2004).

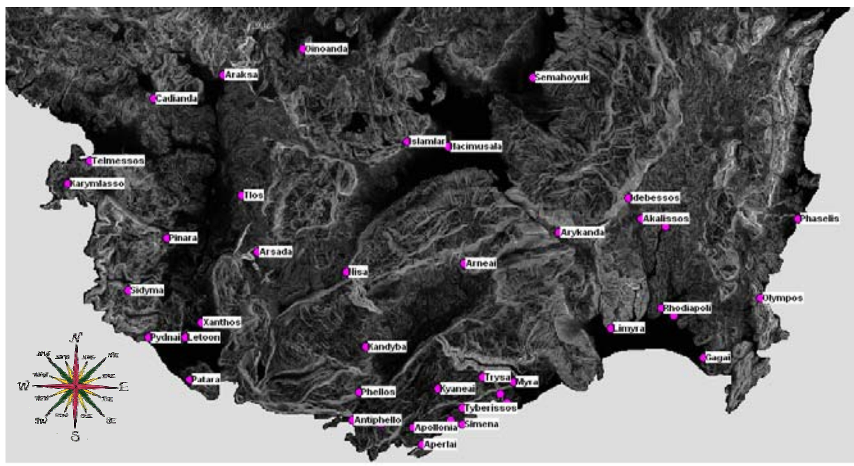
SRTM topographic data is used in this study to determine three topographic parameters (elevation, slope and aspect) for the whole area, ancient settlements and modern settlements. SRTM data is processed in TNT software to produce initial elevation, slope and aspect maps which are shown in Figure 4.1 for the whole area.

SRTM topographic data is extracted by using the vector data showing the borders of the region to obtain the complete study area in raster format. Total number of pixels for the whole area is 922022 each with 90m x 90m size.

A) Elevation 16-bit
Minimum:00
Maximum: 3041
Mean: 999
Std Dev: 672
Median: 1027
Mode: 2
Most: 2959
CellCount: 922022
Bin Interval: 1



B) Slope 32-bit
Minimum:00
Maximum: 67
Mean: 14
Std Dev: 9.5
Median: 13
Mode: 0
Most: 12623
CellCount:922 022
Bin Interval: 0.016



C) Aspect 16-bit
Minimum:-01
Maximum: 360
Mean: 181
Std Dev: 97.3
Median:178
Mode: 135
Most: 9867
CellCount: 922022
Bin Interval: 1

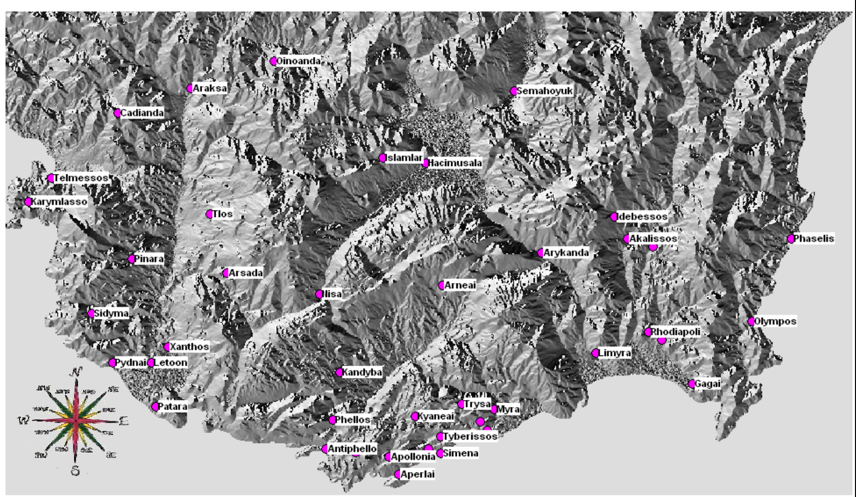


Figure 4.1 Elevation (A), Slope (B) and Aspect (C) maps of the study area

Elevation map

The map shown in Figure 4.1-A is the elevation model of the study area that ranges from 0 m to 3041 m in the study area. The lowest elevations are dominant around the coastal parts of the area. The highest elevations, on the other hand, can be observed further north around Tauros Mountains. The mean elevation value is 998.85 and has a standart deviation of 671.84. The histogram of the area is divided into 100 m intervals starting from 0 m to 3100 m (Figure 4.2-A). The maximum percentage with 10 % is observed between 0 m to 100 m which gradually decreases to 3 % to an elevation of 1000 m. After 1000 m, however, the percentage of elevation suddenly increases to about 6 % which again gradually decreases for higher elevations.

Slope map

Slope map refers to the map that shows amount of surface inclination at any point. The darker regions in the map (Figure 4.1-B) correspond to low slope amounts, and the lighter ones areas to high slopes. The slope in the area ranges from 0 to 67 degrees. The histogram of the area with 2-degree intervals is given in Figure 4.2-B. The histogram suggests two maximum concentrations at 0-1 degrees (10 %) and 10-13 degrees (6 %). The slopes above 46 degrees are negligible since their percentages are nearly 0.

Aspect map

Aspect map is the map that shows the direction of slope that angles from 0 to 360 degrees. Here simply 0 and 360 degrees refer to north, 90 to east, 180 to south and 270 to west. To avoid compexicity this range is divided into 8 intervals with 45 degrees. The flat areas where slope is zero have no aspect value and are therefore assigned -1 value. Considering the flat areas as a separate interval, the number of intervals increased to nine. Lower and upper units of each interval are shown in Table 4.1. During the calculation of these limits -22.5 and +22.5 degrees are added to eigth principal directions. The slope values less than two degrees are considered to be flat. As a result, the nine intervals that will be used in the analysis are obtained to be north, northeast, east, southeast, south, southwest, west, northwest and flat.

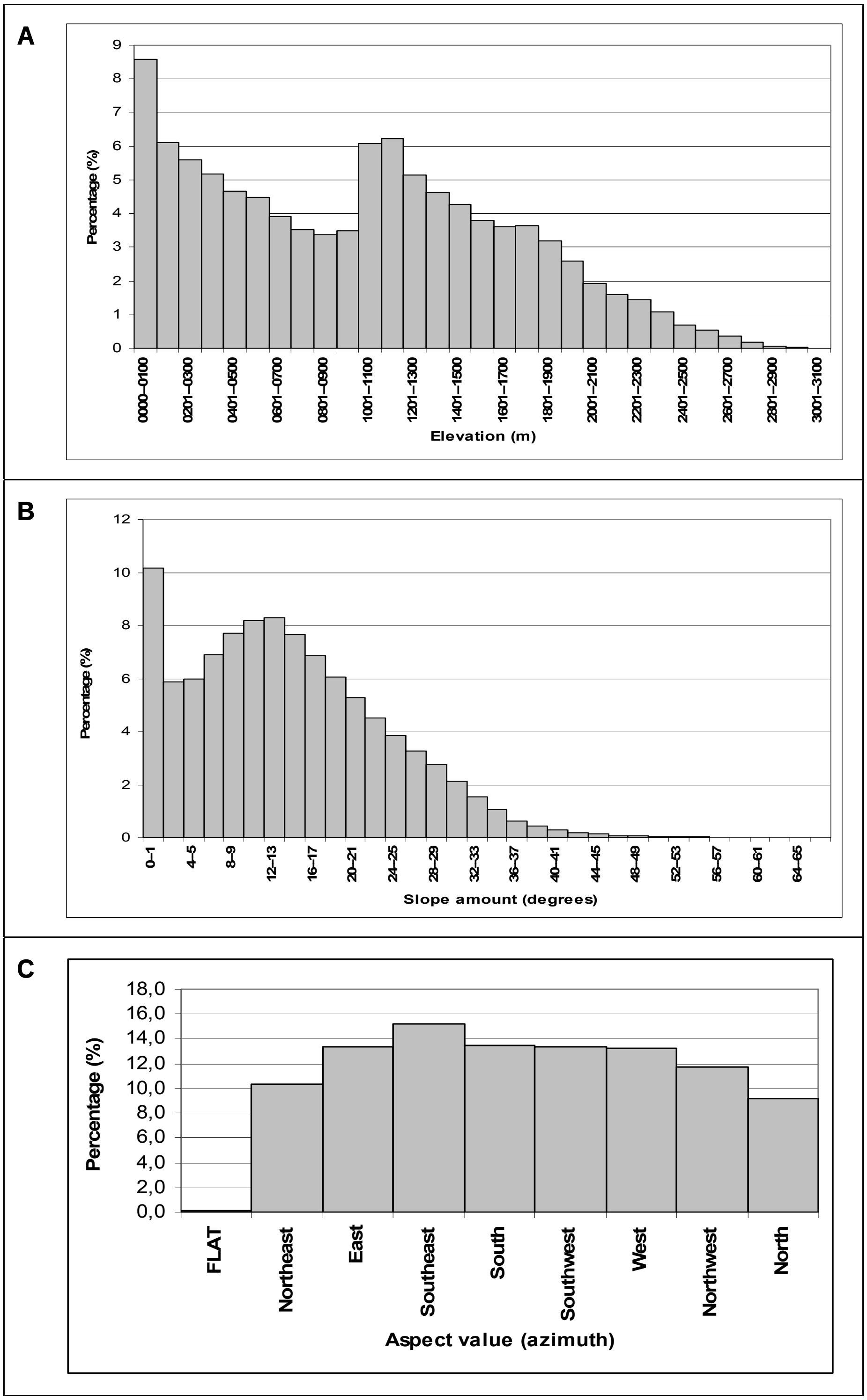


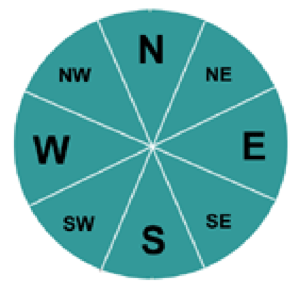
Figure 4.2 Histograms prepared from:

A) elevation map for 100 m interval
B) slope map for 2-degree intervals, and
C) aspect map for 45-degree intervals

The histogram prepared from the aspect values of the region are illustrated in Figure 4.2-C. Flat areas have the least percentage (about 0.2 %); other eight directions, on the other hand, have percentages ranging from 9 to 15. Percentage of the southeast direction is sligthy greater than others; the north direction has the lowest percentage among the eight directions.

Table 4.1 Nine intervals used for aspect parameter

No	Interval	Limits (degree)
1	Flat	Slope <= 2
2	North	337.5 to 22,5
3	Northeast	22.5 to 67.5
4	East	67.5 to 112.5
5	Southeast	112.5 to 157.5
6	South	157.5 to 202.5
7	Southwest	202.5 to 247.5
8	West	247.5 to 292.5
9	Northwest	292.5 to 337.5



4.2. Rock data

Rock types existing in the area are included in the analysis to investigate if a certain rock type is preffered or avoided during the selection of the settlement site. For this reason the geological map of the area is obtained at 1/ 500.000 scale from MTA (General Directorate of Mineral Research and Exploration) available at www.mta.gov.tr. Study area is included in two sheets namely Denizli and Konya.

The first step in the preparation of the rock data is preprocessing that includes stitching two sheets, clipping out the study area and digitizing the rock boundaries. This raw map is shown in Figure 4.3.

The number of the rock units, however, in this map is more than 40 which is quite a large number and will result in complicated processes in further GIS applications. Therefore, in the second step, the rock types are reclassified to reduce the number of the rock types. During the reclassification two properties of rock units are taken into consideration: age and the type of the rocks. This process resulted in the reduction of the rock units into 7 classes. Table 4.2 shows the names and basic properties of these classes. Distribution of these classes is shown in Figure 4.4. A short description of each class is given below.

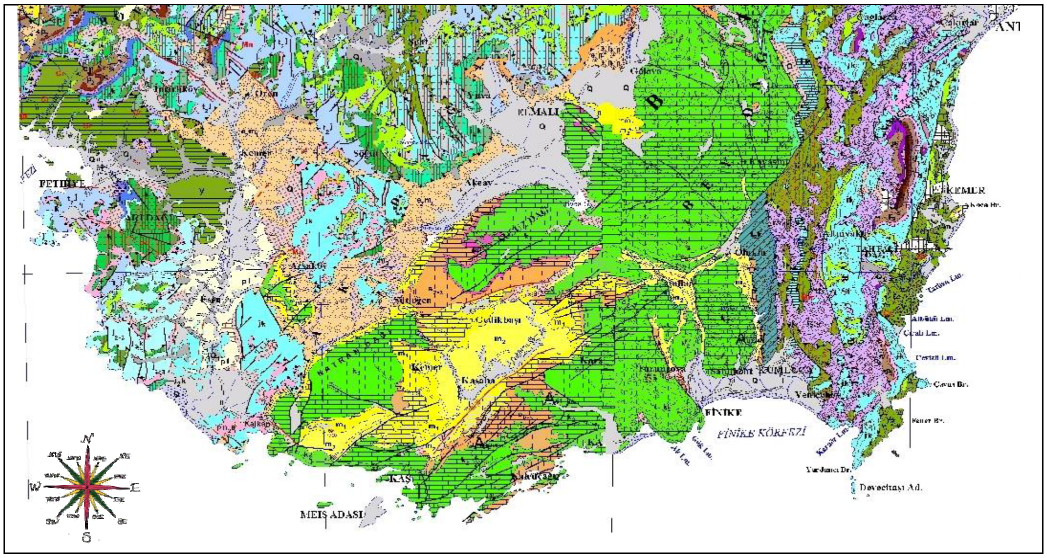


Figure 4.3 Raw rock map obtained from MTA

Table 4.2 Basic information on the rock types used in this study

Name of Rock Class	Age range	Number in the initial map	% over the area
Quaternary clastics	Quaternary	3	15,7
Pliocene Clastics	Pliocene	1	1,5
Clastics and Carbonates	Triassic to Miocene	12	21,3
Neritic Limestone-1	Late Cretaceous	1	22,9
Neritic Limestone-2	Carboniferious-Cretaceous	11	21,2
Pelagic units	Jurassic-Cretaceous	6	8,9
Melange	Triassic to Cretaceous	7	8,7

Quaternary clastics: These rocks are the youngest rock units exposed in the area. They are mostly composed of unconsolidated alluvial material being deposited along stream beds and/or in the coastal areas. Alluvial fans that are today developing at the mouth of streams are also considered in this class.

Pliocene clastics: Pliocene clastic rocks are represented by only one rock type in the raw data. It is composed of unconsolidated or semi-consolidated continental clastic (fragmental) rocks.

Clastics and carbonates: This rock type is represented by 12 classes that range in age from Triassic to Miocene. They are composed of alternation of clastic rocks and carbonaceous units (limestone).

Neritic limestone-1: This class is formed by only one class in the original map that covers large areas in the area. It is composed of thick to massive limestones.

Neritic limestone-2: This class is composed of 11 units existing in the area. They are composed of thick limestones. One of these units is travertine that covers a small area (less than 0.1 %) is included in this class.

The difference between neritic limestone-1 and neritic limestone-2 is the age of them. Neritic limestone-1 is older than neritic limestone-2.

Pelagic units: This class is formed by 6 rock types in the initial map. Pelagic rocks are dominantly composed of thin o medium bedded limestone with occasional chert intercalations.

Melange: Melange is represented by 7 rock units in the initial map. They are composed of ultramafic rocks such as peridotite, dunite, gabbro and spilite.

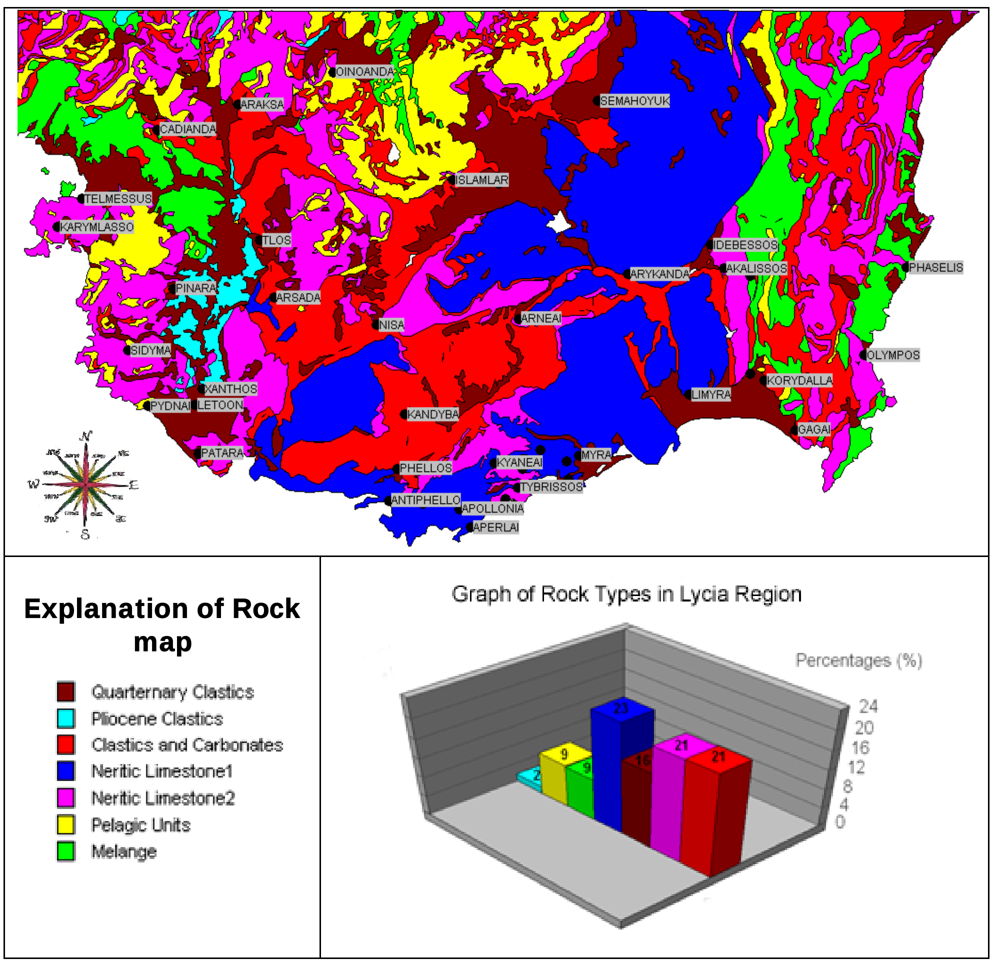


Figure 4.4 Distribution map of reclassified rock class used in this study.

4.3 Soil data

Soil map of the area is obtained in vector format from the General Directorate of Rural Services. The digital map is consisted of soil information on polygon base with an attribute table describing various features of the polygons. Initial form of the soil map is illustrated in Figure 4.5. This map contains a total of 2241 polygons for 36 different soil units. There are 12 fields in the “explanation” that tend to categorize the soil types.

Figure 4.5 Original soil map provided from the General Directorate of Rural Services in digital format. Each polygon on the map corresponds to exposure of a soil type and has an attribute table according to which the types of soil classifications made in this study.

Original soil map is reclassified to avoid complexity; and the number of soil types is reduced to seven for this study. Five classes in the final soil map are assigned according to the thickness of the soil layer. To do this, the “soil thickness table” given in the explanation under “Main Soil Groups” heading in the initial form is used. This table is translated to Turkish and is given in Table 4.3.

Although the soil depth in this table is coded against the slope amount of the topography, the slope is ignored and the reclassification is based only on the soil thickness. Accordingly, the soil classes are assigned using this table and other attributes mentioned in the soil database:

- **Class 1**: Soil with thickness greater than 90 cm (numbers 1, 5, 9, 17 and 21 in Table 4.3).

- **Class 2**: Soil with thickness between 90 and 50 cm (numbers 2, 6, 10, 14, 18, and 22 in Table 4.3)
- **Class 3**: Soil with thickness between 50 and 20 cm (numbers 3, 7, 11, 15, 19, 23 in Table 4.3)
- **Class 4**: Soil with thickness between 20 and 0 cm (numbers 4, 8, 12, 16, 20, 24 in Table 4.3)
- **Class 5**: Barren rock (lithozolic) above which no soil developed (numbers 25, 26, 27, 28, 29 and 30. Some polygons which are defined as "ciplak kaya" (barren rock) are also included in this class.
- **Class 6**: Three soil types refer to the material deposited in the stream channels. These are IR, IY and H (Stream deposits, Flood plain deposits, and alluvial deposits, respectively). These soil tpes are associates with the major streams in the area.
- **Class 7**: Two soil types describe the soil formed in the coastal areas. These are S and SK that correspond to beaches and coastal and-dunes.

The final map showing reclassified soil types is shown in Figure 4.6. Percentages of these classes suggest that more than half of the area is covered by no-soil (barren rock) type. One forth of the areas has a soil thickness less than 20 cm.

Table 4.3 Soil types classified according to their thickness and slope (from General Directorate of Rural Services)

	Depth (cm)				
Slope (%)	**Deep (90+)**	**Medium (90-50)**	**Shallow (50-20)**	**Very shallow (20-0)**	**Litozolic**
A (0-2)	1	2	3	4	25
B (2-6)	5	6	7	8	26
C (6-12)	9	10	11	12	27
D (12-20)	13	14	15	16	28
E (20-30)	17	18	19	20	29
F (30 +)	21	22	23	24	30

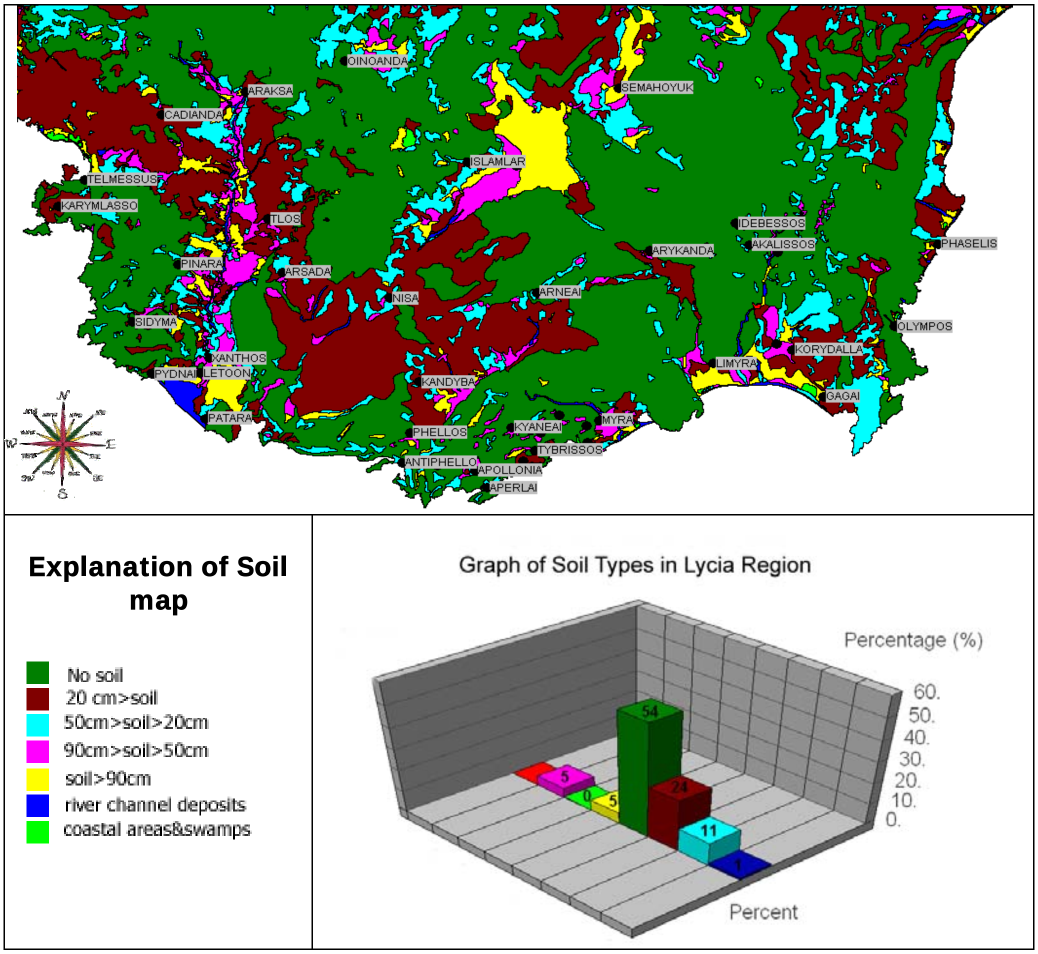


Figure 4.6 Distribution map of reclassified soil classes used in this study

4.4. Ancient settlements

Ancient settlements refer to the Lycian cities that exist in the area and, therefore, constitute the most critical data as far as the purpose and the scope of the thesis are considered. This data, however, is the most problematic one because there is not a definite list of Lycian cities and the presence of some settlements are still open to discussion. To solve the problem, all the ancient settlements explained in the literature were examined and some of the settlements are omitted in this study. A complete list of Lycian settlements is given in Table 4.3, based on the information provided by Umar (1999), Çevik (2002), Akşit (2002), Önen (1997), Bean (1998), Bayburtluoğlu (2004) and Şahin and Adak (2002). Total number of this list is 78. A brief review of these settlements is provided in the previous chapter. Some of these settlements are not involved in this study because of three reasons;

1. Some settlements are known to have existed in Lycia but locations of these settlements are not clear and there are still some discussions about them.

2. Although locations of some ancient settlements are clearly specified, these settlements were located in the border of Lycia region, but the cultures of the people living in these settlements did not belong to Lycian culture, instead, belong to some other neighbouring cultures.

3. Some settlements were minor settlements so that there is very little evidence that they have existed in the history.

Table 4.4 List of Lycian settlements that are considered whether to use in this study or not. The checked raws indicate the ancient settlements that were taken into consideration according to the information written on the related source. The last column indicates the ancient settlements used in this study. Some more ancient settlements were found from these sources however they were not taken into consideration due to reasons explained above.

#	**Settlement**	**Umar 1999**	**Çevik 2002**	**Akşit 2002**	**Önen 1997**	**Bean 1998**	**Bayburt-luoğlu 2004**	**Şahin and Adak 2002**	**This study**
1	TELMESSOS	√	√	√	√	√	√		√
2	KARYMLASSOS	√	√				√		√
3	PINARA	√	√	√	√	√	√		√
4	TLOS	√	√	√	√	√	√		√
5	XANTHOS	√	√	√	√	√	√		√
6	LETOON	√	√	√	√	√	√		√
7	PATARA	√	√	√	√	√	√		√
8	ANTIPHELLOS	√	√	√	√	√	√		√
9	TYBERISSOS	√				√	√		√
10	TEIMIOUSA	√	√	√	√	√	√		√
11	ISTLADA	√		√			√		√
12	KYANEAI	√	√	√	√	√	√		√
13	TRYSA	√	√	√		√	√		√
14	TREBENDA		√						
15	TREBENNA	√					√		
16	MYRA	√	√	√	√	√	√		√
17	ANDRIAKE	√	√	√	√		√		√
18	LIMYRA	√	√	√		√	√		√
19	RHODIAPOLIS	√	√			√	√		√
20	KORYDALLA	√					√		√
21	GAGAI	√				√	√		√
22	OLYMPOS	√	√	√	√		√		√
23	KORMOS	√					√		√
24	AKALISSOS	√	√				√		√
25	IDEBESSOS	√	√				√		√
26	PHASELIS	√	√	√	√	√	√		√
27	ISINDA	√		√		√	√		√
28	APOLLONIA	√	√			√	√		√

29	PHELLOS	√	√	√		√	√		√
30	KANDYBA	√				√	√		√
31	ARSADA	√				√	√		√
32	PODALIA	√	√			√	√		
33	ISLAMLAR		√				√		√
34	SEMAHOYUK	√					√		√
35	SIDYMA	√		√	√	√	√		√
36	APERLAI	√	√	√	√	√	√		√
37	CADIANDA	√	√	√		√	√		√
38	NISA	√					√		√
39	KOMBA	√				√			
40	OENOANDA		√			√	√		√
41	ALOANDA	√							
42	ARAXA	√				√	√		√
43	SIMENA	√	√	√	√	√	√		√
44	ARYKANDA	√	√	√	√	√	√		√
45	PYDNAI	√					√		√
46	DAIDALA	√					√		
47	TELANDROS	√							
48	HOYRAN	√	√						√
49	SOURA	√	√	√	√	√	√		√
50	ARNEAI	√				√	√		√
51	CHOMA	√				√	√		√
52	LIDAI	√				√	√		
53	LISSA	√				√	√		
54	KBYRA		√			√	√		
55	BOUBON		√			√	√		
56	BALBOURA		√			√	√		
57	DOLIKHISTE		√						
58	OLBIA						√		
59	KITANAURA						√	√	
60	MELAINIPPE						√		
61	GAVURPAZARI						√		
62	PHOINIKOS						√		
63	TYMBRIADA	√					√		
64	ONOBARA						√	√	
65	TYPALLIA						√	√	
66	KOSARA							√	
67	LYKAI							√	
68	MNARIKE							√	
69	PYGELA							√	
70	KORYKOS							√	
71	MADNAUSA							√	
72	SOKLAI							√	
73	KODOPA							√	
74	KASTABARA							√	
75	KALYNDA							√	
76	LYRNAI							√	
77	HIPPUKOME							√	
78	SYMBRA							√	

After analyzing Lycian settlements from the sources mentioned, 44 settlements were selected to be used in this study and other 34 were omitted because of the reasons explained above. The settlements used in the study are shown in Figure 4.7.

A database is created for these 44 settlements that include the information about their location (Easting and Northing coordinates), topographic characteristics (elevation, slope and aspect) as measured from SRTM data, rock type (read from rock type map) and soil map (read from soil type map). This database is illustrated in Table 4.5.

Figure 4.7 Locations of the ancient settlements. (Base map from www.earth.google.com)

4.5. Modern Settlements

Modern settlements refer to the villages or cities that are settled today in the region. These settlements are identified using 1/100.000 scaled topographic map of the area prepared by the General Command of Mapping, Turkey, which are included in eight separate sheets printed in 1966. Following criteria are applied during the selection of these settlements:

- No distinction is made as far as the size and population of settlements are considered. The main reason for this is that, the growth of the settlement is a later event and does not affect the decision that this site was selected as a suitable place for settlements. Therefore, all cities, villages and sub-villages ("mahalle") are recorded as settlement.

Table 4.5 Ancient settlement database for 44 Lycian settlements.

Name	Easting	Northing	Elevation	Slope	Aspect	Rock Type	Soil Type
Andriake	765904	4013477	0	0,399	-1	Neritic Limestone-1	Coast & swamp
Letoon	707084	4023427	11	0,399	-1	Quaternary clastics	Soil: 50-90 cm
Karymlassos	684993	4050611	136	0,879	-1	Quaternary clastics	Soil: >90 cm
Telmessos	688809	4055081	6	0,903	-1	Neritic Limestone-2	Soil: >90 cm
Korydalla	796195	4029863	30	1,009	-1	Quaternary clastics	Soil: 50-90 cm
Hacımusalar	753672	4059098	1044	1,009	-1	Quaternary clastics	Soil: >90 cm
Myra	767447	4017242	239	2,376	-1	Neritic Limestone-1	No soil
Trysa	761423	4017901	762	2,437	-1	Neritic Limestone-1	No soil
Patara	707967	4015952	2	3,058	275	Quaternary clastics	Coast & swamp
Kyaneai	754217	4015714	653	3,688	342	Neritic Limestone-1	No soil
Hoyran	758729	4014965	509	3,881	197	Neritic Limestone-2	No soil
Tlos	716632	4049280	370	4,303	255	Quaternary clastics	Soil: 50-90 cm
Semahoyuk	768669	4072444	1123	0,312	-1	Quaternary clastics	Soil: >90 cm
Rhodiapolis	793861	4030777	44	4,572	133	Quaternary clastics	Soil: 50-90 cm
Istlada	759678	4012364	92	5,649	57	Neritic Limestone-2	Soil: 20-50 cm
Sidyma	696531	4031688	545	5,782	73	Neritic Limestone-2	No soil
Gagai	801281	4022343	34	6,458	295	Clastics-Carbonates	Soil: 20-50 cm
Apollonia	748960	4008354	355	6,749	22	Neritic Limestone-1	Soil: 20-50 cm
Tyberissos	757976	4011984	196	6,898	92	Neritic Limestone-1	No soil
Phaselis	817719	4048206	9	7,636	202	Melange	River channel
Simena	757519	4009359	13	8,089	350	Neritic Limestone-2	Soil: 50-90 cm
Aperlai	750882	4005536	56	8,702	135	Neritic Limestone-1	Soil: 20-50 cm
Arykanda	774209	4045654	540	8,776	194	Neritic Limestone-1	No soil
Kormos	793445	4045988	303	9,500	317	Melange	No soil
Teimousa	756213	4010141	26	9,537	220	Neritic Limestone-2	Soil: 0-20 cm
Oinoanda	727420	4075712	1459	10,857	80	Pelagic units	No soil
Araksa	712726	4070289	232	10,911	78	Quaternary clastics	Soil: 20-50 cm
Olympos	811583	4034301	8	11,097	165	Neritic Limestone-2	Soil: 0-20 cm
Idebessos	787017	4050599	976	11,808	155	Quaternary clastics	No soil
Pınara	703260	4041411	218	11,816	68	Pliocene clastics	No soil
Xanthos	708289	4025924	57	12,283	153	Quaternary clastics	Soil: 20-50 cm
Cadianda	700237	4066099	893	12,393	284	Neritic Limestone-2	Soil: 0-20 cm
Akalissos	789143	4047068	444	12,567	86	Neritic Limestone-2	Soil: 20-50 cm
Arneai	757418	4038155	821	12,775	154	Neritic Limestone-2	Soil: 50-90 cm
Arsada	719074	4040430	855	13,924	58	Clastics-Carbonates	Soil: 20-50 cm
Isinda	743216	4009068	550	15,601	202	Neritic Limestone-1	No soil
Pydnai	699756	4023116	15	17,508	152	Quaternary clastics	No soil
Phellos	739004	4014392	723	18,397	341	Clastics-Carbonates	No soil
Antiphellos	737872	4009371	67	19,731	218	Neritic Limestone-1	Soil: 20-50 cm
Nisa	735281	4036591	974	20,589	277	Clastics-Carbonates	Soil: 20-50 cm
Kandyba	740072	4022798	701	21,401	349	Clastics-Carbonates	Soil: 20-50 cm
Soura	765609	4016245	176	23,746	308	Neritic Limestone-1	No soil
Islamlar	746424	4059471	1399	24,166	111	Clastics-Carbonates	Soil: 0-20 cm
Limyra	784483	4027240	256	27,625	170	Neritic Limestone-1	No soil

- Temporary settlements such as “yayla” (highland summer settlements) are not considered since they are not permenant settlements. Similarly small settlements associated with recent farming activity or settlements grown around petrol stations are not considered.
- Touristic sites developed in the recent years are not considered in this study. These settlements are the products of intense tourism activity in the region and can be considered as temporary settlements. Most of these settlements do not even exist in the topographic maps used which date back to 1966.
- Each settlement is represented by a point (a pixel) regardless of the size of the settlement. This point usually is the geometric center of the polygon that represents the settlement. A deviation in this measurement will not be more than a pixel (100 m) which is believed that it will not affect the result of the analysis.

Total number of modern settlements identified and used in this study is 870. A database similar to that of ancient settlements is prepared for the modern settlements and is given in Appendix-A.

Fig 4.8 Locations of 870 modern settlements in Lycia used in this study.

CHAPTER 5

ANALYSES AND RESULTS

This chapter describes the analysis performed in this study to find the relationship between the data collected from the study area and ancient and modern settlements. Result of analyses will be used 1) to quantify effect of physical parameters such as topography, rock type and soil type on the site selection of the ancient settlements, and 2) to derive decision rules in order to predict location of unknown ancient settlements in the region. The flowchart of the method is given in Figure 5.1. The method is composed of four main steps:

Step 1: Obtaining the raw data: The first step is the obtaining of the raw data and digitizing them to create different layers to analyze. This step is explained in previous chapter.

Step 2: Creating Database: The second step is to create the database by using the raw data provided in the first step. Five databases created are as follows:

1) Morphologic database: This database is composed of three raster maps that contain elevation, slope and aspect values of the region.
2) Rock type database: This is a vector map that holds the rock type polygons from geological map reclassified for this study.
3) Soil type database: This is a vector map that possesses the soil type polygons reclassified for this study.
4) Ancient settlement database: This database contains coordinates of 44 ancient settlements as well as their morphological, rock type and soil type properties.
5) Modern settlement database: It is a similar database as for ancient settlements holding the attribute table for 870 modern settlements.

All databases are derived from raw data and are explained in the previous chapter.

Step 3: Analysis: In this step, different analyses will be performed to seek the relationship between the settlements and other parameters. The analyses that will be explained in this chapter are as follows:

1) Distance analyses
2) Density analysis
3) Morphological analysis
4) Rock type analysis
5) Soil type analysis
6) Visibility analysis

Step 4: Prediction: The last step is the prediction of site of possible ancient settlements that may exist in the region. The decision rules for this prediction will be derived from Step 3.

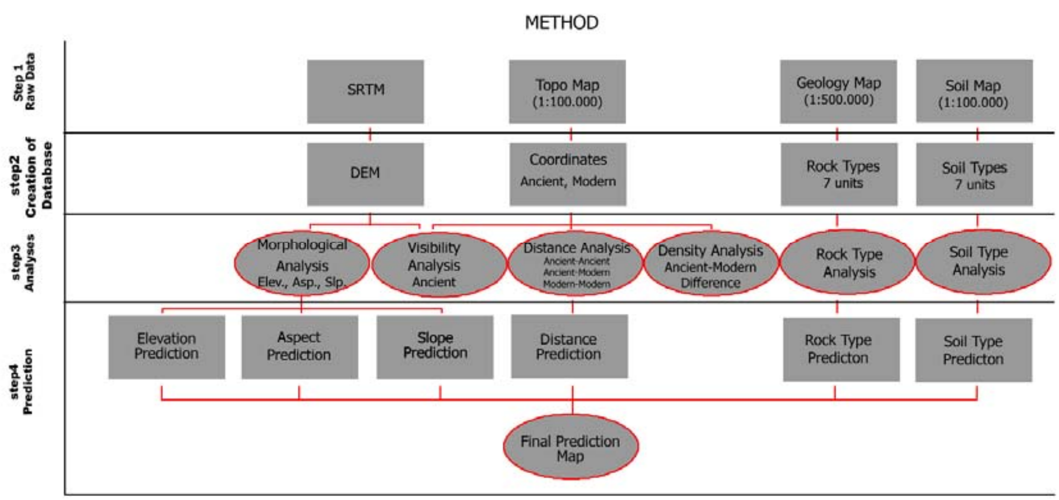


Figure 5.1 Method of study

5.1 Distance Analysis

The purpose of the distance analysis is to find the distances between

1. Ancient Settlements to Ancient Settlements
2. Ancient Settlements to Modern Settlements
3. Modern Settlements to Modern Settlements

To find the distances between the settlements a program segment is written in BASIC language, to identify the minimum distances between these settlements. Summary of the results of these analyses is given in Table 5.1 and Figure 5.2.

Table 5.1. Basic statistics of the distances between the settlements.

	Number	Minimum distance (m)	Maximum distance (m)	Mean (m)	St. Dev.
Ancient to Ancient	44	1523	20076	7222	5039
Modern to Modern	870	248	7290	1487	920
Ancient to Modern	44	6	4110	840	850

The distances between ancient settlements range from 1523 to 20076 m with a mean of 7222 m. The nearest settlements are Simena and Teimiousa (1523 m) followed by Tyberissos and Islada (1745 m). All other distances are greater than 2000 m. The distance range 2000 to 6000 m is the most dominant range observed for the ancient settlements. The most distant settlement is Semahöyük located 20076 m to Hacımusalar.

ancient-ancient; The minimum distance between two ancient settlements are the distance between Simena and Teimousa which is 1523 m. The most distant ancient settlements are Semahöyük and Hacımusalar where the distance is 20076 m.

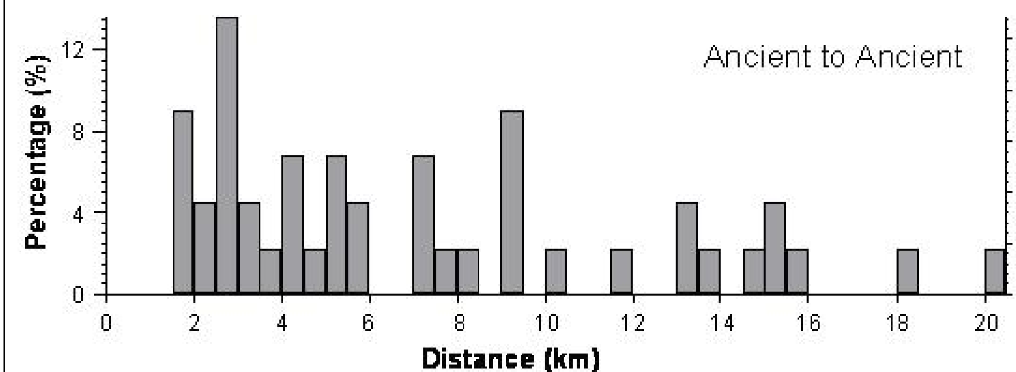
Although the distances seen to be very much, with the new discovered settlements, the distances might decrease.

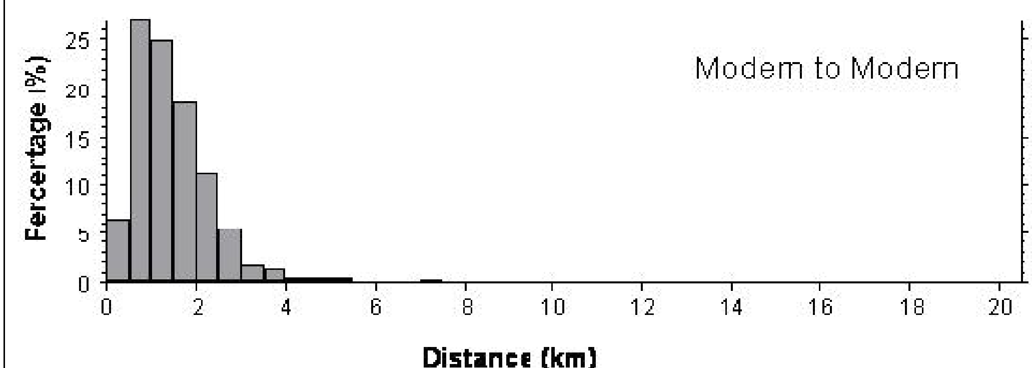
The distances between modern settlements is much less than that of ancient settlements. The reason for this is the number of modern settlements (870) which is greater than almost 20 times of ancient settlements (44). The minimum and maximum distances are calculated as 248 and 7290 m, respectively with a mean of 1487 m.

The distances between an ancient settlement and a modern settlement suggest that most of the ancient settlements are very close to modern ones. The minimum distance is measured as 6 m between Fethiye and Telmessos. The maximum distance, on the other hand, is measured for Aperlai which is located 4110 m away from Kılıçlı village. Most of distances (more than 70 %) are in the range of 2 km (Figure 5.2). The results show that the decision of the people did not change very much during the passing time because the modern settlements are built very closely (in 2 km range) to the ancient ones.

5.2. Density Analysis

The purpose of the density analysis is to find the maximum and minimum concentrations of the ancient and modern settlement concentration within the study area. To find the concentration of the settlements a program is written in BASIC language that calculates frequency of settlements over a grid system. The grid interval is selected as 5 km with a search radius of 10 km. Accordingly, the number of settlement for each point corresponds to the frequency of the settlements within approximately 340 km2. A contour diagram is prepared from these grid-frequencies for ancient and modern settlements (Figure 5.3-A and B).





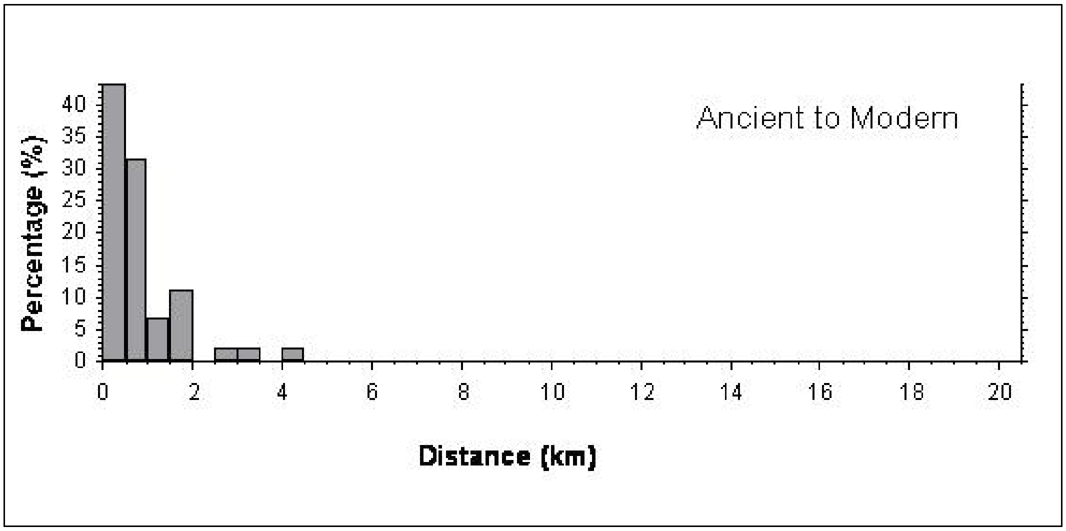


Figure 5.2 Histograms showing the distances between a) ancient to ancient b) modern to modern c) ancient to modern settlements.

Density diagram of ancient settlements suggest that the density of the settlements is higher in the coastal areas. The highest density (10.5 %) is observed in the southern part of the region. Soura, Myra, Andriake and Kyaneai are located in this cluster of high concentration. A lesser concentration is observed in the southeastern part where Patara, Letoon, Xanthos and Sidyma are located; and in the central southeastern part Arykanda, Rhodiapolis, Limyra, Korydalla and Gagai.

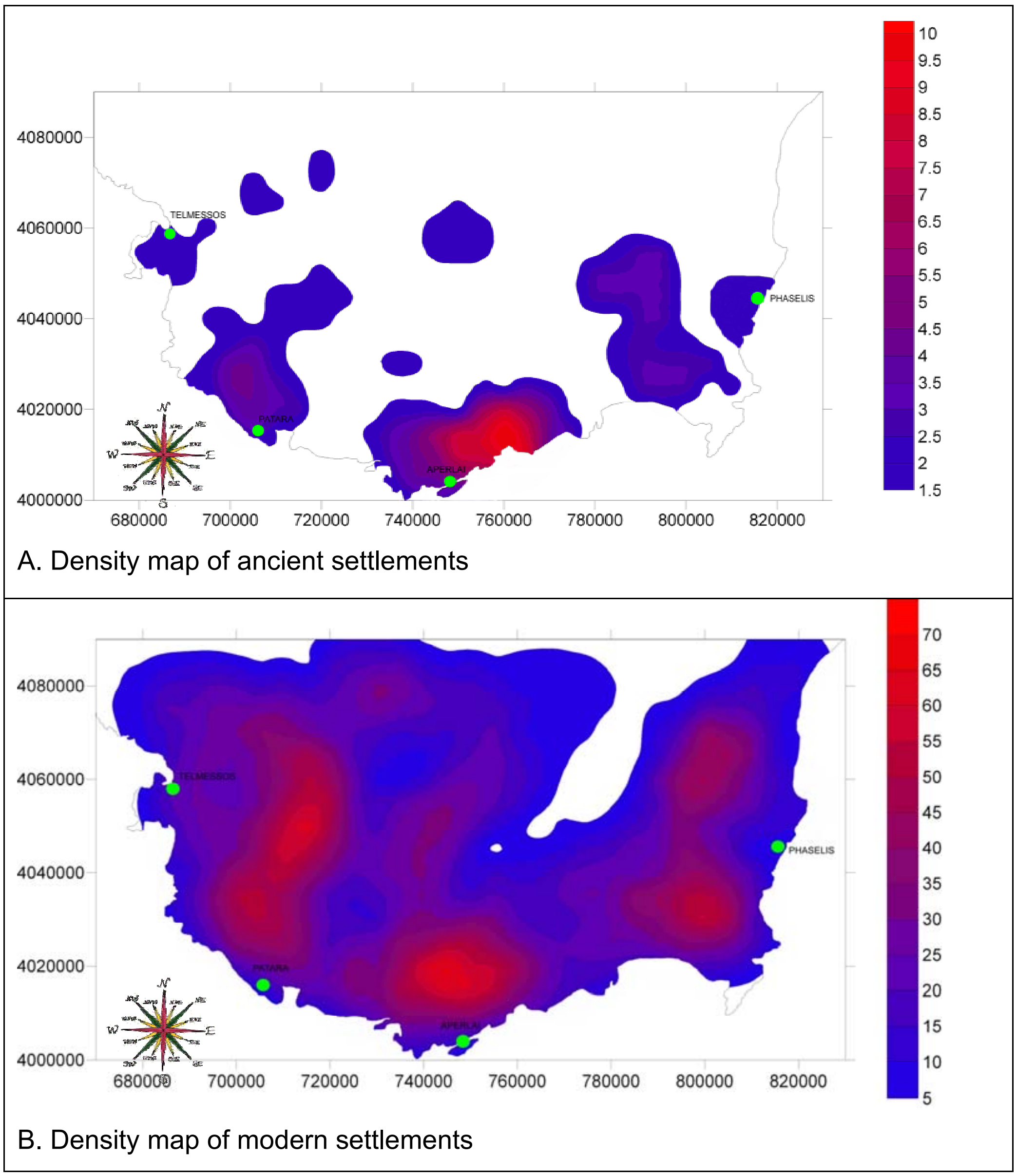
Density diagram of modern settlements indicate a different pattern than the previous one. Three highest concentrations are located along belts extending in north-south direction.

The density maps produced for ancient and modern settlements are subtracted from each other to compare the spatial distribution of densities for these two settlement types. During this process the percentage grid value of modern settlement is subtracted from the percentage grid value of ancient settlement. The resultant values are used to draw a density map which shows the difference between the two. The results indicate a range between -75 to 65. To avoid the complexity, the range is divided into three intervals based on the standard deviation of the data set (histogram in Figure 5.4).

- The “positive range” between 5 to 65 corresponds to the area where percentage of ancient settlement greater than that of modern ones.

These areas are, therefore, dominated by ancient settlements. This area on the map is shown by blue color.

- The “negative range” between -30 to -75 refers to the areas characterized by the abundance of modern settlements. These areas on the map are illustrated by red color.
- The “equal range” between -30 to 5 indicates the area where the percentages of both ancient and modern settlements are equal. These areas are shown by grey color on the map.



A. Density map of ancient settlements

B. Density map of modern settlements

Figure 5.3 Density maps of ancient and modern settlements

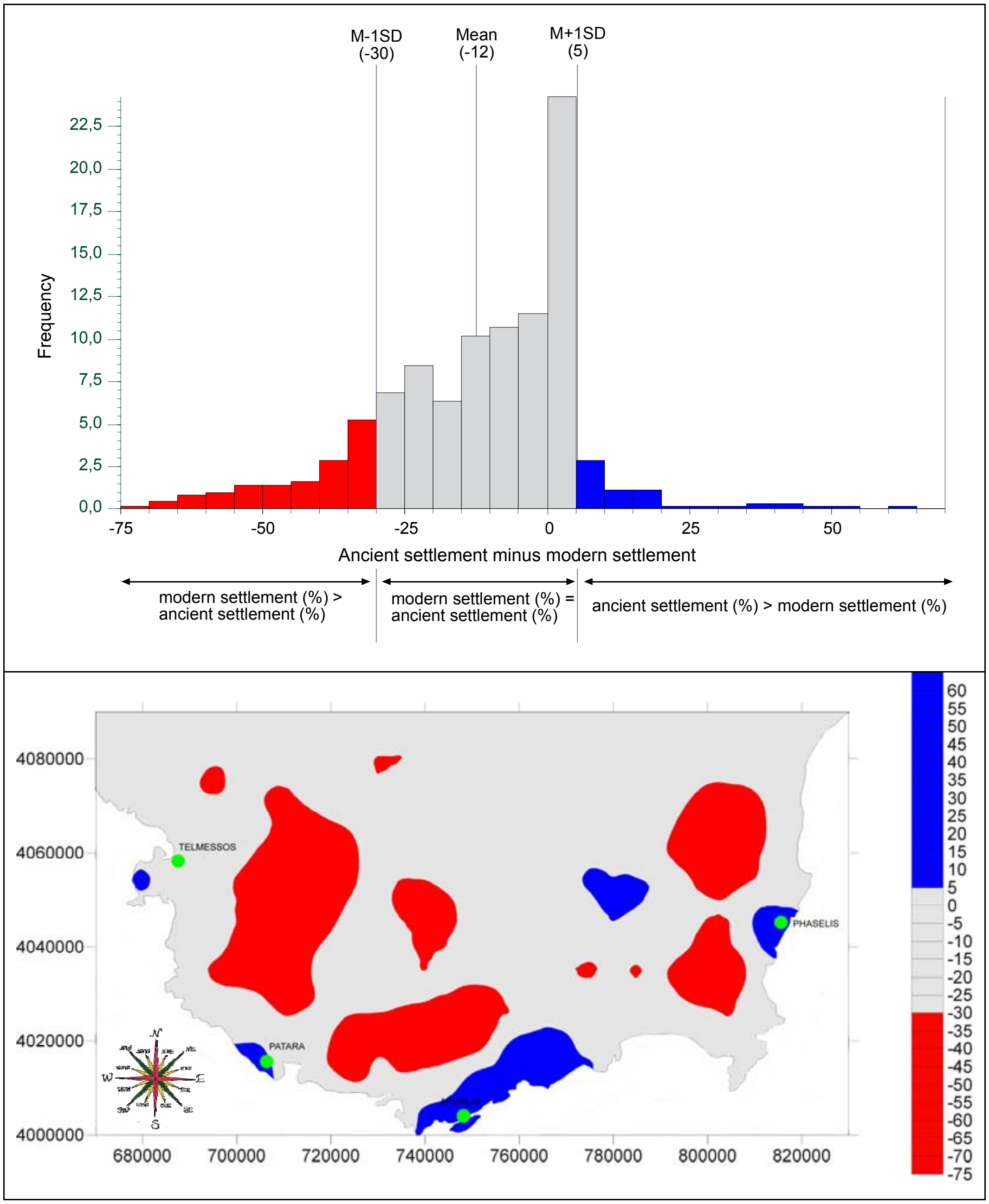


Figure 5.4 Comparison of the percentages of ancient and modern settlements in the area based on the standard deviation values. Histogram above shows the limits of the intervals; the map below is the resultant map.

According to the pattern of the difference map it is obvious that most of the area is represented by grey color indicating that the percentages of both settlements are almost equal or the area is not settled by any type. Distribution of blue colored areas (ancient settlement dominant areas) are mostly confined to coastal areas. The red colored areas (modern settlement dominating regions), on the other hand are usually located interior of the land close to the coastal regions. These clusters in general make a belt parallel to the shoreline. The most dense area is on the coastal zone, so it can be speculated that ancient people came from the sea (fig. 5.3.a). If the age data of the settlements could be divided into periods, this could be better understood.

5.3 Morphological Analysis

Morphological analyses are performed to quantify morphological characteristics of the region and the settlements (both ancient and modern). Elevation, slope and aspect values are three main morphological parameters calculated for the whole region and settlements in the previous chapter. Each parameter will be investigated here separately to see the relationship between these parameters and settlements.

Elevation: Elevation histograms of both ancient and modern settlements are subtracted from the histograms for the whole area (Figure 5.5). The positive region in this histogram indicate that the percentage of the settlements is greater than the percentage of the region for this interval. Therefore, positive number suggest that this elevation is preferred as a site for settlements. Similarly, the negative areas suggest that these elevations are avoided as settlement site.

The histogram for ancient settlements clearly indicates that the interval 0-100 m has a positive value of 27 % which is the most preferred interval. The range between 100 and 1000 m has an irregular and inconsistent values changing between positive and negative values. The elevation above 1000 m, on the other hand, has consistently negative values suggesting that these elevations are avoided for settlement. This histogram, therefore, can be interpreted as indicating two intervals: a) 0 to 1000 m preferred elevations with minor avoided intervals, and b) above 1000 m avoided elevations for ancient settlements.

The histogram for modern settlements displays two distinct intervals of elevation: a) 0 to 1200 m have positive values suggesting a preferred interval for modern settlements, and b) 1200 to more than 3000 m with negative values indicating avoided elevations.

Comparison of two histograms indicates, in general, a similarity in the patterns of the intervals. The reason for the variation of the plus and minus values in ancient histogram is due to the number of settlements (44) which is not enough to have a consistent pattern in 0 to 1000 m interval. The main difference between the two histograms is that the upper limit for ancient settlements is 1000 m, whereas this limit is 1200 m for modern ones. This shows that modern settlements climbs approximately 200 m higher during the time passed.

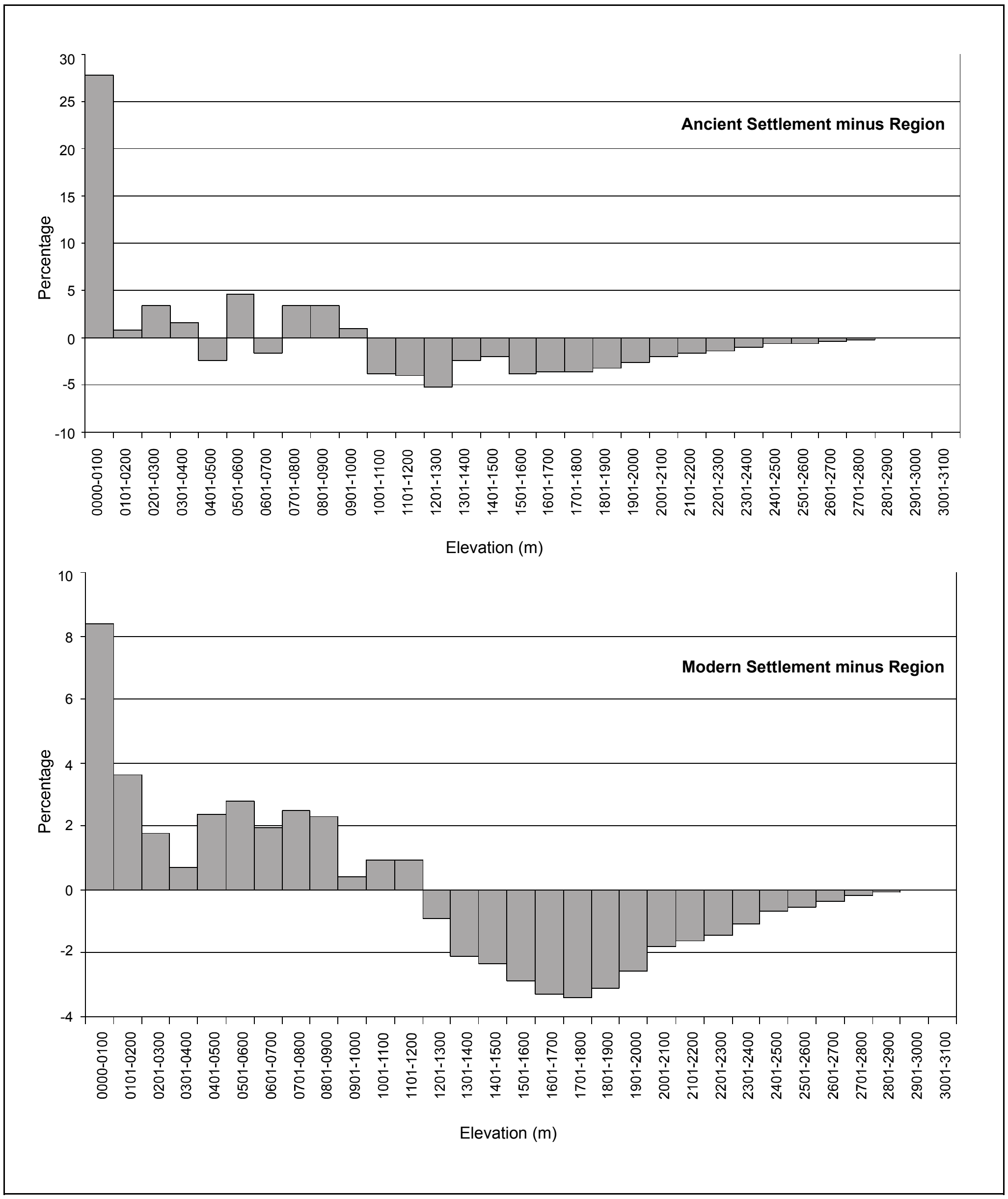


Figure 5.5 Subtracted histograms of settlements and the region for elevation.

Slope: Similar diagram is prepared for the slope values by subtracting the histogram of settlement slope from the histogram of region slope. The results are given in Figure 5.6 for ancient and modern settlements.

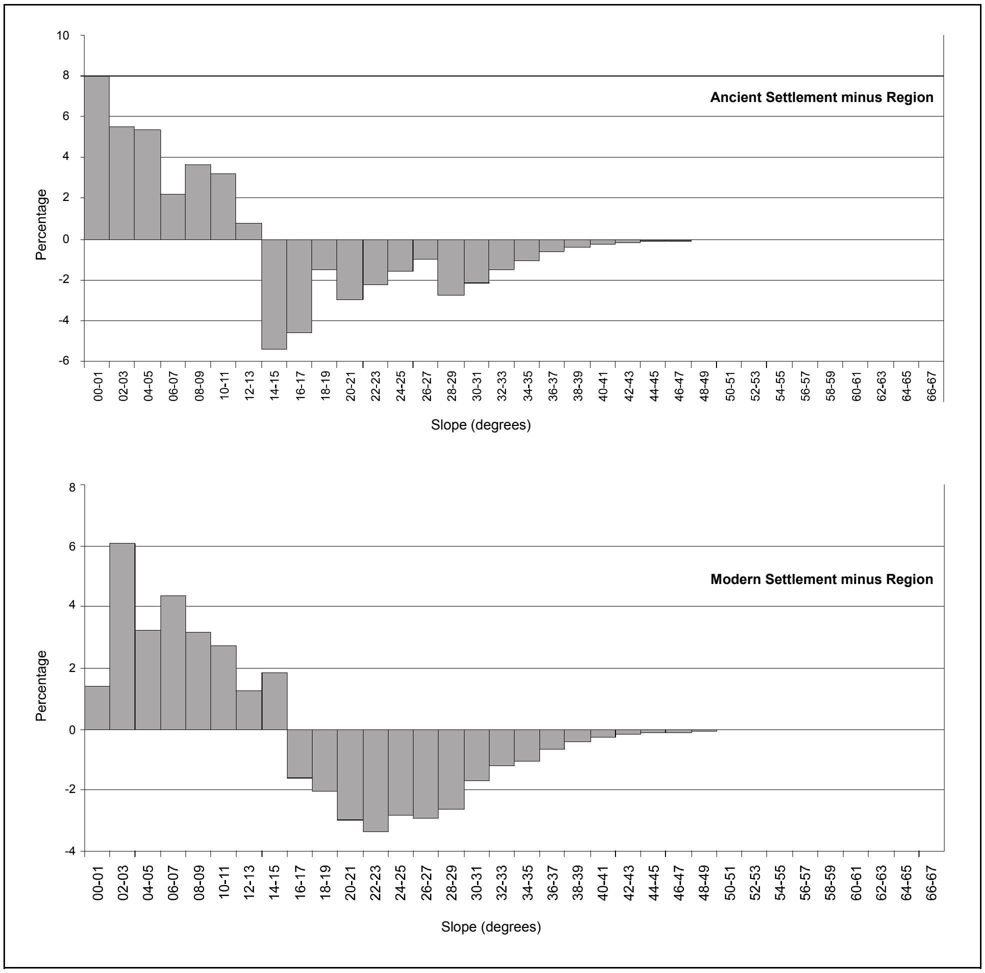


Figure 5.6 Subtracted histograms of settlements and the region for slope

The slope value goes up to 67 degrees in the region, but the maximum slope for ancient settlements is 13 degrees and for modern settlements is 15 degrees. The histograms prepared for both settlement types have similar pattern indicating positive values for low slope amounts and negative values for high.

Comparison of two histograms indicate that:

- The upper limit for the preferred interval for ancient settlements is 13 degrees. This limit is 15 degrees for modern settlements. Therefore, the slope increased by 2 degrees from ancient times to the recent.

- Ancient settlements preferred lower slopes (0-5 degrees), as indicated by high percentages of these intervals. Modern settlements, on the other hand, have low percentage at 0-1 degrees and are mostly concentrated at 2-11 degrees.

Aspect: Aspect values of the settlements are subtracted from that of region to identify positive and negative regions. Results of the process are given in the histograms in Figure 5.7. Aspect values are divided into nine intervals including eight principal directions and the flat areas.

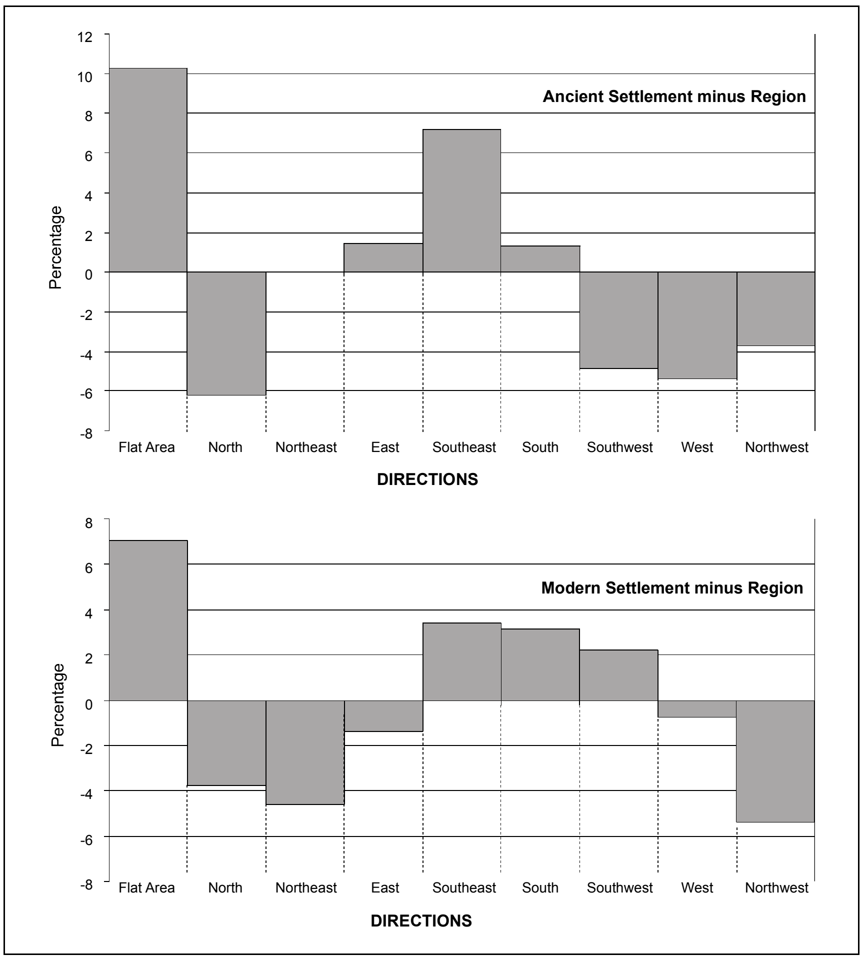


Figure 5.7 Subtracted histograms of settlements and the region for aspect values.

According to the information provided by these histograms:

- Southeast and South facing slopes, and Flat areas are preferred by both ancient and modern settlements

- North, West and Northwest facing slopes are avoided by both ancient and modern settlements
- Southwest is avoided by the ancient settlements but preferred by the modern settlements
- East is preferred by ancient settlements but avoided by the modern ones,
- Northeast is avoided by the modern settlements; there is no data for ancient settlements,
- In both settlement types Flat areas are the mostly preferred landforms (slope amount is less than 2 degrees in these regions). This is followed by Southeast interval.

5.4 Rock Type Analysis

Purpose of this analysis to investigate if there is any tendency to select certain types of rock units for the settlement site. For this reason the distribution of the settlements in relation to the rock units is analyzed by simply subtracting the percentages of settlements from the percentages of the rock units in the area. The results of this process is given in the histograms in Figure 5.8.

Following observations can be made from the histogram prepared for ancient settlements:

- Four units have positive values (preferred) and three units have negative (avoided) values. Preferred units are Quaternary alluvium, Pliocene clastics, and Neritic limestone units. The percentage of Quaternary alluvium is overemphasized, whereas the percentages of Pliocene clastics is very close to zero (neutral).
- Three avoided rock units (clastics and carbonates, pelagic units and melange) have almost similar negative values.

The two most distinguished rock types preferred by ancient people are Quaternary alluvium and Neritic limestone. The reason for preference of the Quaternary alluvium might be that they produce fertile agricultural fields and they have a close vicinity to the flowing waters (streams). On the other hand, Neritic limestone is suitable to be used for building stone as it is easy to say that they used it in the construction.

The histogram prepared for the modern settlements suggest that:

- Quaternary alluvium and clastics and carbonates are obviously preferred rock units.
- Pliocene clastics and melange have percentages very close to zero and can be considered as neutral.
- Neritic limestone (both types) and pelagic units are not preferred.

Based on the comparison of two histograms it can be concluded that only one unit is consistently preferred by two settlement types which is Quaternary alluvium. Pliocene clastics in both has low positive values. One unit (pelagic units) is avoided by both settlements. All other rock types have opposite values for ancient and modern settlements.

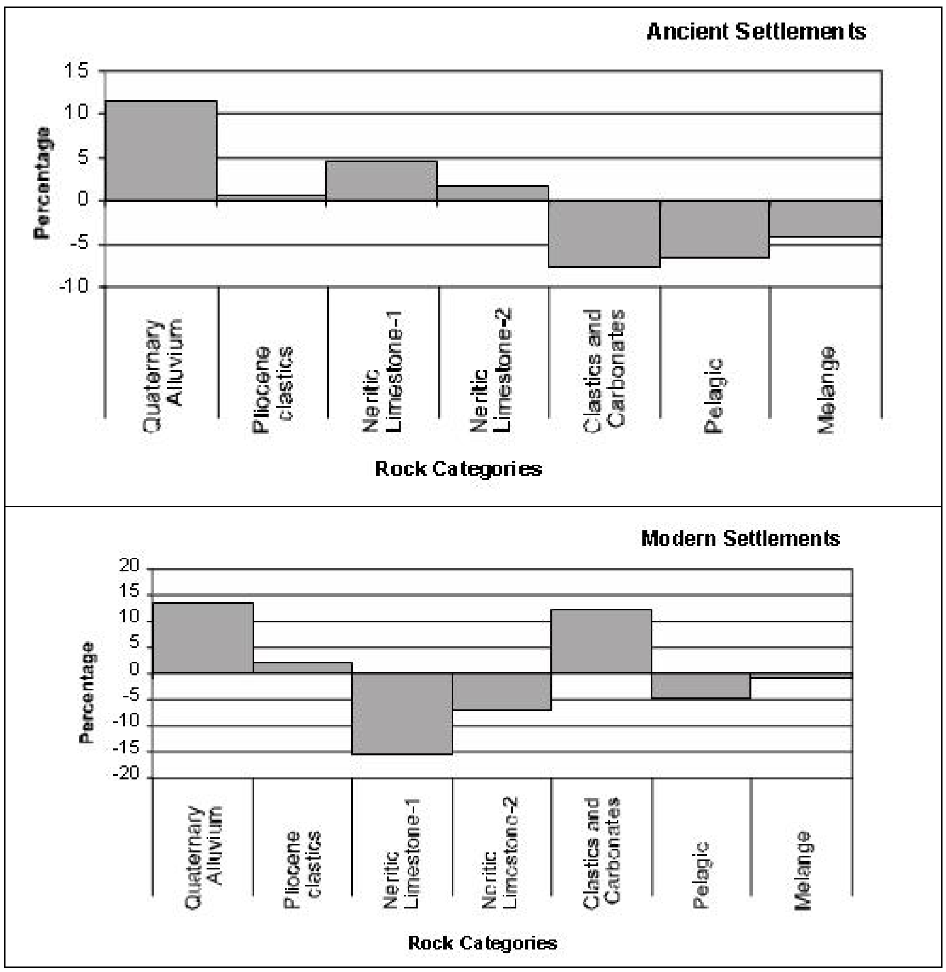
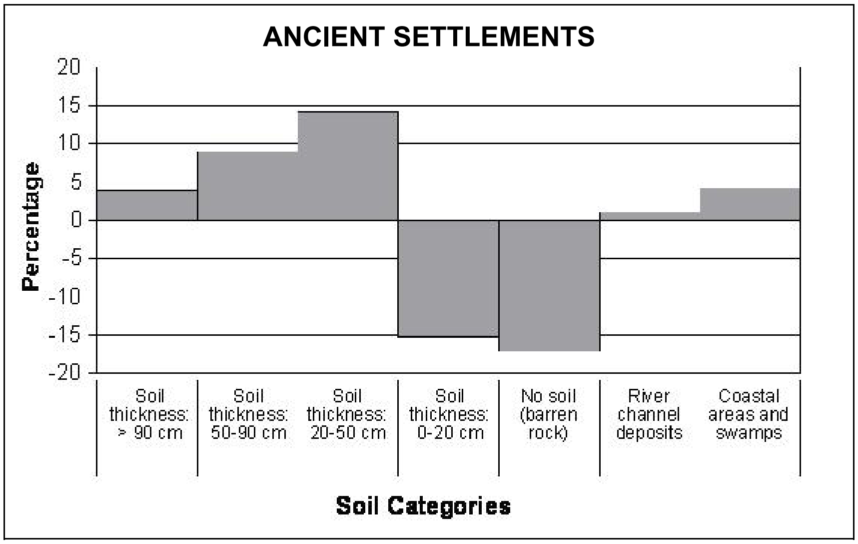


Figure 5.8 Subtracted histograms of settlements and the rock types existing in the area.

5.5 Soil Type Analysis

The logic of the soil analysis is similar to that of rock analysis. Percentage of the settlements in each soil category is subtracted from the percentage of this category for the whole region. The results are given in the histograms in Figure 5.9. Soil types with positive values are interpreted as preferred and others as avoided classes.



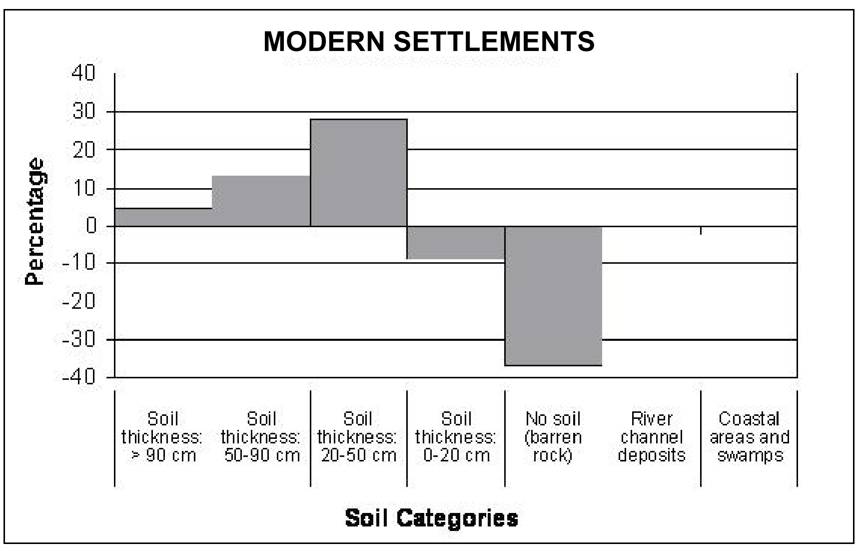


Figure 5.9. Subtracted histograms of settlements and the soil types existing in the area.

Two histograms, in general, have similar patterns as far as preferred and avoided soil types are considered. Both settlement types have positive values for the soils with thickness greater than 20 cm (the first three intervals). For the next two intervals (soil thickness between 0 and 20 cm, and barren rock) they both have negative values. River channels and coastal areas have positive values slightly above zero for the ancient settlements. These two classes have zero value for the modern settlements.

The result is very clear for the soil analysis. The areas that have soils thicker than 20 cm, river channel and coastal areas are preferred for the ancient settlements and less than 20 cm are avoided. The main reason for that might be the agriculture.

5.6 Visibility Analysis

Visibility analysis is carried out to test if the site is visible from certain distance. The main purpose in this test is to understand if there was an attempt to hide the settlement or not. The analysis is based on tracing a ray (line-of-sight) from the location of observer (settlement here) to each possible target location on the surface and back to the observation point (Ertepınar, 2005). The higher elevations along the path will form an obstacle for the surfaces behind them (Figure 5.10). By repeating the raytracing procedure in all directions a viewshed is produced (Heywood, *et al.,* 1998). The output map will be a binary map consisting of visible and invisible parts. For large distances the curvature of earth and the transparency of the atmosphere should be taken into consideration (Burrough and McDonnell, 1998).

One of the important parameters in this analysis is the viewing radius which defines the distance for which the visibility analysis will be carried out. Since the visibility distance is limited by the nature of the human eye and the atmospheric effects (haze), this radius is chosen as 5 km (Ertepınar, 2005).

This process is carried out only for ancient cities because they are the concern of this thesis. For each ancient site a circle is defined on the SRTM data (DEM) with a radius of 5 km. This area is cropped out from the DEM and the analysis is performed using Global Mapper.

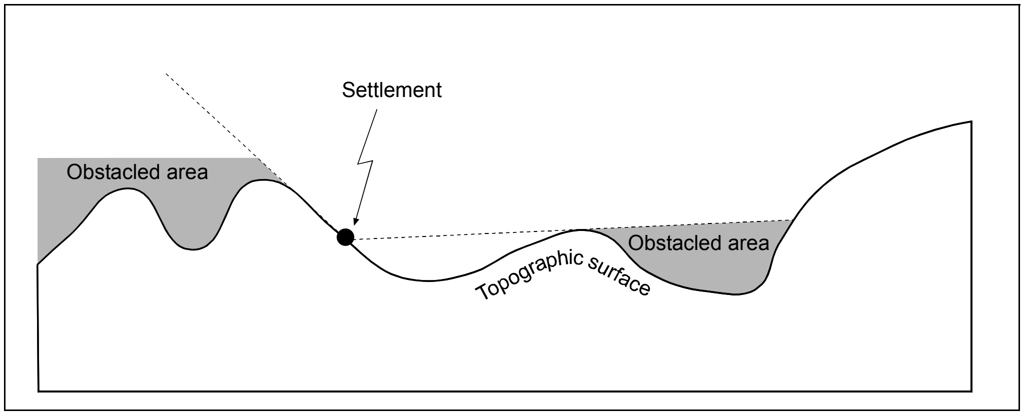


Figure 5.10 Concept of visibility analysis illustrated on a topographic profile.

Results of the visibility analysis are illustrated in Figure 5.11 for 44 ancient settlements. The circle in the figure has a diameter of 5 km which is the maximum distance “to see” a settlement in this study. Total area of each circle is 78.5 km2. Small red dot at the center of the circles represents the location of the settlement. Colored image at the background is cropped SRTM showing the elevation in the area where blue stands for lower and red for higher elevations. The grey polygons over the image show the areas from where this settlement is visible. For the coastal areas the sea is masked and is illustrated by cyan color.

The area covered by the visible region is calculated to quantify the visibility in percentages. For the coastal settlements visibility is calculated only for the land area and is later is optimized to 78.5 km2. The results of the analysis are given in two tables; one for the settlements on the land (Table 5.2) and the other for the coastal settlements (Table 5.3)

Accordingly, the minimum and maximum visibilities of the ancient settlements range from 0.1 to 70.6 % suggesting a very wide visibility range. The average visibility of the land settlements (28.3 %) is almost twice as the coastal settlements (15.3 %).

Eight settlements have less than 5 % visibility. These are Phellos (0.1 %), Tlos (0.1%), Kormos (0.1 %), Phaselis (0.2 %), Gagai (0.2 %), Soura (0.2 %), Antiphellos (0.1 %) and Isında (0.2 %). A brief description of these sites is as follows:

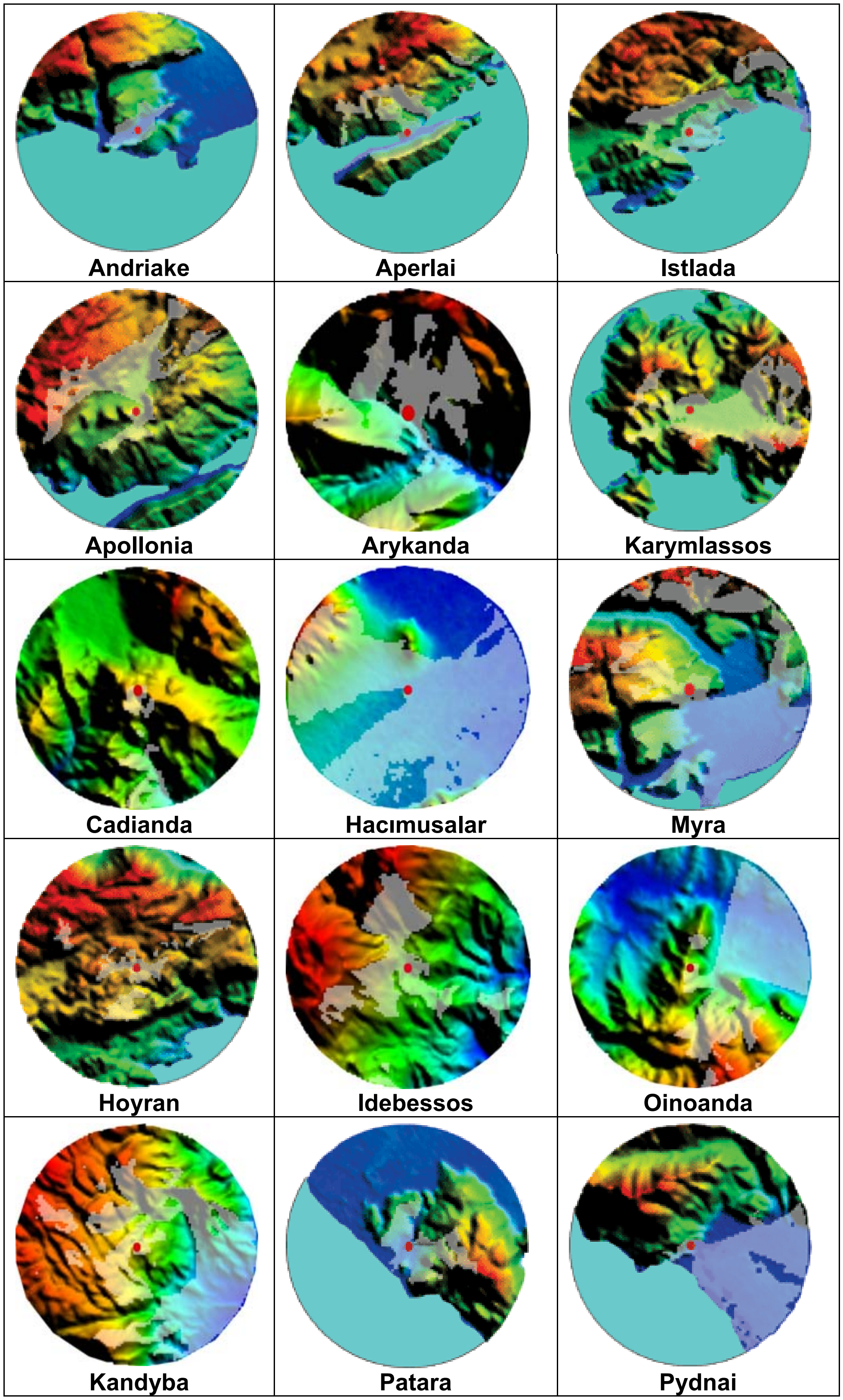


Figure 5.11 Results of viewshed analyses. Grey shaded areas over the DEM are visible areas from the ancient sites.

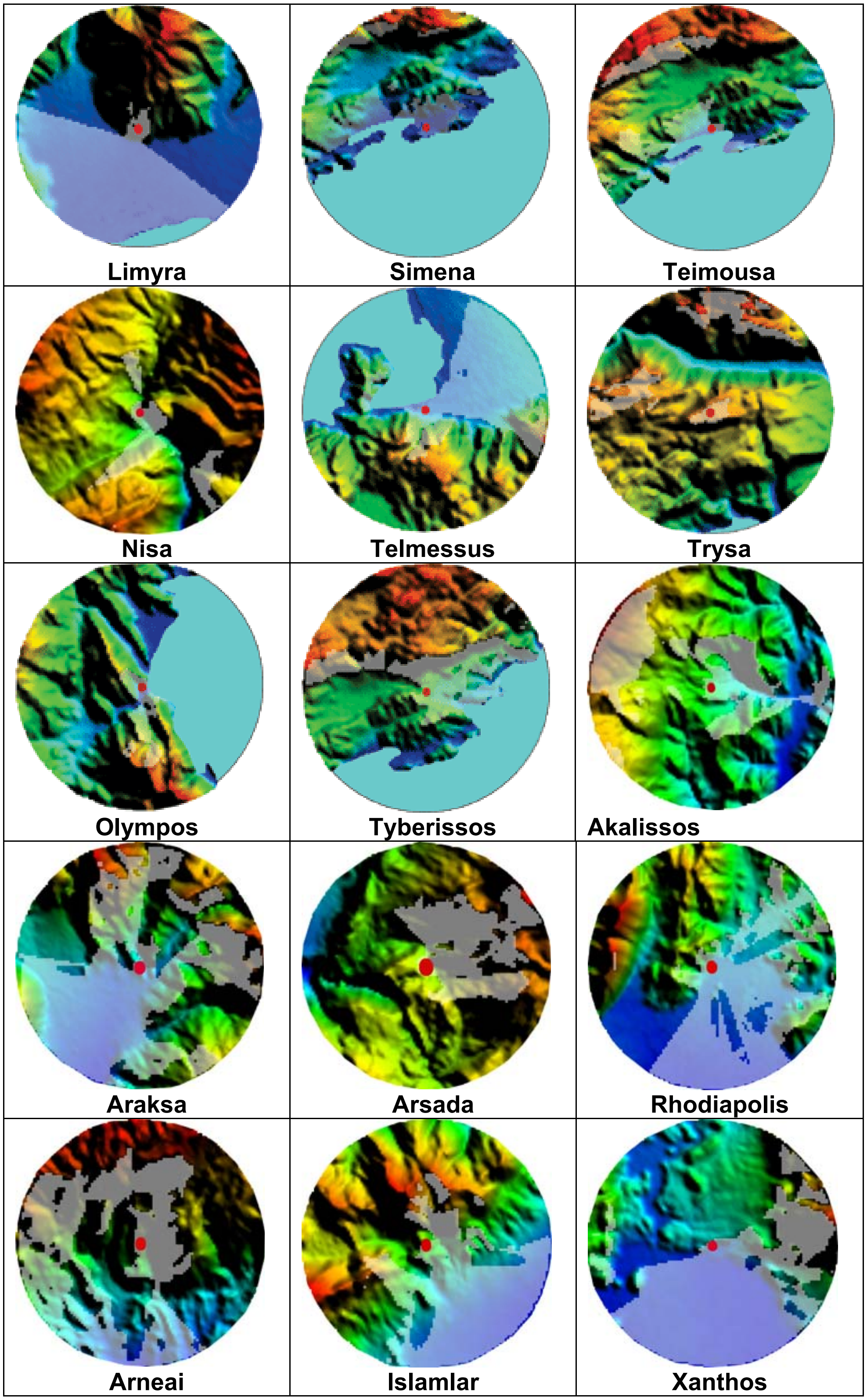


Figure 5.11 (continued)

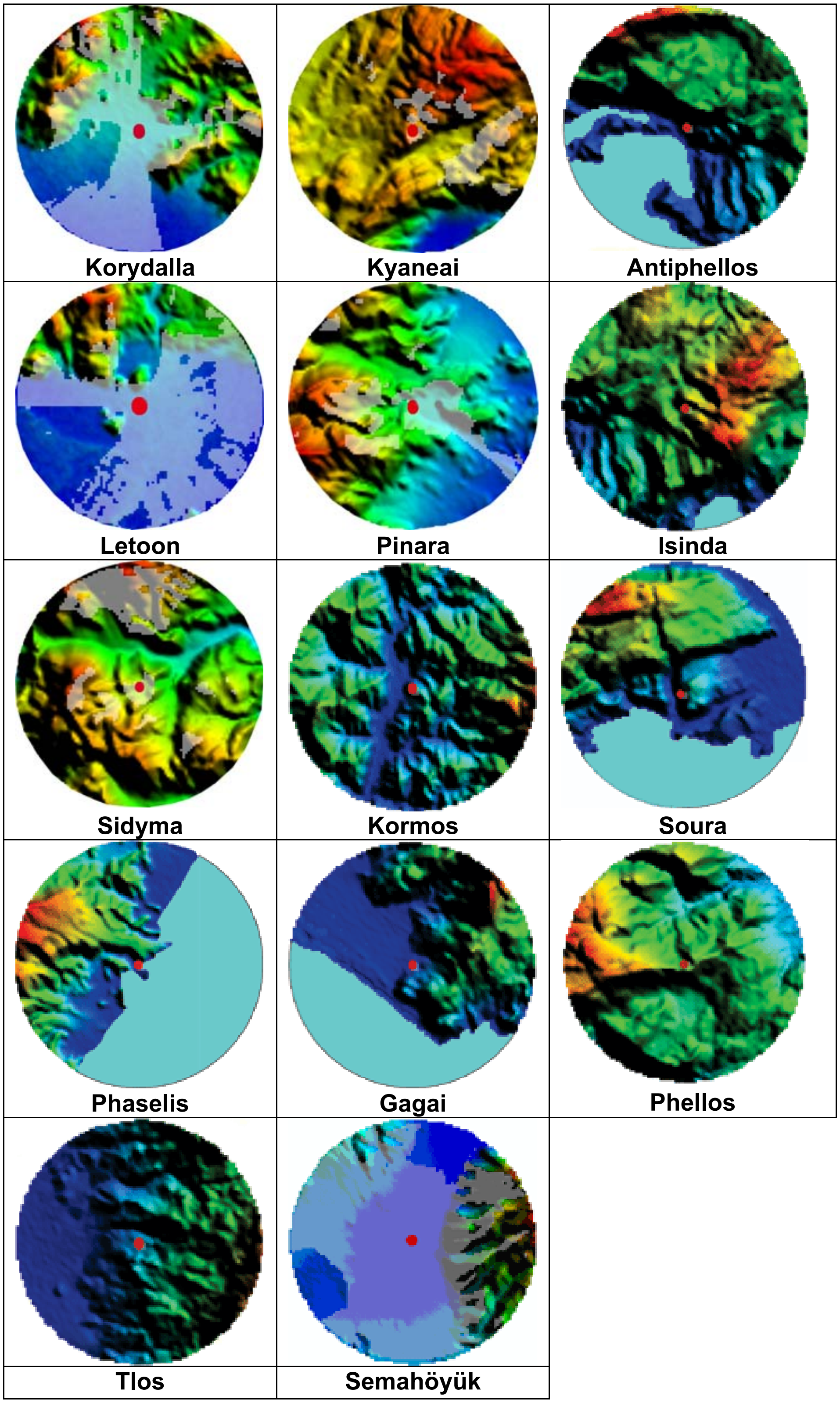


Figure 5.11 (continued)

Table 5.2. Result of visibility of ancient settlements located on the land

Settlement	% Visibility
Araksa	53,1
Arsada	19,2
Islamlar	33,4
Korydalla	39,6
Letoon	54,0
Pinara	14,5
Sidyma	15,0
Xanthos	47,6
Arneai	40,4
Kyaneai	8,4
Phellos	0,1
Rhodiapolis	36,7
Tlos	0,1
Akalissos	24,1
Kandyba	37,8
Cadianda	5,0
Arykanda	33,0
Oinoanda	29,0
Kormos	0,1
Idebessos	17,8
Nisa	7,7
Hacımusalar	63,8
Semahöyük	70,6

Table 5.3 Results of the ancient settlements located on the coastal areas

Settlement	Area (km2) (sea ignored)	% visibility	% visibility optimized to 78.5 km2
Andriake	44.67	3.9	6,8
Antiphellos	62.34	0.1	0,1
Aperlai	42.9	10.7	19,6
Apollonia	72.92	15.0	16,1
Gagai	54.95	0.1	0,2
Hoyran	74.54	6.4	6,7
Isinda	76.88	0.1	0,1
Istlada	51.56	16.7	25,4
Karymlassos	58.48	15.6	20,9
Limyra	76.25	37.4	38,5
Myra	75.12	43.3	45,2
Olympos	52.61	3.6	5,4
Patara	50.26	7.5	11,7
Phaselis	40.27	0.1	0,2
Pydnai	56.1	21.9	30,7
Simena	36.16	25.7	??
Soura	58.48	0.1	0,2
Teimousa	49.16	11.6	18,6
Telmessos	62.49	24.4	30,7
Trysa	78.31	8.9	8,9
Tyberissos	55.82	14.3	20,1

Phellos: The site is located on the southern slope of Felenk mountain (Figure 5.12). A small hill is located in front of the settlement forming a neck where the site is exactly located. This hill, therefore, acts as a barrier which decreases the visibility.

Tlos: Tlos is located within one of the minor creeks connected to Dikilitaş river. Due to the concave shape of the topography, it is visible only from west (Figure 5.12).

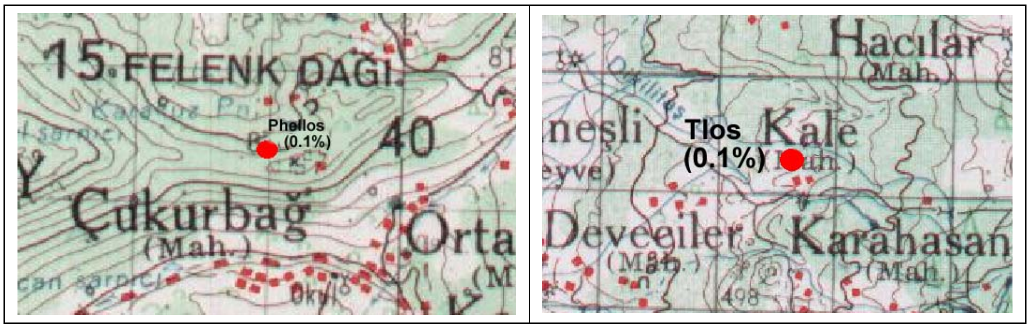


Figure 5.12 Topographic maps showing locations of Phellos (left) and Tlos (right).

Kormos: Kormos is located on the eastern side of the plain developed over Alakır stream (Figure 5.13). The site is within a small concave topography facing southwest. Therefore, Kormos is visible only in a very narrow corridor from southwest.

Phaselis: Phaselis is located on the western side of Asar peninsula (Figure 5.13). Two factors for the low visibility of this site are: 1) It is located on a sloping surface, 2) There is a minor concave-west topographic landform where the site is situated. Therefore, it is visible only from west.

Gagai: Gagai is located on the eastern margin of a flat plain, and therefore, a higher visibility should be expected for this settlement (Figure 5.14). The site, however, is within a small creek flowing westward. Therefore, it is visible only through this creek and is not visible except the west direction.

Soura: Soura is located in a narrow depression that extend in NE-SW direction. It is therefore, surrounded by high topographic masses (Figure 5.14). It is visible only from southwest.

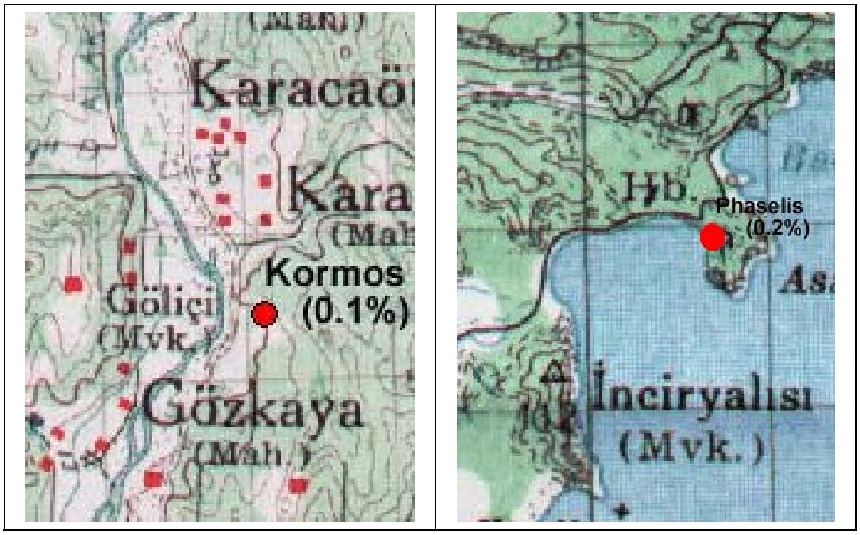


Figure 5.13 Topographic maps showing locations of Kormos (left) and Phaselis (right).

Figure 5.14 Topographic maps showing locations of Gagai (left) and Soura (right).

Antiphellos: Antiphellos is located over a slope that faces southeast (Figure 5.15). The slope is parallel to the shoreline. Variation of the topographic contours indicate that this is not a smooth slope, but rather an irregular surface that possesses several concave-convex landforms. Therefore it is not visible from the land.

Isında: This site is located on the southeastern slope of a depression that extends almost in N-S direction (Figure 5.15). The arrows in the map indicate the depression. This depression might be a karstic structure formed by the solution of limestone (neritic limestone in this study).

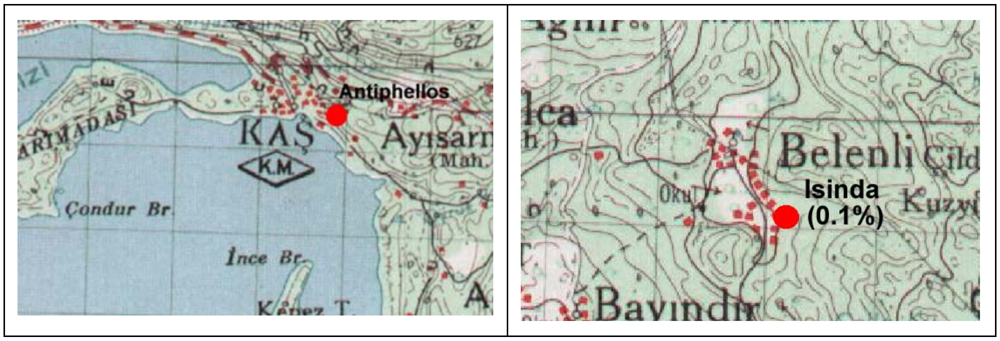


Figure 5.15 Topographic maps showing locations of Antiphellos (left) and Isinda (right).

Maximum visibility is observed mostly for the settlements away from the coastline. Five settlements with larger visibility values are Semahöyük (70.6 %), Hacımusalar (63.8 %), Letoon (54.0 %), Araksa (53.1 %) and Xanthos (47.6 %). Brief descriptions of these sites are as follows:

Semahöyük: Semahöyük is located towards the eastern margin of a plain east of Elmalı (Figure 5.16). This plain is one of the largest alluvial plains of Teke peninsula filled with Quaternary fluvial deposits. The slope amount is zero for large distances which is the main reason for the high visibility of the settlement. The site not visible only from east after 1 km due to the high topography in that part.

Hacımusalar: Hacımusalar has similar topographic conditions to that of Semahöyük. It is located on a large Quaternary alluvial plain to the southwest of Elmalı. It is visible on all sides except the western part where high hills are present. Islamlar settlement is located in that part for which the visibility drops to 33.4 %

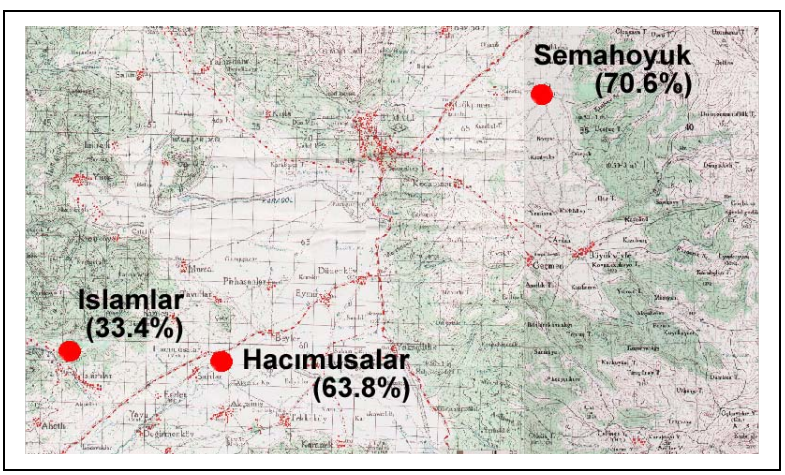


Figure 5.16 Topographic map showing locations of Semahöyük, Hacımusalar and İslamlar.

Letoon and Xanthos: Letoon and Xanthos are located over Quaternary deposits close to the shoreline (Figure 5.17). These deposits cover a large area formed by the deposit of Eşen river. Visibility of Letoon (54 %) is slightly larger than the Xanthos (47.6 %) because Xanthos is located on the northern margin of the plain. Visibility of both settlements are blocked from the north.

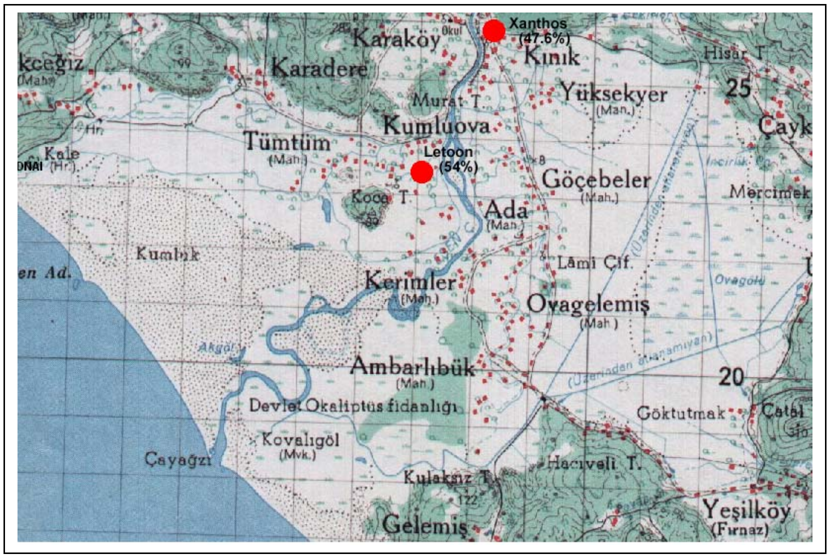


Figure 5.17 Topographic map showing locations of Letoon and Xanthos.

Araksa: Araksa is located on the northeastern margin of a flat plain developed over Kocaçay stream. This plain is filled with Quaternary fluvial deposits and is characterized by low slope. The site is visible from whole southwest, west and south. It is also visible from north and east due to gentle topography.

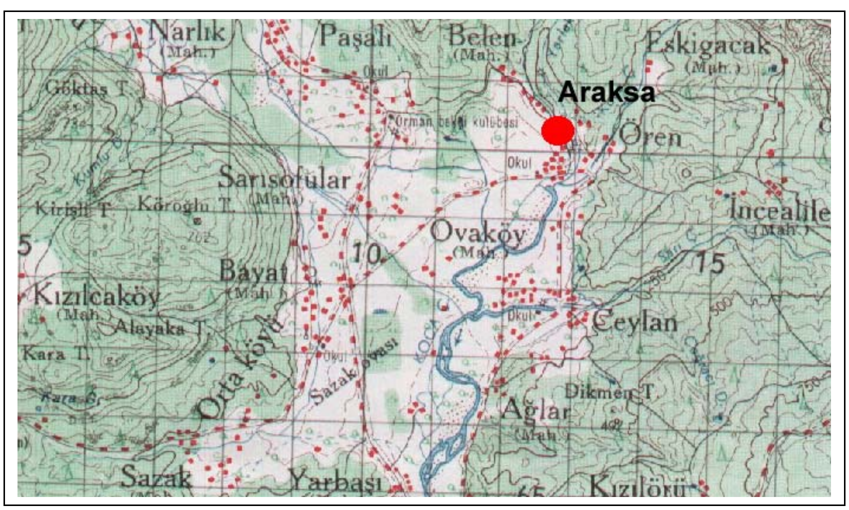


Figure 5.18 Topographic map showing location of Araksa.

The result of the visibility analysis show that the ancient settlements situated on the coastal parts of the land are hidden from the sea. If the dividing the time periods was possible for this study, this fact might be observed much more clearly.

5.7 Prediction

In this part of the study, an attempt will be made to predict location of unknown settlements in Lycia. As it is known from several resources related to Lycian history (see Chapter- 3), several settlements (cities) are reported that can not be located today.

The prediction that will be made in this study is based on the decision rules derived from the ancient settlements used in the study. These are the 44 settlements described in the previous chapters. The decision rules applied here are based on the results of the analyses explained previously. These analyses include three topographic parameters (elevation, slope, and aspect), soil type, rock type, distance between two ancient settlements, and the distance of ancient settlement to a modern settlement. Results of the analyses are summarized in Table 5.4 which form the quantified variable used for the prediction.

The logic of the prediction is illustrated in Figure 5.19 Accordingly, for each variable a layer is prepared which is a binary raster map that classifies the area into two classes as 1) true (suitable site), and 2) false (unsuitable). Suitable areas are assigned a value of “1”, and others “0”. Seven layers are then added to each other to find the final score of each pixel on the earth surface. These scores, theoretically, range between zero and seven. If the final score is zero that means none of the parameters satisfy the condition for a suitable site. If, on the other hand, the final score is seven; then all parameters indicate a suitable location. Any number in between implies that some parameters indicate suitable whereas some other unsuitable areas. Since the accuracy of the output depends on the selection of the thresholds, a maximum attention is given to the determination of the thresholds. The first five parameters are derived from the “difference histograms” of related data layers. These are illustrated in Figure 5.4 for the elevation, Figure 5.5 for the slope, Figure 5.6 for the aspect, Figure 5.7 for rock type, and Figure 5.8 for the soil type. The last two thresholds, on the other hand, are selected from “distance histograms” for “ancient-to-ancient” and “ancient-to-modern” as illustrated in Figure 5.2.

Table 5.4 Threshold values for seven parameters used in the prediction of unknown settlements.

PARAMETERS	THRESHOLD VALUES	
	TRUE	FALSE
Elevation	< 1000 m	> 1000 m
Slope	<=13 degree	> 13 degree
Aspect	Flat areas South-facing slopes, Southeast-facing slopes, East-facing slopes	North-facing slopes, Northeast-facing slopes, Southwest-facing slopes, West-facing slopes, Northwest-facing slopes
Rock Type	1. Quaternary Alluvium 2. Pliocene Clastics 3. Neritic Limestone 1 4. Neritic Limestone 2	1. Clastics and carbonates 2. Pelagic units 3. Melange
Soil Type	1. Soil thickness >= 20 cm 2. Fluvial deposits 3. Coastal deposits	1. Soil thickness < 20 cm 2. Barren rock
Distance (Ancient to Ancient)	>= 1500 m	< 1500 m
Distance (Modern to Ancient)	<= 1000 m	> 1000 m

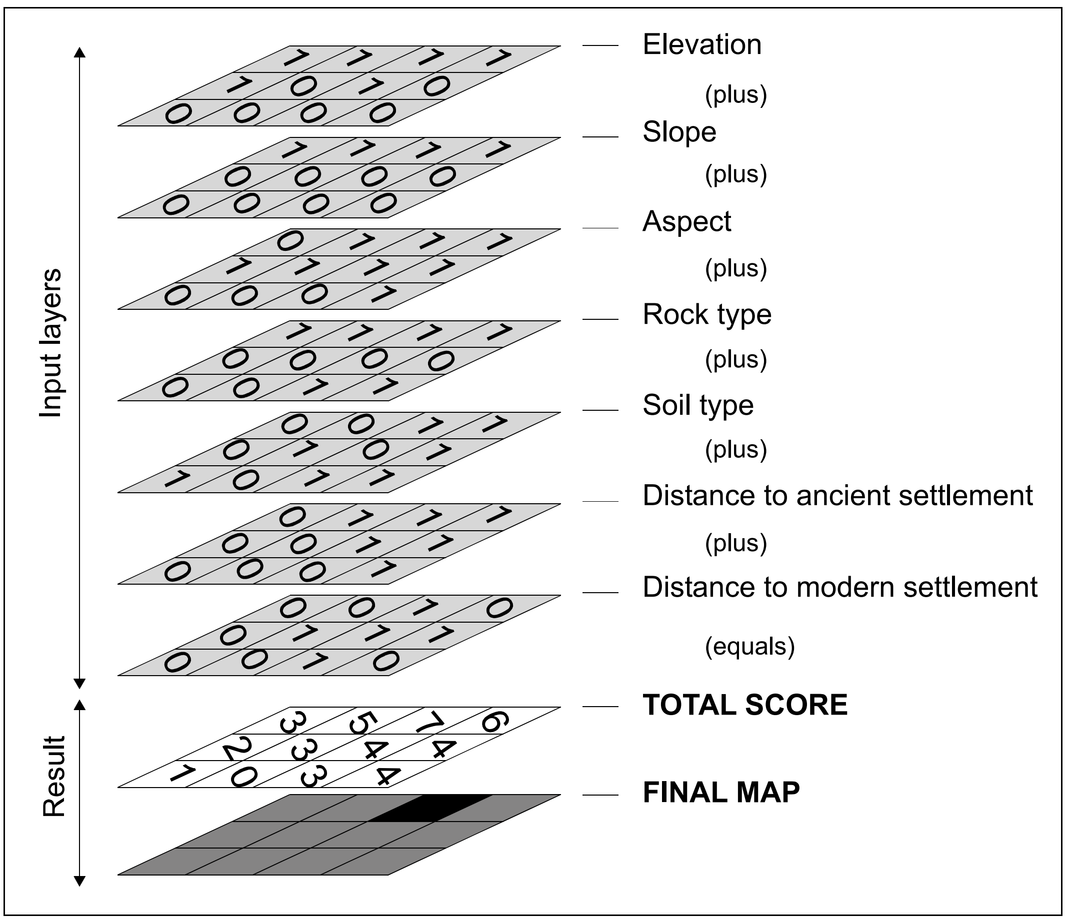


Figure 5.19 Algorithm of the prediction made in the study. Numbers refer to suitable (1) and unsuitable (0) pixels. Total score is obtained by adding 7 layers. The black pixel in the final map (with a score of 7) is the only suitable location in this example.

The results of the analyses for each layer are shown in Figure 5.20. A summary of the results is illustrated in Table 5.5 and briefly explained below separately for each layer.

Table 5.5 Summary of the prediction analysis for each layer

	Suitable areas (total pixels: 922022)	
	Frequency of pixels	Percentage
Elevation	468411	50.8
Slope	475178	51.5
Aspect	99651	10.0
Rock type	137941	14.9
Soil type	144890	15.7
Distance to ancient settlement	890122	96.5
Distance to modern settlement	223905	24.3

Elevation: The histogram generated by subtracting the elevation data of the ancient settlements from the elevations of the whole region suggest the elevation above 1000 m is not suitable for selection a site for ancient settlements (Figure 5.4). There are, however, four settlements above this elevation in the database. These are Hacımusalar (1044 m), Semahöyük (1123 m), Islamlar (1399 m), and Oinoanda (1459 m). These settlements make 9 % of the whole settlements indicating that 91 % of ancient settlements satisfy the elevation threshold.

Resultant map for the elevation layer suggest that the suitable areas for the prediction form a belt almost parallel to the coastal zone (Figure 5.20). The inner sections (black) are above 1000 m and are marked as unsuitable. The percentage of the suitable areas is 50.8.

Slope: The threshold for the slope is determined as 13 degrees based on the subtracted histograms illustrated in Figure 5.5. Ten of ancient settlements have slope amounts greater than this threshold. These are Arsada (13.9°), Isinda (15.6°), Pydnai (17.5°), Phellos (18.4°), Antiphellos (19.7°), Nisa (20.6°), Kandyba (21.4°), Soura (23.7°), Islamlar (24.2°), and Limyra (27.6°). Accordingly, about 73 % of the settlements satisfy the slope threshold. Total amount of suitable areas according to slope threshold is 51.5 % which is the greatest amount for topographic parameters.

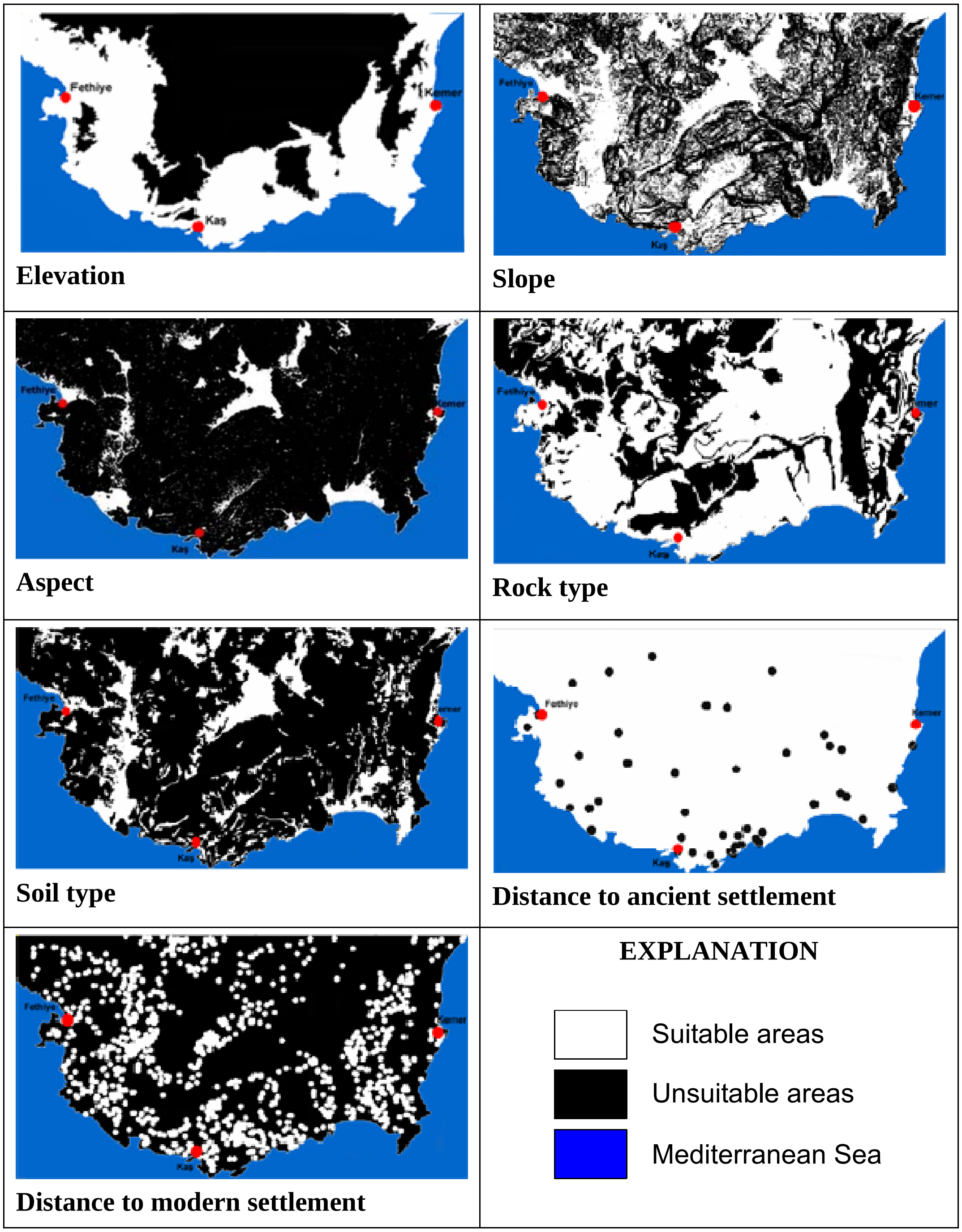


Figure 5.20 Maps produced after applying thresholds for each parameter to predict location of unknown settlements. Threshold values are illustrated in Table 5.4

Resultant map for the slope threshold suggest that there are large white (suitable) areas if only slope is considered. These areas mostly correspond to Quaternary fluvial deposits which form large flat plains in the area. The best pronounced plains are those observed around Elmalı, along Eşen river and some other coastal regions.

Aspect: Aspect values which originally range between 0 and 360 degrees are divided into eight principal directions with 45 degrees intervals. One more interval is added that includes the flat surfaces with slopes less that 2 degrees. According to the difference histograms (Figure 5.6) the south-facing, southeast-facing, east-facing slopes and the flat areas are classified as suitable in the threshold and all others as unsuitable. Number of the ancient settlements that do not satisfy this condition is 16. These settlements are Apollonia (22°), Istlada (57°), Arsada (58°), Antiphellos (218°), Teimousa (220°), Tlos (225°), Patara (275°), Nisa (277°), Cadianda (284°), Gagai (295°), Soura (308°), Kormos (317°), Phellos (341°), Kyaneai (342°), Kandyba (349°) and Simena (350°). The map generated by the aspect threshold of ancient settlements (Figure 5.20) indicates that 10.0 % of the area is suitable as far as aspect is considered.

Rock type: The threshold for the rock type is based on the categorical classification of the abundance of the settlements in a particular rock type versus the total area covered by this rock type (Figure 5.7). Therefore, if the percentage of the settlements in one rock type is greater than the percentage of this type; then this rock type is assumed to be preferred and classified as suitable rock type. Other are considered as unsuitable. According to the adopted threshold four rock units are suitable (Quaternary alluvium, Pliocene units, Neritic limestones 1 and 2) and others are unsuitable. Nine ancient settlements (about 20 % of all) fall in the unsuitable rock types. These are Gagai, Nisa, Arsada, Phellos, Kandyba and Islamlar in clastics and carbonates rock type; Phaselis and Kormos in melange; and Oinoanda in pelagic units.

According to the result map prepared for the rock type, the unsuitable rocks are located to the east, northwest and central-south of the area. Percentage of suitable rock type is 14.9

Soil type: The threshold for the soil type is determined in the same way as for rock type. Two classes (soil thickness less than 20 cm and barren rock) are regarded as unsuitable classes and all other 5 classes as suitable. Accordingly 20 settlements are classified as unsuitable most of which are located over barren rocks. The map generated for the soil types is very similar to the map prepared for the slope. That indicates a genetic relationship between these two parameters. The percentage of suitable soil type is 15.7.

Distance to ancient settlement: The distances between the ancient settlements are calculated in the first section of Chapter 5. The results indicate that the minimum distance between two ancient settlements is 1523 m (Table 5.1). This value (rounded to 1500 m) is taken as threshold that implies an ancient settlement can not be located in the vicinity of another ancient settlement nearer than 1500 m. Therefore, the circular regions around the ancient settlements with a radius of 1500 m are assigned as unsuitable areas.

Distance to modern settlement: Distance analysis that investigates the distances between ancient and modern settlements indicates that today there is a modern settlement in the close vicinity of the ancient settlements. This might be due to the reason that the site of the ancient settlement is suitable and that this site is inherited by the recent period settlements. Therefore, during the prediction of an ancient site a modern settlement should be expected to exist in the neighborhood. To estimate that distance the histogram (Figure 5.2) showing the distances between these two types of settlements is used. This histogram which is prepared at 500 m interval indicates that more than 70 % of the ancient settlements are located to a distance less than 1000 m. Therefore, the threshold for this analysis is selected as 1000 m and circles with this radius are drawn around the modern settlements. Suitable areas are therefore within these circles.

Final map: After generation of all individual maps for seven parameters, all these maps are added to find the final scores. Final scores theoretically should range between zero and seven. A pixel with a value of zero means that none of the parameters is suitable for that pixel. Value of seven, on the other hand, indicates that all parameters are suitable for this location. The percentages of the final scores are given in Table 5.6.

Table 5.6 Percentages of scores for various combinations of parameter used in prediction.

Score	Description	Area (km2)	Percentage
0	No parameter is suitable	5.9	0.06
1	One parameter is suitable	775.1	8.13
2	Two parameters are suitable	2957.5	31.00
3	Three parameters are suitable	2772.6	29.09
4	Four parameters are suitable	1407.1	14.76
5	Five parameters are suitable	920.9	9.66
6	Six parameters are suitable	518.4	5.44
7	Seven parameters are suitable	173.6	1.82
	TOTAL	9531.2	

The final map can be prepared for different combinations of the parameters. This can be done in several ways. For example a weighting can be given for certain parameters which are believed to be more important than others; or only certain parameters can be considered after filtering through some statistical methods. In this study, however, all parameters are included in the generation of the final map assuming that they are all important and have the same weight on the selection of a site.

The final prediction map (Figure 5.21 and Table 5.6) indicates that %1.82 of the area potentially can hold unknown settlements. Distribution of white pixels emphasizes concentration of potential sites within two belts. The first belt is in the western part of the area extending in N-S direction. This area corresponds to the fluvial plain of Eşen river and its vicinity. The density of pixels increases in certain parts of this belt which are the most probable locations for unknown settlements.

The second belt extends as a narrow corridor between Kaş and Kemer. Density in this belt is greater in the vicinity of Kaş. Higher concentrations are observed towards the vicinity of coastline west of Kaş.

Figure 5.21 Final prediction map generated by adding layers of seven parameters. White pixels show suitable areas other unsuitable.

CHAPTER 6

DISCUSSION

Lycian settlements are examined in this study within the context of certain physical parameters that possibly affected the location of these sites. Physical parameters considered in this study are three morphological features (elevation, slope and aspect), rock type and soil type. The thesis started to evaluate the location of ancient settlements in relation to these parameters and ended with an attempt of prediction using the decision rules derived from these parameters. Modern settlements are also used to examine the change occurred during the time. GIS is intensely used in the study to generate new layers and make necessary queries.

The thesis will be discussed here under four heading that concentrate on:

1) Data used in the study
2) Method used in the study
3) Prediction
4) Contribution to Archaeology

6.1. Data Used in the Study

Boundary of study area: In this study it is intended to cover an area that would represent the land of Lycia. The exact boundary of this region, however, is not known. Therefore, the area bounded by the west of Antalya in the east, and Fethiye in the west is selected as study area. South of this area is defined by the shoreline which is a natural boundary. The islands within the Mediterranean Sea are not considered in the study. For the northern boundary, on the other hand, a straight line is drawn in E-W direction to limit the area in the north. This boundary could be selected basing on natural parameters such as mountain ridges or stream valleys. Such a natural boundary which might also be the actual boundary of Lycian region would produce better results. Natural boundary, however, is not used in this study due to the lack of data.

The coordinate system used: The coordinate system used in the study is Latitude / Longitude with the datum as “World Geodetic System 1984” and the Ellipsoid of

WGS 1984. Most of the data, however, are converted to UTM coordinates to perform the analysis. The coordinates for the ancient and modern settlements in the databases are also given in UTM. During the conversion there might be a difference in the values that may negatively affect the result of the analysis.

Data sources: Five data sets are used during the studies. These are 1) topographic data, 2) rock data, 3) soil data, 4) ancient settlement data, and 5) modern settlement data. For each data set first a raw data is obtained from different sources and is processed for the final set to be used in the analysis. During this period, it is obvious that, some accuracy problems would arise.

Topographic data is produced from SRTM data which originally has a pixel size of 90 m and resampled to 100 m. Therefore each pixel in this study corresponds to an area of 10000 m2. This resolution is optimum for this study considering the size of the study area. Total number of pixels used in the study is 922022.

Rock data is obtained from geological map of Turkey prepared by MTA (Mineral Research and Exploration, Turkey) at 1/500.000 scale. Larger scale maps (e.g. 1/100.000) would be better to use in the study because they are more detailed than the one used. The main reason not using these maps is that some sheets are not completed yet for this part of Turkey. The rock map initially contains 41 different units. This number is reduced into seven in this study because of two reasons: (1) several rock units are identical with minor variation either in their age of rock characteristics, (2) large number of classes would complicate the analysis. Reclassification of the rock types, however, is a subjective process and needs certain expertise. Someone else can reclassify the initial map in a different manner that may affect the results. One problem associated with the rock map is that the map is manually digitized and geo-referenced. This process may lead to some distortions in the map which may cause some accuracy problems.

Soil map is provided from General Directorate of Rural Services (Turkey). The original scale of the map is 1/100.000 which is a suitable resolution for this study. Since the soil map is obtained in vector format, it has a better accuracy compared to the rock map data. Similar to rock map, this map is also reclassified using the information provided in the attribute table of the map. Although there are several attributes of the soils, the thickness of the soils is used in the production of the final soil map that has seven classes.

Ancient settlement database is created manually by taking some of the sources explained in this study into consideration. Coordinates of the ancient settlements were read from 1/100.000 scale topographic map. Therefore the accuracy of the data is high and the error is not more than 50 m. For some settlements, however, the exact location is not defined in the literature. For this reason, only 44 settlements are used in this study although a total of 78 settlements are reported in the literature.

Modern settlement database is the least problematic data layer used in this study. A total of 870 settlements are identified in the 1/100.000 scale topographic maps and their coordinates are read with an error of less than 50 m. Highland settlements and recent touristic sites are not included in the study. Each settlement is represented by a pixel whatever the size of settlement is.

Use of other ancillary data: Use of other data that can be used to evaluate the location of an ancient site would increase the accuracy of the results obtained. These data could not be used simply because of the lack of data. Some examples of data layers that can positively affect the results are:

- **Water resources:** Although the water is assumed to be one of the most important parameters in the selection of a site, it is not used in this study because of several reasons. Firstly, there is no data on the springs in the region which is one of the water resources. The area in general is characterized by karstic topography which implies presence of intense karst-springs. Secondly, there is not an inventory of the seasonal and permanent streams in the area and it is difficult to identify the correct streams from drainage map of the region. Lastly, since the discharges of the water resources are not known it is almost impossible to convert the springs (point data) and the streams (vector data) into one single data type.
- **Time periods:** Some of the settlements used in this study are older than the others while some others are built during Lycian period. The response of the different period settlement to the physical parameters might be different. Therefore, a division of the settlements into different period can be very useful. This is not done in this study because of insufficient information on the ages of settlements.
- **Population:** Population of the settlement may refer to the size and, therefore, importance of the city. If the population of the settlements are

known, then a weighted analysis can be performed which may result in more meaningful output. In this study, however, the population of only a few settlements can be estimated and there is no data for the rest. Therefore, all settlements used in this study are considered to be equally populated.

- **Type of settlement:** All the sites in this study are considered as “settlement” and no distinction is made on the type of the site. Some settlements in the database, however, might be of other types such as military or religious origin. Some coastal settlements might be only small sites behaved like a port.
- **Ancient trade routes:** The trade routes might be another useful data for the evaluation of ancient settlements. This data could be very important particularly in the prediction of sites.
- **Detailed morphology:** Morphological parameters used in this study are elevation, slope and aspect. In most cases more detailed topographic expression is needed to evaluate the location of site. Curvatures of slopes, concave-convex slopes, drainage pattern, classification of landforms (such as valley, hill-top, flood plain, foot-slope etc) are examples of detailed landforms. The main reason for excluding these parameters in this study is that, there is not yet an automated way to extract these information from topographic maps and that a manual classification is a time-consuming process and out of the scope.
- **Forest and agriculture:** Presence of forest and agricultural fields should be considered as one of the primary physical parameters that can affect the location of the site. These data are not used in this study because there is not a reliable inventory for these parameters that reflect the usage in ancient times. Use of present day forestry areas and crop field can give an idea on the present day landscape and may not reflect the usage in the past.

6. 2. Method used in the study

The method used in this study can be divided into four major steps of data:

1. Obtaining Raw data: Raw data for each layer is obtained from their authorities. These are NASA for SRTM, MTA (Mineral Research and Exploration) for geological data, KHGM (General Directorate of Rural Services), and HGK (General Command of Mapping) for 1/100.000 scale topographic maps. These data are not modified in the study and their accuracy is not tested because these institutions are believed to be authototies in the production of these data.

2. Creating databases: For each layer used, the related data is modified or reclassified according to the purpose of this study.

To create the topographic database, SRTM data was used. By using related software, SRTM data has been modified to aspect, slope and elevation data for the region.

To create the soil database, the data obtained from KHGM was used. The raw data was in vector form, thus, after deciding the useful soil units for this study, raw units were combined to form the useful units which had a number of seven.

To create the rock database, the data obtained from MTA was used. Raw data was in raster form, thus first of all, vector form of this data was produced by using appropriate software. After transformation of the data, rock types were decreased to seven units which were originally around 40 by deciding which units to use and which do not in this study.

Obtaining the ancient settlement database was one the most difficult processes in this thesis. To do so, 1/100.000 scaled topographic maps were used which were obtained from HGK. By using the appropriate software, all of the ancient settlement locations were pointed. According to the criteria discussed in data chapter, number of the ancient settlements was decreased to 44, although the number obtained previously was 78.

Finally, the modern settlements database was created by using 1/100.000 scaled topographic maps obtained from HGK and totally 870 modern settlements were identified. All of these settlements were involved in the study.

3. Analyses: Necessary analyses are performed using the databases for the data layers. These analyses are 1) Distance analyses, 2) Density analysis, 3) Morphological analysis, 4) Rock type analysis, 5) Soil type analysis, and 6) Visibility analysis. The results of these analyses will be discussed in the next section.

4. Prediction: Although most of the ancient settlements are known today in Lycia region, some may have not been discovered yet. According to the databases created and information obtained from the analysis of these databases, some decision rules were identified. Although it is not possible to insist on the accuracy of these decision rules due to the lack of data in the study area, by using them, some potential ancient settlement locations could be obtained. In the last step, prediction of unknown settlements for the study area is made using these decision rules derived in the third step.

6. 3. Prediction

In the last few years, with the help of the increasing technology, prediction models are used widely for site selection in the world. Due to lack of data, some problems occur in the accuracy of the model. The prediction model used in this study is a new one adopted from several methods mentioned in the literature and modified in accordance with the purpose of this study. The method is simple and straightforward.

The decision rules are used during the prediction are derived from the data used in the study. Therefore, all decision rules are based on the properties of 44 ancient settlements. If this number is increased by adding some other settlements, statistically a more reliable set of decision rules can be derived. Another problem associated with these decision rules is that they are all considered equally affecting the site. For example the weight of the asceptc and soil type is assumed to be similar. However, in fact, some parameters can be more effective than some others. This means that a weighted analysis should be carried during the prediction.

The prediction carried out in this study shows clearly that the alluvial plain of the Eşen river is the most probable area that might consist potential ancient settlements. This is not a surprise, as Xanthos, the capital city and Letoon, the holy place of Lycia are situated in this area

6.4 Contribution to Archaeology

This study leads to some important results for archaeology. One of the most recognizable results is quantifying the physical parameters for the study area. The study submits data for elevation, slope, aspect values, as well as rock and soil types of the region and location data of the modern and ancient settlements. GIS analyses were held by the help of these physical parameters quantified, which help archaeologists to collapse the survey areas much easier to find other ancient settlements. There is no doubt that, this kind of a study helps archaeologists to save a big amount of time and money.

One of the important analyses for the archaeology held in this study is the visibility analysis which can be used to understand whether the location of the settlements are seleceted so that the site is intended to be hidden as indicated by very low visibility distances or percentages.

Prediction can be seen as a result of quantifying parameters and using these parameters in GIS analyses. The information found in the result of the analyses is used to identify potentially high areas for other ancient settlement locations that are not discovered by the archaeologists yet.

In this study, a prediction model developed as a case study for Lycia region. It is obvious that, the model can be used not only for Lycia region but also for anywhere that enough spatial data was collected. This study might lead to some other prediction model studies in Turkey.

CHAPTER 8

CONCLUSIONS

The main conclusions of the study are identified as follows;

- Ancient settlements are generally built on the flat areas and south, southeast and east facing slope areas almost similar to modern settlements.
- Ancient settlements generally have slope values between 0 and 13 degrees. Slopes greater than 13 degrees are not preferred. Modern settlements, on the other hand, are settled over slopes up to 15 degrees.
- Ancient settlements are situated at the elevation of maximum 1000 m. Elevations greater than 1000 m are not preferred. Compared to the modern settlements, this value is almost 200 m lower.
- The preferred rock types for the ancient settlements are Quaternary Alluvium, Pliocene Clastics, Neritic Limestones. Other rock types are strongly avoided. Modern settlements, however, preferred Quaternary Alluvium and "Clastics and Carbonates"

The areas having soils thicker than 20 cm were preferred as well as fluvial and coastal deposits which is almost similar for modern settlements.

The minimum distance between two ancient settlements is 1523 m and maximum distance is 20076 m.

The minimum distance between ancient and modern settlements is 6 m and maximum distance is 4110 m.

The minimum distance between modern and modern settlements is 248 m and maximum distance is 7290 m.

Ancient settlements are located on the coastal areas whereas, modern settlements are situated on the interior parts of the land.

Most of the ancient settlements located on the coastal zone are suggested to be hidden in almost all directions.

Prediction result strongly stresses alluvial plain of Eşen river is the most potential area for unknown settlements in Lycia region.

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APPENDIX-A

870 modern settlements and their elevation, slope, aspect, latitude, longitude, rock type and soil type values used in this study.

Name	Slope	Aspect	Elev	Longitude	Latitude	Rock Type	Soil Type
Abazali	13	38	613	741.305,19	4.026.885,27	Clastics and Carbonates	20 cm >soil> 0 cm
Ada	1	-1	9	709.081,45	4.022.374,47	Quarternary Clastics	soil > 90 cm
Adala	16	137	944	774.938,62	4.035.868,15	Clastics and Carbonates	50 cm >soil> 20 cm
Afsar	1	-1	1091	746.293,16	4.050.521,09	Clastics and Carbonates	90 cm >soil> 50 cm
Agalar	1	-1	244	804.556,63	4.062.451,62	Neritic Limestone-1	soil > 90 cm
Agalar	10	346	1067	740.827,24	4.007.570,33	Clastics and Carbonates	50 cm >soil> 20 cm
Agilli	3	117	1204	741.005,85	4.051.105,13	Clastics and Carbonates	90 cm >soil> 50 cm
Agilli	8	159	504	741.355,92	4.011.424,57	Neritic Limestone-2	soil > 90 cm
Agilyani	12	132	450	747.842,76	4.016.048,02	Neritic Limestone-2	soil > 90 cm
Aglar	13	300	189	711.944,64	4.066.655,31	Clastics and Carbonates	50 cm >soil> 20 cm
Aglica	20	9	795	798.802,12	4.055.463,48	Melange	no soil
Ahat	3	202	1171	724.061,45	4.080.221,08	Pliocene Clastics	50 cm >soil> 20 cm
Ahatli	4	138	1178	744.878,37	4.055.921,43	Clastics and Carbonates	50 cm >soil> 20 cm
Ahatli koyu	1	-1	379	745.409,03	4.016.609,93	Clastics and Carbonates	50 cm >soil> 20 cm
Ahmetler	15	210	679	759.131,79	4.023.209,60	Neritic Limestone-2	soil > 90 cm
Akarkuyu	21	250	1268	720.452,23	4.024.930,63	Neritic Limestone-2	20 cm >soil> 0 cm
Akbuk	3	246	122	712.158,19	4.054.949,25	Quarternary Clastics	soil > 90 cm
Akcaalan	14	114	524	787.335,40	4.042.258,16	Clastics and Carbonates	50 cm >soil> 20 cm
Akcaekinlik	3	105	318	702.102,99	4.043.046,96	Quarternary Clastics	50 cm >soil> 20 cm
Akcagil	10	268	1123	800.994,68	4.053.320,26	Clastics and Carbonates	no soil
Akcainis	1	-1	1049	753.885,70	4.056.448,53	Quarternary Clastics	90 cm >soil> 50 cm
Akcainis	1	-1	1048	753.992,74	4.056.765,64	Quarternary Clastics	90 cm >soil> 50 cm
Akcakese	8	36	875	809.883,16	4.075.217,43	Clastics and Carbonates	90 cm >soil> 50 cm
Akcakuyu	12	152	620	750.538,96	4.021.463,08	Clastics and Carbonates	50 cm >soil> 20 cm
Akcalan	12	42	897	723.711,29	4.060.240,88	Clastics and Carbonates	50 cm >soil> 20 cm
Akcay	5	103	1085	745.912,42	4.054.223,40	Clastics and Carbonates	90 cm >soil> 50 cm
Akcay	17	77	425	777.182,53	4.040.754,24	Quarternary Clastics	no soil
Akdag	10	145	1706	733.328,64	4.040.976,37	Clastics and Carbonates	50 cm >soil> 20 cm
Akdam	7	95	16	772.750,81	4.017.356,20	Neritic Limestone-1	20 cm >soil> 0 cm
Akdambeleni	10	55	86	707.520,72	4.038.996,28	Pliocene Clastics	20 cm >soil> 0 cm
Akdamlar	3	207	100	814.359,14	4.086.126,10	Clastics and Carbonates	20 cm >soil> 0 cm
Akdere	25	124	215	791.520,33	4.041.850,38	Neritic Limestone-2	no soil
Akinlar	8	291	846	719.978,37	4.051.129,98	Quarternary Clastics	20 cm >soil> 0 cm
Akkaya	16	197	571	795.667,75	4.047.205,72	Melange	no soil
Akkoru koyu	18	187	924	739.629,09	4.025.465,73	Clastics and Carbonates	50 cm >soil> 20 cm
Aklar	15	231	691	713.780,38	4.030.964,79	Neritic Limestone-2	no soil
Aksakallar	9	303	401	745.980,20	4.016.850,22	Clastics and Carbonates	50 cm >soil> 20 cm
Akyaka	7	92	422	777.210,54	4.040.125,73	Clastics and Carbonates	50 cm >soil> 20 cm
Akyazi	10	276	907	724.186,61	4.030.290,64	Clastics and Carbonates	20 cm >soil> 0 cm
Alabas	11	175	1198	806.448,11	4.062.888,49	Clastics and Carbonates	50 cm >soil> 20 cm
Alacadag	11	87	622	775.886,13	4.032.287,10	Clastics and Carbonates	50 cm >soil> 20 cm
Alacat	1	-1	99	708.540,06	4.045.235,64	Quarternary Clastics	soil > 90 cm
Alahoca	4	108	136	702.385,37	4.032.769,33	Quarternary Clastics	90 cm >soil> 50 cm
Alakent	12	108	38	768.506,04	4.016.934,46	Quarternary Clastics	90 cm >soil> 50 cm

Aligani	23	85	628	775.918,52	4.031.458,50	Clastics and Carbonates	no soil
Alikaya	8	232	406	716.397,26	4.046.798,61	Quarternary Clastics	90 cm >soil> 50 cm
Alinca	14	175	781	692.172,62	4.035.888,70	Pelagic Units	50 cm >soil> 20 cm
Altinyaka	12	243	999	799.822,84	4.051.135,40	Clastics and Carbonates	90 cm >soil> 50 cm
Ambararasi	11	173	428	745.799,54	4.017.253,81	Clastics and Carbonates	50 cm >soil> 20 cm
Ambarkavak	8	258	1092	722.040,39	4.068.760,32	Clastics and Carbonates	50 cm >soil> 20 cm
Ambarlibuk	1	-1	5	708.429,90	4.020.053,60	Quarternary Clastics	soil > 90 cm
Ambaryani	7	157	574	742.447,15	4.012.171,55	Neritic Limestone-2	50 cm >soil> 20 cm
Arapkoyu	14	102	341	759.697,90	4.034.338,82	Clastics and Carbonates	20 cm >soil> 0 cm
Arapsuyu	4	278	10	825.515,23	4.087.907,27	Quarternary Clastics	soil > 90 cm
Arapyurdu	31	223	900	732.988,17	4.020.386,61	Quarternary Clastics	50 cm >soil> 20 cm
Ardicburun	5	16	976	719.376,91	4.038.533,88	Clastics and Carbonates	90 cm >soil> 50 cm
Arif	8	72	92	779.059,56	4.027.402,31	Clastics and Carbonates	90 cm >soil> 50 cm
Arif	18	193	706	773.357,01	4.045.138,48	Quarternary Clastics	50 cm >soil> 20 cm
Arifler	20	195	253	705.650,21	4.040.757,87	Pliocene Clastics	no soil
Arma	6	158	1206	732.433,81	4.033.293,10	Clastics and Carbonates	90 cm >soil> 50 cm
Armutagaci	8	218	1021	722.931,57	4.065.545,20	Clastics and Carbonates	no soil
Armutalan	4	145	439	771.806,67	4.021.183,54	Neritic Limestone-1	20 cm >soil> 0 cm
Armutalani	8	142	651	678.594,58	4.078.068,81	Clastics and Carbonates	soil > 90 cm
Armutcu	15	279	881	807.676,91	4.073.576,25	Clastics and Carbonates	50 cm >soil> 20 cm
Armutlu	3	354	1072	748.493,66	4.052.160,56	Neritic Limestone-2	90 cm >soil> 50 cm
Arnavutlar	19	150	725	731.287,82	4.018.963,51	Clastics and Carbonates	50 cm >soil> 20 cm
Arpacik	14	172	927	691.360,12	4.078.239,45	Pelagic Units	50 cm >soil> 20 cm
Arpacik koyu	1	-1	885	692.629,21	4.077.110,06	Quarternary Clastics	50 cm >soil> 20 cm
Arsakoy	8	258	854	719.061,88	4.041.325,70	Clastics and Carbonates	50 cm >soil> 20 cm
Asagigolcuk	6	39	1151	800.806,93	4.062.159,93	Clastics and Carbonates	50 cm >soil> 20 cm
Asagikoy	6	169	131	755.505,46	4.012.120,76	Quarternary Clastics	90 cm >soil> 50 cm
Asagikuzdere	1	-1	46	815.839,95	4.054.176,91	Quarternary Clastics	20 cm >soil> 0 cm
Asagiorencik	19	228	1230	806.859,66	4.067.399,93	Clastics and Carbonates	50 cm >soil> 20 cm
Asar	6	73	545	696.481,68	4.031.700,60	Neritic Limestone-1	no soil
Asar	6	108	272	753.379,14	4.015.487,37	Neritic Limestone-1	no soil
Asar	7	66	660	740.752,23	4.008.284,52	Neritic Limestone-2	50 cm >soil> 20 cm
Asarcik	14	88	601	702.933,77	4.046.766,94	Neritic Limestone-2	no soil
Asardede	10	102	405	789.401,95	4.047.296,49	Neritic Limestone-2	no soil
Asaronu	33	105	571	776.973,24	4.028.838,03	Neritic Limestone-1	no soil
Asarpinar	21	14	529	802.896,06	4.033.768,01	Clastics and Carbonates	20 cm >soil> 0 cm
Aslanbucak	1	-1	51	815.498,56	4.055.572,28	Quarternary Clastics	20 cm >soil> 0 cm
Atbuku	3	76	8	812.593,91	4.038.779,44	Melange	river channel deposits
Atlidere	7	198	1435	740.052,25	4.083.076,24	Melange	50 cm >soil> 20 cm
Atliderekoy	5	203	179	710.237,14	4.062.394,77	Clastics and Carbonates	90 cm >soil> 50 cm
Avdan	4	75	1321	781.049,67	4.085.814,05	Neritic Limestone-2	50 cm >soil> 20 cm
Avlan	11	155	438	694.012,92	4.033.830,13	Quarternary Clastics	50 cm >soil> 20 cm
Aydinlar	10	324	48	708.175,75	4.029.823,00	Quarternary Clastics	90 cm >soil> 50 cm
Ayisarnici	24	203	376	739.293,05	4.009.704,74	Neritic Limestone-1	no soil
Ayiveliler	16	192	730	758.242,65	4.024.134,85	Neritic Limestone-1	no soil
Ayranci	13	181	423	727.328,38	4.011.202,09	Neritic Limestone-1	50 cm >soil> 20 cm
Bagarasi	27	171	713	691.369,56	4.070.616,93	Pelagic Units	no soil
Bagbeleni	14	226	598	776.340,17	4.043.436,93	Clastics and Carbonates	50 cm >soil> 20 cm
Bagbuku	25	166	1140	798.184,19	4.072.205,17	Melange	50 cm >soil> 20 cm
Bagliagac	13	256	769	719.379,09	4.045.608,42	Clastics and Carbonates	50 cm >soil> 20 cm

Baglica	4	159	1036	702.091,86	4.026.199,76	Neritic Limestone-2	no soil
Baglica	8	117	529	746.463,51	4.014.428,39	Neritic Limestone-2	50 cm >soil> 20 cm
Baglica	12	195	163	736.885,31	4.020.529,57	Quarternary Clastics	50 cm >soil> 20 cm
Bahcebasi	6	3	44	801.299,83	4.024.678,92	Melange	20 cm >soil> 0 cm
Bahcecik	3	107	8	817.443,79	4.071.214,63	Melange	50 cm >soil> 20 cm
Bahceler	16	94	62	809.832,95	4.025.237,07	Quarternary Clastics	50 cm >soil> 20 cm
Balikci	8	117	357	799.740,02	4.037.354,16	Clastics and Carbonates	50 cm >soil> 20 cm
Balkica	6	27	65	709.157,63	4.038.484,31	Quarternary Clastics	20 cm >soil> 0 cm
Balli	11	96	361	701.437,65	4.029.200,76	Neritic Limestone-2	no soil
Ballik	19	192	265	794.030,87	4.041.438,87	Melange	no soil
Bartu	20	117	960	795.862,53	4.064.130,96	Melange	50 cm >soil> 20 cm
Basaribelen	13	228	1467	729.333,91	4.037.607,51	Quarternary Clastics	50 cm >soil> 20 cm
Baskoz	12	191	777	770.370,36	4.045.997,52	Clastics and Carbonates	20 cm >soil> 0 cm
Baslica	6	172	583	743.043,76	4.012.216,97	Neritic Limestone-2	50 cm >soil> 20 cm
Bayat	2	-1	193	709.782,43	4.067.992,85	Quarternary Clastics	90 cm >soil> 50 cm
Bayindir	2	-1	1137	741.999,71	4.049.191,65	Neritic Limestone-1	soil > 90 cm
Bayindir	5	231	272	741.267,86	4.008.155,76	Clastics and Carbonates	20 cm >soil> 0 cm
Bayindir	13	151	1371	763.982,85	4.075.205,14	Quarternary Clastics	20 cm >soil> 0 cm
Bayir	7	178	1080	750.648,05	4.075.475,94	Quarternary Clastics	50 cm >soil> 20 cm
Baykus	3	276	96	712.263,58	4.044.574,32	Quarternary Clastics	soil > 90 cm
Bayralar	1	-1	1036	758.228,17	4.059.187,05	Quarternary Clastics	soil > 90 cm
Bayramlar	9	253	798	718.546,39	4.043.153,98	Clastics and Carbonates	50 cm >soil> 20 cm
Baysikoy	7	213	188	795.034,88	4.036.857,06	Clastics and Carbonates	50 cm >soil> 20 cm
bel	8	144	970	763.801,16	4.039.764,83	Clastics and Carbonates	no soil
Bel	19	177	691	694.720,03	4.028.708,56	Clastics and Carbonates	50 cm >soil> 20 cm
Belarasi	17	196	1243	723.845,31	4.072.742,85	Pelagic Units	no soil
Belbasi	14	199	363	781.030,56	4.036.798,34	Clastics and Carbonates	50 cm >soil> 20 cm
Belcegiz	5	115	17	690.085,72	4.047.100,10	Quarternary Clastics	90 cm >soil> 50 cm
Beldibi	13	103	31	817.561,50	4.069.880,40	Melange	50 cm >soil> 20 cm
Beldibi	15	50	999	735.635,20	4.035.016,28	Clastics and Carbonates	50 cm >soil> 20 cm
Belen	6	168	813	712.047,35	4.071.075,22	Neritic Limestone-1	no soil
Belen	7	231	1117	751.046,79	4.075.485,35	Clastics and Carbonates	20 cm >soil> 0 cm
Belen	10	29	454	804.493,16	4.031.103,13	Clastics and Carbonates	50 cm >soil> 20 cm
Belen	12	229	303	777.481,16	4.019.955,88	Clastics and Carbonates	50 cm >soil> 20 cm
Belen	18	281	1162	725.302,93	4.037.247,17	Neritic Limestone-2	50 cm >soil> 20 cm
Belencik	10	216	601	752.690,88	4.021.313,04	Clastics and Carbonates	50 cm >soil> 20 cm
Belenkoy	10	209	207	686.203,66	4.052.015,95	Quarternary Clastics	20 cm >soil> 0 cm
Belenli	9	95	1448	738.527,42	4.051.853,59	Neritic Limestone-1	no soil
Belenli	23	282	559	742.898,34	4.009.388,18	Clastics and Carbonates	50 cm >soil> 20 cm
Belkonak	14	150	573	750.620,93	4.020.996,97	Clastics and Carbonates	50 cm >soil> 20 cm
Beloren	11	190	664	767.358,63	4.022.338,79	Neritic Limestone-1	50 cm >soil> 20 cm
Besikci	10	232	141	800.292,54	4.029.688,49	Melange	50 cm >soil> 20 cm
Beycik	9	162	587	807.900,46	4.044.024,25	Clastics and Carbonates	90 cm >soil> 50 cm
Beycik	12	112	810	806.938,66	4.045.524,97	Quarternary Clastics	50 cm >soil> 20 cm
Beykonak	8	347	191	800.686,09	4.026.680,64	Neritic Limestone-2	20 cm >soil> 0 cm
Beyler	1	-1	1036	755.970,50	4.060.654,59	Quarternary Clastics	soil > 90 cm
Beymelek	3	185	34	772.658,33	4.017.025,14	Quarternary Clastics	90 cm >soil> 50 cm
Bezirgan	1	-1	738	720.160,97	4.018.060,11	Quarternary Clastics	90 cm >soil> 50 cm
Bogalar	9	129	1211	737.222,62	4.082.165,82	Melange	no soil
Bogazcik	8	160	341	739.917,12	4.052.397,66	Neritic Limestone-1	90 cm >soil> 50 cm

Bogazcik	9	113	1348	747.560,83	4.009.192,24	Clastics and Carbonates	50 cm >soil> 20 cm
Bogazici	4	171	336	695.529,92	4.033.522,74	Quarternary Clastics	50 cm >soil> 20 cm
Bogazsazi	15	265	1058	720.056,02	4.057.995,44	Clastics and Carbonates	20 cm >soil> 0 cm
Bogurtlenlioz	6	95	16	817.883,25	4.051.568,00	Melange	20 cm >soil> 0 cm
Boluceagac	10	129	661	732.025,21	4.019.070,19	Clastics and Carbonates	50 cm >soil> 20 cm
Bostanalani	10	156	1193	805.057,16	4.063.261,15	Clastics and Carbonates	20 cm >soil> 0 cm
Boyaagaci	9	277	1062	723.306,40	4.064.406,87	Clastics and Carbonates	no soil
Boyacipinar	15	139	714	732.327,96	4.019.479,84	Clastics and Carbonates	50 cm >soil> 20 cm
Boyali	7	261	1258	726.282,87	4.060.573,23	Pelagic Units	20 cm >soil> 0 cm
Boyukoy	4	195	519	696.667,84	4.071.393,64	Quarternary Clastics	50 cm >soil> 20 cm
Bozalan	14	295	986	721.297,90	4.052.794,21	Quarternary Clastics	50 cm >soil> 20 cm
Bozcabayir	11	226	1549	759.779,49	4.081.124,05	Pelagic Units	no soil
Bozhoyuk	1	-1	1121	768.716,51	4.072.539,45	Quarternary Clastics	soil > 90 cm
Bozukbahce	4	184	40	709.186,50	4.031.242,48	Neritic Limestone-2	50 cm >soil> 20 cm
Bozyer	6	45	295	700.025,94	4.053.333,18	Pelagic Units	no soil
Bozyer	9	204	136	790.670,96	4.037.610,82	Neritic Limestone-2	20 cm >soil> 0 cm
Bucak	4	195	723	700.245,32	4.071.999,84	Pelagic Units	no soil
Bucak	11	86	67	694.959,01	4.056.345,17	Quarternary Clastics	no soil
Bucakkemer	14	46	380	742.231,71	4.026.645,09	Clastics and Carbonates	20 cm >soil> 0 cm
Bukcegiz	12	129	163	700.830,26	4.024.464,15	Quarternary Clastics	no soil
Bungus	5	194	299	707.769,39	4.072.872,97	Quarternary Clastics	river channel deposits
Burun	1	-1	6	771.526,23	4.016.242,87	Quarternary Clastics	soil > 90 cm
Buyukcali	1	-1	79	711.522,87	4.045.376,25	Quarternary Clastics	soil > 90 cm
Buyuksoyle	2	-1	1217	770.900,37	4.064.745,76	Quarternary Clastics	90 cm >soil> 50 cm
Buyuktaranir	14	332	683	762.930,12	4.034.648,28	Clastics and Carbonates	20 cm >soil> 0 cm
Caglarca	14	82	788	808.185,82	4.085.928,34	Melange	50 cm >soil> 20 cm
Caglarca	21	190	563	729.622,97	4.011.639,07	Neritic Limestone-1	50 cm >soil> 20 cm
Cagman	13	221	813	763.673,03	4.030.757,18	Clastics and Carbonates	20 cm >soil> 0 cm
Cakalbayat	2	-1	535	762.655,17	4.016.751,00	Neritic Limestone-1	90 cm >soil> 50 cm
Cakallar	8	348	253	704.373,80	4.042.679,14	Pliocene Clastics	50 cm >soil> 20 cm
Cakirlar	1	-1	41	818.060,02	4.086.685,52	Quarternary Clastics	90 cm >soil> 50 cm
Cakmak	1	-1	4	810.318,05	4.024.117,10	Quarternary Clastics	soil > 90 cm
Cal	19	163	1099	688.621,72	4.079.601,78	Quarternary Clastics	50 cm >soil> 20 cm
Calica	3	288	48	694.701,65	4.057.581,78	Quarternary Clastics	90 cm >soil> 50 cm
Calica	5	95	23	707.607,79	4.028.614,40	Quarternary Clastics	no soil
Calti	11	213	442	796.711,00	4.050.294,84	Pelagic Units	90 cm >soil> 50 cm
Caltiozu	4	51	118	706.793,82	4.048.835,00	Melange	no soil
Camiyani	15	166	872	747.477,88	4.035.593,77	Clastics and Carbonates	90 cm >soil> 50 cm
Camizlar	9	339	120	715.062,06	4.038.802,42	Neritic Limestone-1	50 cm >soil> 20 cm
Camkoy	2	-1	97	695.215,83	4.059.582,86	Quarternary Clastics	90 cm >soil> 50 cm
Camlica	3	90	214	745.518,97	4.022.074,55	Quarternary Clastics	90 cm >soil> 50 cm
Camlikoy	5	159	1113	723.366,88	4.035.984,88	Clastics and Carbonates	90 cm >soil> 50 cm
Camurkoy	2	-1	99	712.951,23	4.047.360,76	Quarternary Clastics	20 cm >soil> 0 cm
Camurlu	19	118	780	789.000,60	4.052.139,49	Neritic Limestone-2	50 cm >soil> 20 cm
Camyuva	1	-1	17	818.282,77	4.052.848,28	Quarternary Clastics	soil > 90 cm
Canakci	1	-1	2	799.214,62	4.024.257,94	Quarternary Clastics	coastal areas & swamps
Catak	8	284	681	718.382,99	4.055.668,09	Quarternary Clastics	20 cm >soil> 0 cm
Catallar	13	197	382	691.911,69	4.051.711,82	Melange	20 cm >soil> 0 cm
Catallar	14	150	381	775.083,40	4.042.921,09	Clastics and Carbonates	20 cm >soil> 0 cm
Cataloluk	3	35	745	739.917,92	4.022.625,20	Clastics and Carbonates	no soil

Cataloluk	13	119	1716	735.219,16	4.046.521,25	Quarternary Clastics	50 cm >soil> 20 cm
Cavdir	1	-1	36	711.299,31	4.027.415,55	Pliocene Clastics	90 cm >soil> 50 cm
Cavdir	5	216	131	780.925,15	4.028.900,46	Quarternary Clastics	90 cm >soil> 50 cm
Cavus	3	117	54	808.116,65	4.026.329,24	Clastics and Carbonates	soil > 90 cm
Cay	12	137	173	807.075,54	4.031.593,03	Clastics and Carbonates	50 cm >soil> 20 cm
Cayagzi	9	290	182	792.202,93	4.041.909,38	Neritic Limestone-2	50 cm >soil> 20 cm
Cayan koyu	5	38	345	704.823,20	4.073.050,64	Quarternary Clastics	50 cm >soil> 20 cm
Caydagildigi	1	-1	12	792.833,09	4.027.689,88	Quarternary Clastics	20 cm >soil> 0 cm
Cayici	14	268	321	789.779,38	4.040.021,89	Clastics and Carbonates	no soil
Caykenari	2	-1	87	708.503,15	4.042.659,50	Pliocene Clastics	soil > 90 cm
Caykoy	4	233	102	714.105,14	4.024.032,83	Clastics and Carbonates	90 cm >soil> 50 cm
Caykoy	11	118	1387	735.946,44	4.048.046,30	Neritic Limestone-2	50 cm >soil> 20 cm
Cemle	14	15	1437	737.272,56	4.045.732,34	Clastics and Carbonates	50 cm >soil> 20 cm
Cenger	13	188	573	690.503,08	4.071.797,63	Clastics and Carbonates	50 cm >soil> 20 cm
Cerdin	18	265	501	688.665,92	4.075.014,51	Neritic Limestone-2	20 cm >soil> 0 cm
Cerler	13	116	479	749.405,59	4.018.915,87	Clastics and Carbonates	no soil
Cesme	14	111	529	745.067,02	4.030.124,09	Clastics and Carbonates	50 cm >soil> 20 cm
Cevizlik	5	155	1250	732.533,10	4.033.868,93	Clastics and Carbonates	50 cm >soil> 20 cm
Cevreli	6	177	128	755.191,22	4.012.072,70	Quarternary Clastics	90 cm >soil> 50 cm
Ceylan	3	209	204	713.097,84	4.067.607,29	Clastics and Carbonates	50 cm >soil> 20 cm
Ceylankoy	1	-1	1149	731.527,88	4.074.925,62	Quarternary Clastics	90 cm >soil> 50 cm
Cinarcik	9	316	719	807.299,14	4.074.426,31	Clastics and Carbonates	90 cm >soil> 50 cm
Cinarcik	17	328	940	800.363,56	4.054.427,87	Clastics and Carbonates	50 cm >soil> 20 cm
Cingenkoy	1	-1	73	711.017,03	4.047.200,74	Quarternary Clastics	soil > 90 cm
Cirali	17	62	15	811.429,75	4.035.264,86	Neritic Limestone-2	no soil
Citdibi	3	238	767	806.848,87	4.077.087,90	Melange	50 cm >soil> 20 cm
Cobanalani	15	298	1014	720.359,75	4.055.185,66	Quarternary Clastics	20 cm >soil> 0 cm
Cobanisa	4	122	1160	769.808,87	4.083.996,51	Neritic Limestone-2	soil > 90 cm
Cobanlar	4	209	1197	710.236,18	4.052.930,61	Clastics and Carbonates	90 cm >soil> 50 cm
Cobanlar	5	176	125	725.861,62	4.081.511,19	Quarternary Clastics	50 cm >soil> 20 cm
Cobanlar	9	148	1404	738.012,33	4.050.168,80	Quarternary Clastics	50 cm >soil> 20 cm
Cogmen	18	288	640	681.244,41	4.080.653,12	Clastics and Carbonates	50 cm >soil> 20 cm
Cokek	17	218	937	724.268,24	4.061.483,74	Neritic Limestone-2	20 cm >soil> 0 cm
Cokerencik	15	338	466	739.325,50	4.016.295,63	Clastics and Carbonates	20 cm >soil> 0 cm
Corus	1	-1	8	797.869,92	4.026.456,90	Quarternary Clastics	20 cm >soil> 0 cm
Cubuklu	6	93	340	790.720,06	4.050.409,57	Neritic Limestone-2	no soil
Cukurbag	5	137	1387	739.055,90	4.013.451,50	Clastics and Carbonates	90 cm >soil> 50 cm
Cukurbag	17	181	523	737.222,25	4.049.182,57	Quarternary Clastics	50 cm >soil> 20 cm
Cukurca	13	258	1086	800.724,99	4.053.400,36	Clastics and Carbonates	90 cm >soil> 50 cm
Cukurceylan	5	211	1183	734.707,53	4.079.904,40	Pelagic Units	90 cm >soil> 50 cm
Cukurceylan	11	220	170	711.570,64	4.064.504,58	Clastics and Carbonates	90 cm >soil> 50 cm
Cukurelma	3	114	1153	768.496,92	4.080.292,81	Clastics and Carbonates	50 cm >soil> 20 cm
Cukurhayit	9	178	567	740.240,67	4.024.195,35	Clastics and Carbonates	50 cm >soil> 20 cm
Cukurincir	17	127	80	706.419,97	4.030.047,90	Quarternary Clastics	20 cm >soil> 0 cm
Cukurkavak	2	-1	1451	722.689,34	4.084.631,01	Neritic Limestone-2	no soil
Cukurkavak	16	255	1091	719.403,26	4.081.698,35	Neritic Limestone-2	no soil
Cukurkoyu	15	91	1684	782.347,23	4.072.087,38	Neritic Limestone-1	no soil
Culfa	15	292	636	796.766,71	4.061.878,72	Melange	no soil
Curukin	2	-1	214	779.646,90	4.038.824,79	Clastics and Carbonates	20 cm >soil> 0 cm
Dagbag	12	240	544	762.273,02	4.035.598,04	Clastics and Carbonates	20 cm >soil> 0 cm

Dalca	13	190	293	801.863,18	4.035.064,83	Melange	50 cm >soil> 20 cm
Darbogaz	19	213	274	700.782,61	4.034.390,24	Quarternary Clastics	90 cm >soil> 50 cm
Darici	6	135	1013	802.707,48	4.061.904,48	Clastics and Carbonates	no soil
Dariyeri	23	157	966	685.797,68	4.080.423,45	Clastics and Carbonates	50 cm >soil> 20 cm
Davazlar	10	162	594	758.748,11	4.017.042,28	Neritic Limestone-2	90 cm >soil> 50 cm
Dedeler	3	125	9	817.764,03	4.058.938,86	Quarternary Clastics	50 cm >soil> 20 cm
Degirmenkoy	1	-1	1056	749.830,19	4.055.622,43	Quarternary Clastics	90 cm >soil> 50 cm
Demirler	3	218	89	708.121,31	4.037.067,96	Quarternary Clastics	soil > 90 cm
Deniz	1	-1	9	818.775,12	4.052.194,68	Quarternary Clastics	soil > 90 cm
Derekoy	1	-1	33	754.415,92	4.079.933,51	Pelagic Units	90 cm >soil> 50 cm
Derekoy	4	86	1223	766.427,81	4.019.521,70	Pelagic Units	no soil
Derekoy	5	71	348	738.800,34	4.016.851,54	Clastics and Carbonates	50 cm >soil> 20 cm
Derekoy	7	233	1365	722.336,62	4.060.755,22	Clastics and Carbonates	50 cm >soil> 20 cm
Derekoy	10	236	406	788.185,89	4.045.033,11	Clastics and Carbonates	50 cm >soil> 20 cm
Derekoy	11	337	897	797.230,98	4.074.357,08	Quarternary Clastics	river channel deposits
Dereleryakasi	15	210	437	743.141,37	4.028.969,79	Clastics and Carbonates	20 cm >soil> 0 cm
Deveciler	6	280	311	715.636,74	4.048.997,04	Quarternary Clastics	90 cm >soil> 50 cm
Dikmendi	11	280	763	719.187,21	4.059.933,94	Clastics and Carbonates	50 cm >soil> 20 cm
Dinek	3	153	111	709.584,13	4.029.350,07	Pliocene Clastics	90 cm >soil> 50 cm
Dip	7	97	453	699.827,07	4.043.648,79	Quarternary Clastics	50 cm >soil> 20 cm
Dirgenler	2	-1	186	751.083,69	4.027.456,69	Quarternary Clastics	50 cm >soil> 20 cm
Disovacik	19	112	709	802.880,74	4.038.372,00	Clastics and Carbonates	no soil
Diyne	16	108	540	759.123,34	4.015.740,17	Neritic Limestone-2	50 cm >soil> 20 cm
Dodurga koyu	21	30	837	696.480,15	4.030.018,73	Neritic Limestone-2	no soil
Dogantas	14	152	661	754.377,14	4.037.012,92	Clastics and Carbonates	90 cm >soil> 50 cm
Dogular	9	348	44	708.028,25	4.029.348,34	Quarternary Clastics	50 cm >soil> 20 cm
Dogus	13	134	1385	744.116,28	4.056.890,10	Clastics and Carbonates	20 cm >soil> 0 cm
Dolasma	12	316	291	714.454,55	4.061.044,96	Clastics and Carbonates	50 cm >soil> 20 cm
Dolasma	15	242	436	715.120,71	4.062.154,48	Clastics and Carbonates	50 cm >soil> 20 cm
Domenyeri	22	242	1174	799.253,15	4.060.893,54	Melange	no soil
Dont	1	-1	1204	733.441,71	4.082.405,50	Quarternary Clastics	90 cm >soil> 50 cm
Dudenagzi	2	-1	444	739.113,33	4.012.307,03	Neritic Limestone-1	soil > 90 cm
Dudenkoy	1	-1	1034	760.375,33	4.063.212,49	Quarternary Clastics	soil > 90 cm
Duger	9	299	165	714.563,74	4.048.245,20	Pliocene Clastics	90 cm >soil> 50 cm
Dumluca	16	141	775	789.422,48	4.052.826,96	Neritic Limestone-2	no soil
Dutdere	10	209	1253	717.996,41	4.083.955,06	Neritic Limestone-2	no soil
Dutyakasi	10	93	1223	743.820,35	4.055.438,89	Clastics and Carbonates	50 cm >soil> 20 cm
Ebuhora	1	-1	147	687.259,28	4.050.255,60	Neritic Limestone-2	soil > 90 cm
Ecebeli	3	229	651	702.426,07	4.066.702,41	Melange	90 cm >soil> 50 cm
Egelkoyu	1	-1	30	815.367,45	4.046.049,31	Quarternary Clastics	20 cm >soil> 0 cm
Eken	4	106	492	788.720,91	4.046.889,70	Neritic Limestone-2	50 cm >soil> 20 cm
Ekincik	25	186	657	699.818,19	4.037.441,81	Neritic Limestone-2	50 cm >soil> 20 cm
Eldirek	5	183	189	696.216,01	4.061.467,50	Clastics and Carbonates	20 cm >soil> 0 cm
Eldirek	7	97	1241	727.536,77	4.083.996,39	Quarternary Clastics	50 cm >soil> 20 cm
Elmali	8	241	1102	760.789,02	4.069.748,15	Quarternary Clastics	20 cm >soil> 0 cm
Emirler	3	53	177	697.256,92	4.062.018,99	Pelagic Units	90 cm >soil> 50 cm
Emirler	10	284	279	730.649,92	4.084.111,50	Clastics and Carbonates	20 cm >soil> 0 cm
Emirler	13	241	1396	747.039,09	4.020.810,31	Quarternary Clastics	50 cm >soil> 20 cm
Emirler	14	162	157	705.175,45	4.046.349,14	Quarternary Clastics	50 cm >soil> 20 cm
Erdevil	8	94	1216	726.276,55	4.082.773,60	Pliocene Clastics	50 cm >soil> 20 cm

Erentepe	9	186	346	802.604,55	4.035.080,29	Melange	50 cm >soil> 20 cm
Eseler	1	-1	1054	750.546,71	4.057.327,80	Quarternary Clastics	90 cm >soil> 50 cm
Esen-Kestep	1	-1	117	704.606,52	4.036.872,98	Pliocene Clastics	50 cm >soil> 20 cm
Esenkoy	6	342	128	698.440,99	4.055.372,09	Quarternary Clastics	50 cm >soil> 20 cm
Eskibahce	1	-1	18	691.439,53	4.057.574,36	Quarternary Clastics	50 cm >soil> 20 cm
Eskicami	1	-1	19	789.554,44	4.027.519,04	Quarternary Clastics	90 cm >soil> 50 cm
Eskigacak	4	272	241	714.153,65	4.071.183,08	Clastics and Carbonates	20 cm >soil> 0 cm
Eskihisar	7	258	1092	750.529,12	4.075.701,92	Quarternary Clastics	50 cm >soil> 20 cm
Eskikoy	3	49	72	706.733,77	4.033.159,62	Pliocene Clastics	soil > 90 cm
Eymir	1	-1	1033	758.668,12	4.062.265,51	Quarternary Clastics	soil > 90 cm
Fakiciftligi	4	126	185	747.812,76	4.023.590,67	Quarternary Clastics	soil > 90 cm
Fethiye	1	-1	6	688.803,06	4.055.084,59	Neritic Limestone-2	soil > 90 cm
Fette	12	97	1052	737.865,62	4.026.741,24	Clastics and Carbonates	20 cm >soil> 0 cm
FINIKE	25	135	80	782.441,09	4.021.477,15	Neritic Limestone-1	no soil
Figla	11	263	1250	725.525,04	4.035.219,11	Clastics and Carbonates	50 cm >soil> 20 cm
Filler	21	229	737	807.260,00	4.073.333,24	Clastics and Carbonates	20 cm >soil> 0 cm
Gacakyayla	3	63	1155	722.775,44	4.078.719,88	Clastics and Carbonates	50 cm >soil> 20 cm
Gavuragili	12	200	51	698.087,84	4.023.177,41	Pelagic Units	no soil
Gavuragili	15	206	509	701.878,56	4.044.774,12	Neritic Limestone-2	no soil
Gavurpazari	3	354	705	727.560,48	4.016.652,50	Clastics and Carbonates	50 cm >soil> 20 cm
Gebeler	6	301	140	712.955,95	4.052.351,32	Pliocene Clastics	soil > 90 cm
Gecit	30	247	1140	750.751,79	4.068.791,14	Neritic Limestone-2	no soil
Gecmen	6	177	1305	768.391,69	4.064.265,15	Neritic Limestone-1	50 cm >soil> 20 cm
Gedeller	12	75	204	814.966,59	4.079.694,83	Clastics and Carbonates	50 cm >soil> 20 cm
Gedik	5	234	1251	737.654,26	4.077.193,82	Pelagic Units	50 cm >soil> 20 cm
Gedikbasi	14	119	750	747.523,39	4.035.116,32	Clastics and Carbonates	90 cm >soil> 50 cm
Gelemis	11	171	38	708.140,93	4.017.175,95	Neritic Limestone-2	coastal areas & swamps
Gerenlik	7	275	477	788.842,00	4.045.493,95	Clastics and Carbonates	no soil
Gerisburnu	11	237	248	713.622,46	4.057.700,66	Pliocene Clastics	20 cm >soil> 0 cm
Gey	3	308	629	691.774,81	4.030.754,35	Neritic Limestone-2	50 cm >soil> 20 cm
Geyikbayiri	7	79	649	808.592,90	4.086.868,74	Clastics and Carbonates	20 cm >soil> 0 cm
Gocebeler	1	-1	9	709.213,22	4.022.863,76	Quarternary Clastics	soil > 90 cm
Gocmenler	1	-1	91	709.684,32	4.050.048,15	Quarternary Clastics	soil > 90 cm
Godeme	14	144	248	767.331,99	4.020.317,87	Neritic Limestone-1	no soil
Gokben	9	67	424	701.422,27	4.051.378,54	Quarternary Clastics	50 cm >soil> 20 cm
Gokbuk	8	57	225	779.297,62	4.039.159,73	Clastics and Carbonates	20 cm >soil> 0 cm
Gokcealan	7	106	79	808.520,38	4.028.724,38	Clastics and Carbonates	50 cm >soil> 20 cm
Gokcebuk	30	166	788	728.411,83	4.017.879,82	Clastics and Carbonates	20 cm >soil> 0 cm
Gokceler	14	287	856	806.192,64	4.071.734,69	Clastics and Carbonates	20 cm >soil> 0 cm
Gokceoren	6	291	844	728.578,13	4.013.558,04	Clastics and Carbonates	soil > 90 cm
Gokceovacik	3	270	350	692.740,12	4.050.342,39	Quarternary Clastics	50 cm >soil> 20 cm
Gokceyaka	4	42	343	779.154,57	4.036.582,49	Clastics and Carbonates	50 cm >soil> 20 cm
Gokceyazi	2	-1	12	751.702,07	4.019.906,93	Neritic Limestone-2	90 cm >soil> 50 cm
Gokceyazi	5	189	537	767.287,83	4.016.357,31	Quarternary Clastics	50 cm >soil> 20 cm
Gokdere	6	255	46	816.945,84	4.081.311,65	Clastics and Carbonates	no soil
Gokdere	13	7	736	732.007,26	4.016.405,05	Neritic Limestone-2	50 cm >soil> 20 cm
Gokler	14	216	420	788.926,35	4.043.916,15	Clastics and Carbonates	no soil
Gokpinar	2	-1	1182	718.360,72	4.047.574,19	Quarternary Clastics	90 cm >soil> 50 cm
Gokpinar	11	261	645	764.266,30	4.071.447,47	Quarternary Clastics	50 cm >soil> 20 cm
Gokseki	12	183	162	732.187,87	4.010.393,20	Neritic Limestone-1	50 cm >soil> 20 cm

Gol	16	207	787	790.258,27	4.054.154,97	Neritic Limestone-2	no soil
Golbasi	17	127	496	749.692,23	4.019.452,30	Clastics and Carbonates	no soil
Golbent	3	66	111	702.319,09	4.031.249,59	Quarternary Clastics	50 cm >soil> 20 cm
Golcuk	6	153	825	799.350,32	4.058.407,75	Melange	50 cm >soil> 20 cm
Golcuk	21	209	713	799.036,95	4.042.785,58	Melange	50 cm >soil> 20 cm
Golcuk koyu	12	269	1131	802.018,39	4.055.885,42	Clastics and Carbonates	no soil
Golderesi	13	193	932	804.481,59	4.072.140,61	Melange	50 cm >soil> 20 cm
Golova-Mugren	5	189	1117	771.160,16	4.077.121,20	Quarternary Clastics	soil > 90 cm
Goltarla	12	233	1081	764.568,14	4.050.320,60	Quarternary Clastics	50 cm >soil> 20 cm
Gombe	4	153	1247	738.677,01	4.048.925,78	Clastics and Carbonates	soil > 90 cm
Gomuce	11	158	1169	742.413,54	4.033.745,60	Clastics and Carbonates	50 cm >soil> 20 cm
Goynuk	1	-1	24	817.077,04	4.064.182,06	Neritic Limestone-1	soil > 90 cm
Goynuk	8	168	589	764.547,62	4.022.131,17	Quarternary Clastics	no soil
Gozlengic	12	87	408	701.294,14	4.028.596,81	Neritic Limestone-2	no soil
Gozlukuyu	7	345	390	697.937,80	4.030.919,89	Neritic Limestone-2	no soil
Gozyaka	1	-1	179	792.708,83	4.044.962,82	Neritic Limestone-2	no soil
Gucukpinar	14	186	2070	791.770,72	4.069.773,64	Neritic Limestone-1	no soil
Gumusyaka	10	172	1409	765.589,30	4.083.146,84	Pelagic Units	50 cm >soil> 20 cm
Guncali	15	171	887	757.410,39	4.038.407,75	Pelagic Units	90 cm >soil> 50 cm
Gunederesi	7	105	1143	797.759,59	4.072.671,08	Quarternary Clastics	50 cm >soil> 20 cm
Gunesli	2	-1	139	713.796,33	4.049.864,22	Quarternary Clastics	90 cm >soil> 50 cm
Gunesli	3	246	683	808.100,67	4.057.729,72	Clastics and Carbonates	soil > 90 cm
Guney	14	149	984	689.306,87	4.069.166,94	Quarternary Clastics	20 cm >soil> 0 cm
Guney	15	156	468	719.941,78	4.056.705,81	Neritic Limestone-2	50 cm >soil> 20 cm
Guneyyaka	24	111	546	748.353,51	4.017.237,11	Quarternary Clastics	soil > 90 cm
Gunlukbasi	1	-1	16	690.166,09	4.059.206,33	Quarternary Clastics	soil > 90 cm
Gurceyit	6	309	583	751.964,50	4.020.876,18	Neritic Limestone-2	no soil
Gurcu	8	103	803	796.564,23	4.064.619,39	Melange	no soil
Gurdek	22	100	548	791.252,55	4.052.127,43	Neritic Limestone-2	50 cm >soil> 20 cm
Gurlu	7	255	532	751.326,26	4.021.246,02	Clastics and Carbonates	50 cm >soil> 20 cm
Gurses	6	124	490	764.149,70	4.017.308,75	Neritic Limestone-1	90 cm >soil> 50 cm
Gursu	8	306	48	691.770,08	4.054.442,73	Clastics and Carbonates	90 cm >soil> 50 cm
Gursu	15	136	917	746.662,92	4.034.982,50	Neritic Limestone-2	no soil
Guzle	14	302	924	799.208,56	4.048.360,82	Clastics and Carbonates	50 cm >soil> 20 cm
Guzoren koyu	10	258	602	798.153,24	4.039.547,40	Melange	50 cm >soil> 20 cm
Hacikaralar	20	237	355	718.550,54	4.015.476,86	Quarternary Clastics	50 cm >soil> 20 cm
Hacilar	5	286	711	718.558,23	4.050.267,11	Neritic Limestone-2	20 cm >soil> 0 cm
Hacilar	11	49	242	790.439,45	4.039.808,68	Quarternary Clastics	50 cm >soil> 20 cm
Hacilaryeri	15	108	477	806.907,96	4.034.692,02	Pelagic Units	50 cm >soil> 20 cm
Hacimusalar	1	-1	1049	753.021,27	4.059.488,18	Quarternary Clastics	soil > 90 cm
Hacioglu	29	158	803	731.786,06	4.019.521,90	Clastics and Carbonates	50 cm >soil> 20 cm
Haciomerler	5	191	67	794.383,24	4.032.780,70	Melange	soil > 90 cm
Haciosmanlar	5	212	182	714.757,04	4.045.756,91	Pliocene Clastics	20 cm >soil> 0 cm
Haciveliler	1	-1	29	795.005,57	4.030.067,43	Clastics and Carbonates	90 cm >soil> 50 cm
Haciveliler	6	117	424	745.079,57	4.015.816,75	Quarternary Clastics	50 cm >soil> 20 cm
Haciyusuflar	11	203	1584	759.018,71	4.082.888,99	Pelagic Units	no soil
Hafizlar	2	-1	85	711.800,10	4.046.575,75	Quarternary Clastics	soil > 90 cm
Hallac	1	-1	30	779.897,63	4.026.600,20	Quarternary Clastics	90 cm >soil> 50 cm
Hamballar	11	87	174	807.587,88	4.030.318,19	Clastics and Carbonates	50 cm >soil> 20 cm
Hanonu	10	128	1429	716.325,35	4.084.090,90	Pelagic Units	50 cm >soil> 20 cm

Harleni	19	209	600	775.587,69	4.044.010,66	Clastics and Carbonates	20 cm >soil> 0 cm
Hasircilar	10	88	41	706.501,77	4.028.919,86	Pliocene Clastics	20 cm >soil> 0 cm
Haskoy	1	-1	14	789.866,78	4.026.268,08	Quarternary Clastics	90 cm >soil> 50 cm
Hatapcilar	14	163	82	797.163,07	4.028.156,13	Quarternary Clastics	20 cm >soil> 0 cm
Hatipolen	19	304	1155	800.782,93	4.052.563,32	Clastics and Carbonates	no soil
Havuzonu	16	233	1075	806.174,67	4.069.305,97	Clastics and Carbonates	50 cm >soil> 20 cm
Hidirhoca	19	207	801	749.092,52	4.036.099,92	Clastics and Carbonates	90 cm >soil> 50 cm
Hisar	5	129	757	691.272,83	4.041.044,82	Neritic Limestone-1	no soil
Hisar	10	358	281	761.457,78	4.017.949,37	Neritic Limestone-2	no soil
Hisaragzi	9	130	1028	688.517,82	4.077.927,87	Clastics and Carbonates	no soil
Hisaronu	3	302	297	690.992,03	4.049.588,51	Neritic Limestone-2	50 cm >soil> 20 cm
Hizirkaya	1	-1	14	792.075,17	4.028.214,99	Quarternary Clastics	soil > 90 cm
Hocaoglu	10	341	1029	803.637,02	4.062.398,29	Clastics and Carbonates	50 cm >soil> 20 cm
Hokkabazlar	2	-1	64	711.096,78	4.042.463,17	Pliocene Clastics	50 cm >soil> 20 cm
Hollece	16	247	915	799.972,17	4.053.055,49	Clastics and Carbonates	90 cm >soil> 50 cm
Hortlaklar	2	-1	64	710.944,60	4.043.021,46	Pliocene Clastics	50 cm >soil> 20 cm
Hoyran	3	122	460	758.783,22	4.014.256,50	Neritic Limestone-2	90 cm >soil> 50 cm
Hurma	1	-1	10	820.720,24	4.084.825,12	Quarternary Clastics	90 cm >soil> 50 cm
Icecek	8	272	275	801.678,68	4.035.977,20	Clastics and Carbonates	50 cm >soil> 20 cm
Iceriovacik	12	192	746	804.405,89	4.038.994,26	Clastics and Carbonates	50 cm >soil> 20 cm
Ikiagirli	27	182	475	693.187,29	4.033.796,36	Quarternary Clastics	50 cm >soil> 20 cm
Ikikuyu	4	164	834	755.049,05	4.018.113,00	Neritic Limestone-2	no soil
Ikizce	3	165	918	721.944,21	4.022.213,01	Clastics and Carbonates	50 cm >soil> 20 cm
Ikizler	16	222	1161	772.699,88	4.078.799,46	Neritic Limestone-1	no soil
Ilica	27	155	86	800.324,91	4.024.956,20	Melange	soil > 90 cm
Ilvit	6	148	178	762.874,96	4.014.967,80	Neritic Limestone-1	no soil
Ilyaskoy	6	149	316	800.149,68	4.033.025,76	Melange	20 cm >soil> 0 cm
Ilyaslar	5	13	1117	726.271,23	4.078.675,81	Neritic Limestone-2	50 cm >soil> 20 cm
Imecik	15	247	1167	787.677,10	4.082.779,56	Quarternary Clastics	50 cm >soil> 20 cm
Imircik	19	131	1058	748.390,58	4.069.518,34	Quarternary Clastics	90 cm >soil> 50 cm
Incealiler	3	18	1185	715.913,05	4.069.565,89	Pelagic Units	20 cm >soil> 0 cm
Incealiler	13	204	566	728.554,99	4.075.895,19	Clastics and Carbonates	50 cm >soil> 20 cm
Incir koy	7	220	605	697.707,86	4.072.096,70	Pelagic Units	50 cm >soil> 20 cm
Inciragaci	1	-1	21	794.567,23	4.052.543,57	Melange	90 cm >soil> 50 cm
Inciragaci	7	107	306	787.706,96	4.026.376,98	Quarternary Clastics	90 cm >soil> 50 cm
Inciragaci	14	58	625	787.601,81	4.047.117,76	Quarternary Clastics	no soil
Incircik	11	309	878	807.762,46	4.071.933,42	Melange	50 cm >soil> 20 cm
Incircik	14	124	818	796.306,02	4.063.397,87	Clastics and Carbonates	50 cm >soil> 20 cm
Incirli	7	161	647	754.494,05	4.021.040,91	Neritic Limestone-2	no soil
Incirlik	12	205	583	801.406,16	4.038.694,70	Clastics and Carbonates	50 cm >soil> 20 cm
Inisdibi	1	-1	97	762.721,49	4.028.948,32	Clastics and Carbonates	no soil
Inisdibi	6	325	567	745.191,61	4.017.592,60	Clastics and Carbonates	20 cm >soil> 0 cm
Inisdibi	19	321	248	758.646,64	4.012.053,96	Neritic Limestone-2	50 cm >soil> 20 cm
Inlice	18	152	849	786.522,43	4.048.067,09	Quarternary Clastics	no soil
Iskele	2	-1	8	781.210,91	4.024.960,26	Quarternary Clastics	soil > 90 cm
Islamlar	6	229	1119	717.637,45	4.021.389,50	Clastics and Carbonates	90 cm >soil> 50 cm
Islamlar	10	188	585	746.986,13	4.057.915,86	Quarternary Clastics	50 cm >soil> 20 cm
Izzettin	4	235	320	699.593,18	4.034.685,87	Neritic Limestone-2	50 cm >soil> 20 cm
Kabaagac	19	122	202	705.371,03	4.046.608,53	Quarternary Clastics	50 cm >soil> 20 cm
Kabak	16	182	257	690.142,09	4.038.011,66	Neritic Limestone-2	no soil

Kabalar	3	108	1231	737.424,98	4.083.986,60	Melange	50 cm >soil> 20 cm
Kabapinar	9	114	345	715.403,79	4.060.287,96	Neritic Limestone-2	20 cm >soil> 0 cm
Kabapinar	12	136	337	704.418,85	4.028.087,83	Quarternary Clastics	50 cm >soil> 20 cm
Kabaseki	7	126	1374	736.097,95	4.041.476,00	Quarternary Clastics	50 cm >soil> 20 cm
Kadikoy	13	212	440	801.527,43	4.037.710,91	Clastics and Carbonates	50 cm >soil> 20 cm
Kadirleryakasi	7	266	261	741.312,24	4.007.526,66	Neritic Limestone-1	soil > 90 cm
Kale	1	-1	11	716.779,65	4.049.241,98	Quarternary Clastics	90 cm >soil> 50 cm
KALE	8	280	395	768.403,54	4.015.504,52	Quarternary Clastics	90 cm >soil> 50 cm
Kaleucagiz	2	-1	5	756.238,16	4.010.165,93	Neritic Limestone-2	20 cm >soil> 0 cm
Kalkan	10	233	49	716.985,19	4.016.040,49	Neritic Limestone-1	20 cm >soil> 0 cm
Kalkantas	2	-1	1166	732.307,67	4.074.394,89	Quarternary Clastics	no soil
Kanca	10	163	174	704.141,01	4.032.624,87	Quarternary Clastics	50 cm >soil> 20 cm
Kapakli	4	171	133	760.290,81	4.013.446,83	Neritic Limestone-1	20 cm >soil> 0 cm
Kapakli	5	68	1220	739.785,42	4.046.190,77	Clastics and Carbonates	50 cm >soil> 20 cm
Kapiagzi	3	354	732	724.856,07	4.016.662,42	Quarternary Clastics	soil > 90 cm
Kapsizlar	2	-1	128	704.978,96	4.045.581,95	Neritic Limestone-2	50 cm >soil> 20 cm
Karaagac	1	-1	1022	693.711,70	4.037.826,82	Neritic Limestone-2	no soil
Karaagac	10	134	937	786.945,90	4.050.350,60	Quarternary Clastics	50 cm >soil> 20 cm
Karaagac	15	211	402	789.563,45	4.043.377,13	Clastics and Carbonates	50 cm >soil> 20 cm
Karaagacli	9	252	472	713.274,38	4.073.502,20	Quarternary Clastics	20 cm >soil> 0 cm
Karaahmetler	6	192	97	708.485,33	4.048.371,71	Neritic Limestone-1	50 cm >soil> 20 cm
Karabel	1	-1	1158	723.414,82	4.075.617,82	Clastics and Carbonates	no soil
Karabel	5	162	870	764.060,72	4.025.744,06	Neritic Limestone-2	20 cm >soil> 0 cm
Karabel	9	218	935	721.231,05	4.036.767,61	Clastics and Carbonates	50 cm >soil> 20 cm
Karabiyik	4	209	209	714.740,23	4.051.549,76	Pliocene Clastics	90 cm >soil> 50 cm
Karabucak	11	146	53	817.547,08	4.054.523,89	Melange	no soil
Karabucak	13	138	27	704.322,31	4.043.965,56	Neritic Limestone-1	20 cm >soil> 0 cm
Karabucak	14	130	180	766.770,15	4.016.110,09	Melange	50 cm >soil> 20 cm
Karabuk	18	264	230	793.429,79	4.046.556,45	Melange	50 cm >soil> 20 cm
Karacaoren	8	160	219	678.550,58	4.077.053,26	Clastics and Carbonates	soil > 90 cm
Karacaoren	17	205	638	793.129,07	4.047.226,41	Quarternary Clastics	50 cm >soil> 20 cm
Karacortmek	2	-1	918	694.224,25	4.076.890,16	Quarternary Clastics	90 cm >soil> 50 cm
Karaculha	3	228	166	697.596,48	4.059.524,64	Quarternary Clastics	20 cm >soil> 0 cm
Karadag	2	-1	226	757.565,44	4.030.150,34	Neritic Limestone-2	90 cm >soil> 50 cm
Karadayilar	16	145	307	792.438,72	4.048.422,79	Quarternary Clastics	no soil
Karadere	5	142	32	704.196,68	4.024.875,99	Neritic Limestone-2	20 cm >soil> 0 cm
Karadurmus	9	162	285	703.352,67	4.027.699,20	Melange	no soil
Karaerik	21	1	837	798.584,34	4.064.109,38	Melange	no soil
Karagedik	3	305	33	688.150,07	4.062.133,01	Clastics and Carbonates	20 cm >soil> 0 cm
Karagozler	13	114	1286	725.656,41	4.083.980,62	Quarternary Clastics	50 cm >soil> 20 cm
Karahasanlar	8	279	491	717.078,93	4.048.201,72	Clastics and Carbonates	90 cm >soil> 50 cm
Karahuseyinler	5	145	1186	733.383,54	4.034.007,45	Quarternary Clastics	90 cm >soil> 50 cm
Karakoy	1	-1	15	707.463,54	4.025.339,15	Quarternary Clastics	90 cm >soil> 50 cm
Karakoy	5	263	1120	774.233,60	4.081.788,75	Neritic Limestone-2	50 cm >soil> 20 cm
Karakuyu	7	164	843	755.632,62	4.018.673,81	Neritic Limestone-1	no soil
Karamik	1	-1	1032	759.524,91	4.055.280,35	Quarternary Clastics	soil > 90 cm
Karamiklar	2	-1	53	794.742,22	4.032.002,71	Quarternary Clastics	soil > 90 cm
Karamusalar	7	94	46	707.584,68	4.030.218,04	Pliocene Clastics	90 cm >soil> 50 cm
Karaomerler	4	94	83	708.562,00	4.039.592,81	Clastics and Carbonates	50 cm >soil> 20 cm
Karaosmanlar	12	262	1261	806.307,20	4.064.734,87	Clastics and Carbonates	20 cm >soil> 0 cm

Karaoz	11	276	52	806.559,86	4.020.656,25	Clastics and Carbonates	50 cm >soil> 20 cm
Karapinar	5	347	39	693.845,91	4.055.775,54	Neritic Limestone-2	soil > 90 cm
Karapinar	12	157	1103	733.441,44	4.013.723,43	Melange	50 cm >soil> 20 cm
Karasar	16	192	667	798.782,20	4.042.671,15	Melange	50 cm >soil> 20 cm
Karasini	7	130	792	795.003,86	4.061.050,66	Clastics and Carbonates	50 cm >soil> 20 cm
Karataspinari	6	345	700	728.406,57	4.016.962,81	Quarternary Clastics	no soil
Karatepe	1	-1	4	772.214,68	4.016.236,08	Melange	soil > 90 cm
Karayer	2	-1	194	690.398,05	4.066.833,31	Quarternary Clastics	20 cm >soil> 0 cm
Kargi	3	261	25	683.271,40	4.065.006,45	Clastics and Carbonates	20 cm >soil> 0 cm
Kargicak	8	39	270	762.504,14	4.033.966,64	Neritic Limestone-2	no soil
Kargicak	17	280	651	703.489,36	4.044.718,48	Clastics and Carbonates	50 cm >soil> 20 cm
Kargicik	13	225	454	779.538,47	4.041.825,07	Clastics and Carbonates	20 cm >soil> 0 cm
Karkadin	13	259	840	798.358,51	4.045.209,46	Clastics and Carbonates	50 cm >soil> 20 cm
Karsik	6	253	64	810.153,41	4.028.435,96	Quarternary Clastics	50 cm >soil> 20 cm
Kartin	7	121	644	742.276,66	4.013.284,18	Neritic Limestone-1	50 cm >soil> 20 cm
KAS	15	220	41	737.387,99	4.009.622,53	Quarternary Clastics	50 cm >soil> 20 cm
Kasaba	2	-1	216	746.256,59	4.022.542,98	Neritic Limestone-2	soil > 90 cm
Kavacik	18	169	690	678.528,00	4.079.923,05	Clastics and Carbonates	20 cm >soil> 0 cm
Kavak	11	206	49	798.573,97	4.027.488,76	Neritic Limestone-2	20 cm >soil> 0 cm
Kavakli	9	201	223	791.528,58	4.034.314,87	Quarternary Clastics	50 cm >soil> 20 cm
Kavaklidere	6	272	1153	728.190,75	4.080.821,60	Melange	50 cm >soil> 20 cm
Kayabasi	2	-1	1435	743.538,98	4.084.559,82	Clastics and Carbonates	20 cm >soil> 0 cm
Kayabasi	15	101	546	741.137,12	4.024.569,71	Clastics and Carbonates	50 cm >soil> 20 cm
Kayacik	14	245	781	735.907,83	4.045.698,69	Quarternary Clastics	20 cm >soil> 0 cm
Kayacik	22	19	1611	719.242,06	4.052.933,00	Quarternary Clastics	20 cm >soil> 0 cm
Kayadibi	1	-1	183	715.147,93	4.040.917,86	Quarternary Clastics	90 cm >soil> 50 cm
Kayadibi	8	254	306	781.797,10	4.030.554,43	Quarternary Clastics	90 cm >soil> 50 cm
Kayadibi	11	264	65	716.443,92	4.043.291,67	Neritic Limestone-2	20 cm >soil> 0 cm
Kayakoy	1	-1	137	684.994,73	4.050.509,13	Neritic Limestone-2	soil > 90 cm
Kazapinar	6	167	1228	736.198,00	4.037.955,66	Quarternary Clastics	50 cm >soil> 20 cm
Keciler koyu	1	-1	145	687.411,99	4.051.045,66	Quarternary Clastics	soil > 90 cm
Kecili	9	223	52	815.530,89	4.052.433,74	Quarternary Clastics	20 cm >soil> 0 cm
Kemer	1	-1	12	711.117,50	4.058.653,71	Quarternary Clastics	90 cm >soil> 50 cm
Kemer	3	87	125	818.464,56	4.056.701,91	Quarternary Clastics	20 cm >soil> 0 cm
Kemer	6	95	313	743.432,89	4.027.162,85	Quarternary Clastics	river channel deposits
Kemerler	3	221	67	799.939,50	4.028.893,71	Pelagic Units	50 cm >soil> 20 cm
Kemeryeri	9	272	839	721.548,80	4.065.840,34	Neritic Limestone-2	no soil
Kerimler	1	-1	10	707.872,96	4.021.660,35	Quarternary Clastics	90 cm >soil> 50 cm
Kertmec	21	165	388	679.993,10	4.072.507,50	Clastics and Carbonates	20 cm >soil> 0 cm
Kese	2	-1	580	749.643,49	4.020.253,19	Neritic Limestone-2	no soil
Kesik	1	-1	880	692.505,57	4.076.692,51	Quarternary Clastics	50 cm >soil> 20 cm
Keslik	12	195	706	779.394,87	4.031.989,89	Neritic Limestone-1	no soil
Kilicli	2	-1	1169	741.901,02	4.050.951,66	Neritic Limestone-1	90 cm >soil> 50 cm
Kilicli	3	326	301	749.215,25	4.009.292,41	Quarternary Clastics	90 cm >soil> 50 cm
Kilicotu	9	95	776	703.106,32	4.064.916,76	Clastics and Carbonates	20 cm >soil> 0 cm
Kiltepe	7	101	673	769.928,43	4.040.727,35	Clastics and Carbonates	50 cm >soil> 20 cm
Kinali	9	221	1209	751.916,08	4.075.477,26	Neritic Limestone-2	50 cm >soil> 20 cm
Kinalikoyu	2	-1	139	684.630,12	4.050.523,99	Neritic Limestone-2	20 cm >soil> 0 cm
Kincilar	9	310	177	713.829,81	4.056.690,31	Melange	20 cm >soil> 0 cm
Kincilar	10	307	1314	735.049,71	4.073.783,32	Clastics and Carbonates	50 cm >soil> 20 cm

Kinik	1	-1	15	708.338,87	4.025.462,22	Quarternary Clastics	90 cm >soil> 50 cm
Kinik	13	120	1229	730.932,25	4.081.188,05	Quarternary Clastics	50 cm >soil> 20 cm
Kirankosk	13	312	1028	799.896,42	4.051.797,19	Clastics and Carbonates	90 cm >soil> 50 cm
Kirazyayla	19	285	1624	800.187,34	4.071.054,00	Clastics and Carbonates	50 cm >soil> 20 cm
Kireli	33	27	542	779.723,80	4.020.995,44	Neritic Limestone-1	no soil
Kiris	7	233	59	819.407,01	4.053.991,02	Melange	20 cm >soil> 0 cm
Kirisburnu	21	334	1598	734.261,18	4.071.657,49	Melange	no soil
Kirkdirek	14	210	365	792.366,89	4.050.634,51	Melange	90 cm >soil> 50 cm
Kirkgedik	6	335	1370	739.072,39	4.084.304,85	Melange	50 cm >soil> 20 cm
Kirnic	15	226	677	692.804,82	4.042.616,89	Pelagic Units	20 cm >soil> 0 cm
Kirsecik	16	165	625	716.032,25	4.063.890,79	Clastics and Carbonates	20 cm >soil> 0 cm
Kirserik	13	106	493	774.329,76	4.043.503,88	Clastics and Carbonates	50 cm >soil> 20 cm
Kisla	6	172	1139	755.545,65	4.071.087,23	Quarternary Clastics	50 cm >soil> 20 cm
Kislacik	13	136	174	678.743,90	4.070.061,67	Clastics and Carbonates	20 cm >soil> 0 cm
Kitislar	9	33	286	741.620,20	4.018.605,78	Clastics and Carbonates	20 cm >soil> 0 cm
Kiyilar	12	23	590	770.787,00	4.040.674,84	Clastics and Carbonates	50 cm >soil> 20 cm
Kizilagac	2	-1	1137	742.605,18	4.047.817,33	Clastics and Carbonates	50 cm >soil> 20 cm
Kizilagac	4	219	313	787.781,26	4.048.107,87	Clastics and Carbonates	50 cm >soil> 20 cm
Kizilagac	17	173	658	742.186,15	4.023.557,26	Neritic Limestone-2	river channel deposits
Kizilarmut	12	288	565	797.171,67	4.048.309,39	Melange	50 cm >soil> 20 cm
Kizilbel	8	12	871	714.928,48	4.073.959,38	Pelagic Units	no soil
Kizilbel	23	179	800	700.561,55	4.072.297,11	Quarternary Clastics	no soil
Kizilbucak	20	202	1102	693.645,75	4.080.148,59	Quarternary Clastics	50 cm >soil> 20 cm
Kizilburun	14	251	965	799.366,20	4.050.440,40	Clastics and Carbonates	90 cm >soil> 50 cm
Kizilca	3	80	1114	751.375,06	4.061.028,27	Quarternary Clastics	50 cm >soil> 20 cm
Kizilcakaya	10	254	240	690.131,48	4.039.974,69	Pelagic Units	no soil
Kizilcakaya	12	148	513	772.585,37	4.041.832,61	Clastics and Carbonates	50 cm >soil> 20 cm
Kizilcakoy	5	120	457	704.925,98	4.067.705,15	Neritic Limestone-2	no soil
Kizilcakoy	6	91	623	699.766,69	4.032.636,06	Neritic Limestone-2	20 cm >soil> 0 cm
Kizilcaonus	15	232	340	798.559,62	4.037.254,80	Clastics and Carbonates	50 cm >soil> 20 cm
Kizilkaya	5	21	108	697.839,14	4.055.670,53	Clastics and Carbonates	50 cm >soil> 20 cm
Kizilkaya	17	151	788	739.853,34	4.025.129,27	Quarternary Clastics	50 cm >soil> 20 cm
Kiziloren	3	305	462	750.408,40	4.014.773,51	Neritic Limestone-1	90 cm >soil> 50 cm
Kiziloru	9	280	682	715.098,04	4.065.142,49	Clastics and Carbonates	20 cm >soil> 0 cm
Kizilovacik	14	230	571	757.080,07	4.014.356,72	Neritic Limestone-2	no soil
Kizilyaka	24	127	804	741.235,69	4.028.247,25	Clastics and Carbonates	50 cm >soil> 20 cm
Kocaarmut	8	161	722	727.026,74	4.017.497,06	Clastics and Carbonates	50 cm >soil> 20 cm
Kocaboynuz	4	340	483	754.343,18	4.014.511,65	Neritic Limestone-2	90 cm >soil> 50 cm
Kocaduz	15	158	785	757.389,61	4.037.795,06	Neritic Limestone-2	90 cm >soil> 50 cm
Kocaesli	8	246	238	704.837,37	4.026.994,49	Pliocene Clastics	50 cm >soil> 20 cm
Kocagundogan	1	-1	1079	734.239,34	4.013.688,55	Clastics and Carbonates	soil > 90 cm
Kocaoglan	1	-1	73	709.842,12	4.047.501,90	Quarternary Clastics	90 cm >soil> 50 cm
Kocapinar	4	356	1177	764.637,63	4.067.809,00	Quarternary Clastics	90 cm >soil> 50 cm
Kocayer	2	-1	55	749.269,42	4.033.909,71	Pliocene Clastics	90 cm >soil> 50 cm
Kocayer	5	133	816	757.457,32	4.018.962,33	Clastics and Carbonates	no soil
Kocayer	6	200	385	710.269,73	4.031.607,12	Neritic Limestone-2	50 cm >soil> 20 cm
Koklumese	2	-1	789	758.201,33	4.018.402,20	Neritic Limestone-2	no soil
Konali	19	113	597	737.848,22	4.017.305,83	Clastics and Carbonates	50 cm >soil> 20 cm
Kontas	7	313	1203	734.563,91	4.074.165,18	Melange	50 cm >soil> 20 cm
Kontes	1	-1	127	711.816,42	4.056.242,42	Quarternary Clastics	90 cm >soil> 50 cm

Korganoz	11	203	1014	721.089,20	4.021.921,56	Clastics and Carbonates	50 cm >soil> 20 cm
Koristen	8	289	662	752.414,93	4.019.844,03	Neritic Limestone-2	no soil
Korler	1	-1	65	737.387,37	4.073.990,53	Pelagic Units	50 cm >soil> 20 cm
Korler	7	31	1551	815.860,43	4.085.682,92	Clastics and Carbonates	50 cm >soil> 20 cm
Koru	8	241	1192	697.827,72	4.078.247,81	Clastics and Carbonates	50 cm >soil> 20 cm
Korubuku	1	-1	52	710.315,87	4.038.941,93	Pliocene Clastics	90 cm >soil> 50 cm
Koruca	1	-1	37	787.764,22	4.028.592,15	Quarternary Clastics	90 cm >soil> 50 cm
Koskerler	4	220	50	769.688,03	4.019.285,83	Neritic Limestone-1	90 cm >soil> 50 cm
Kote	4	214	593	752.619,29	4.016.268,27	Neritic Limestone-2	no soil
Kovacik	8	265	527	717.684,76	4.045.217,28	Quarternary Clastics	90 cm >soil> 50 cm
Koybasi	11	153	857	720.840,17	4.020.647,07	Neritic Limestone-1	50 cm >soil> 20 cm
Koymat	1	-1	18	684.386,37	4.062.887,87	Quarternary Clastics	soil > 90 cm
Koyunyatak	12	91	359	791.463,10	4.050.971,95	Neritic Limestone-2	50 cm >soil> 20 cm
Koyyikigi	10	292	531	789.110,71	4.045.104,23	Clastics and Carbonates	no soil
Koyyuzu	15	37	848	740.072,07	4.027.300,68	Clastics and Carbonates	50 cm >soil> 20 cm
Kozaca	15	194	1281	799.923,36	4.065.405,29	Clastics and Carbonates	50 cm >soil> 20 cm
Kozagac	12	266	916	718.415,85	4.025.651,51	Neritic Limestone-2	50 cm >soil> 20 cm
Kozagaci	14	222	823	693.176,85	4.044.802,93	Neritic Limestone-2	20 cm >soil> 0 cm
Kozarasi	11	193	1109	804.637,15	4.062.922,36	Clastics and Carbonates	50 cm >soil> 20 cm
Kozdibi	5	84	1025	802.681,71	4.069.284,92	Melange	20 cm >soil> 0 cm
Kozyani	10	43	247	799.098,87	4.033.449,64	Clastics and Carbonates	50 cm >soil> 20 cm
Kucuk	1	-1	23	796.106,70	4.029.030,41	Quarternary Clastics	90 cm >soil> 50 cm
Kucukcekerler	1	-1	518	751.937,53	4.017.337,88	Neritic Limestone-2	90 cm >soil> 50 cm
Kucukdarica	11	47	1007	805.344,88	4.066.186,49	Clastics and Carbonates	no soil
Kucukdarica	14	95	1151	802.536,13	4.063.873,74	Clastics and Carbonates	50 cm >soil> 20 cm
Kucukhasanlar	2	-1	122	712.939,46	4.043.536,75	Pliocene Clastics	soil > 90 cm
Kucukhuyuk	6	311	166	713.308,07	4.055.791,44	Pliocene Clastics	50 cm >soil> 20 cm
Kucukkum	1	-1	3	770.151,05	4.014.406,42	Quarternary Clastics	soil > 90 cm
Kumkoy	1	-1	4	768.706,51	4.013.884,35	Quarternary Clastics	50 cm >soil> 20 cm
Kumluca	9	342	39	796.570,42	4.029.667,48	Clastics and Carbonates	20 cm >soil> 0 cm
Kumlucayazari	11	99	286	806.690,27	4.032.270,31	Clastics and Carbonates	50 cm >soil> 20 cm
Kumluova	2	-1	13	707.054,29	4.023.835,12	Quarternary Clastics	90 cm >soil> 50 cm
Kurtlar	9	125	1277	725.607,27	4.083.621,98	Clastics and Carbonates	no soil
Kuyrukluin	21	209	789	800.261,26	4.041.145,74	Melange	50 cm >soil> 20 cm
Kuyucak	17	167	1035	696.364,11	4.041.998,51	Neritic Limestone-2	50 cm >soil> 20 cm
Kuzburun	7	133	504	750.485,14	4.018.398,80	Neritic Limestone-2	no soil
Kuzca	18	280	1031	719.785,03	4.057.205,72	Quarternary Clastics	20 cm >soil> 0 cm
Kuzca koyu	24	138	1841	793.808,15	4.064.254,08	Neritic Limestone-1	no soil
Kuzpinar	10	346	445	789.327,43	4.045.853,13	Clastics and Carbonates	no soil
Kuzukoy	1	-1	1036	748.536,52	4.065.003,71	Pelagic Units	20 cm >soil> 0 cm
Macun	7	164	1464	756.137,70	4.081.139,27	Clastics and Carbonates	50 cm >soil> 20 cm
Madrasyakasi	1	-1	304	743.468,42	4.026.917,10	Quarternary Clastics	90 cm >soil> 50 cm
Magrisad	18	208	1504	715.018,15	4.082.571,97	Pelagic Units	no soil
Martli	15	293	1024	720.855,69	4.055.944,32	Quarternary Clastics	50 cm >soil> 20 cm
Mehmelcikyani	5	45	1196	739.867,88	4.047.895,73	Clastics and Carbonates	50 cm >soil> 20 cm
Mersincik	7	48	527	775.939,19	4.033.117,70	Clastics and Carbonates	50 cm >soil> 20 cm
Mersintepe	16	134	914	740.568,78	4.027.906,02	Clastics and Carbonates	20 cm >soil> 0 cm
Meyilli	1	-1	59	815.983,74	4.086.077,75	Clastics and Carbonates	50 cm >soil> 20 cm
Mezgit	3	342	180	715.049,71	4.040.017,56	Pliocene Clastics	soil > 90 cm
Mezgit	9	263	490	790.262,66	4.048.610,10	Neritic Limestone-2	50 cm >soil> 20 cm

Minare	12	62	218	703.184,53	4.041.431,66	Clastics and Carbonates	no soil
Mollaveli	5	299	48	708.914,60	4.032.960,72	Pliocene Clastics	50 cm >soil> 20 cm
Mursal	2	-1	1033	751.737,98	4.063.692,40	Quarternary Clastics	90 cm >soil> 50 cm
Murucak	11	286	482	717.585,35	4.051.102,11	Quarternary Clastics	20 cm >soil> 0 cm
Nadarlar	6	204	492	751.360,29	4.015.401,96	Neritic Limestone-2	90 cm >soil> 50 cm
Namaztasi	2	-1	260	758.202,11	4.031.868,69	Clastics and Carbonates	20 cm >soil> 0 cm
Narli	32	214	622	809.828,54	4.045.358,98	Clastics and Carbonates	20 cm >soil> 0 cm
Narlik	5	79	279	706.568,98	4.071.404,52	Quarternary Clastics	50 cm >soil> 20 cm
Nizamlar	12	184	422	745.539,66	4.017.072,04	Clastics and Carbonates	50 cm >soil> 20 cm
Nodar	8	148	1272	732.804,51	4.034.392,31	Clastics and Carbonates	50 cm >soil> 20 cm
Nuriler	16	138	36	771.526,91	4.016.640,96	Quarternary Clastics	90 cm >soil> 50 cm
Nurlu	6	313	1403	740.979,44	4.079.334,30	Clastics and Carbonates	90 cm >soil> 50 cm
Ocaklar	2	-1	53	692.565,23	4.059.606,13	Quarternary Clastics	90 cm >soil> 50 cm
Okcuoldugu	17	287	239	741.799,06	4.005.162,22	Neritic Limestone-1	50 cm >soil> 20 cm
Ordu	7	37	279	719.049,89	4.014.144,50	Quarternary Clastics	50 cm >soil> 20 cm
Oren	7	236	211	712.766,25	4.069.774,33	Pelagic Units	soil > 90 cm
Oren	8	314	1240	733.344,15	4.073.495,88	Clastics and Carbonates	no soil
Oren	12	262	1600	742.008,17	4.070.226,22	Quarternary Clastics	50 cm >soil> 20 cm
Orencik	8	70	1034	804.036,41	4.067.584,04	Clastics and Carbonates	50 cm >soil> 20 cm
Orta	2	-1	7	824.964,23	4.087.064,99	Quarternary Clastics	soil > 90 cm
Orta koyu	2	-1	197	709.367,53	4.067.127,97	Quarternary Clastics	90 cm >soil> 50 cm
Ortabag	12	164	733	750.140,49	4.035.796,57	Clastics and Carbonates	90 cm >soil> 50 cm
Ortagecit	7	119	209	747.629,64	4.024.072,20	Quarternary Clastics	soil > 90 cm
Ortakoy	1	-1	9	800.871,83	4.024.053,96	Clastics and Carbonates	90 cm >soil> 50 cm
Ortakoy	4	122	119	754.434,44	4.011.700,28	Quarternary Clastics	no soil
Ortakoy	17	160	760	718.828,71	4.064.743,03	Quarternary Clastics	20 cm >soil> 0 cm
Ortakuyu	16	169	553	739.679,51	4.013.554,98	Quarternary Clastics	90 cm >soil> 50 cm
Ortapinar	15	232	1139	721.607,71	4.070.054,49	Clastics and Carbonates	50 cm >soil> 20 cm
Orulca	16	156	483	739.793,46	4.010.177,25	Neritic Limestone-2	no soil
Ovacik	9	268	1348	807.046,14	4.061.611,38	Neritic Limestone-1	90 cm >soil> 50 cm
Ovacik	12	95	1114	784.197,59	4.076.580,47	Quarternary Clastics	50 cm >soil> 20 cm
Ovagelemis	1	-1	7	708.620,81	4.021.004,72	Quarternary Clastics	soil > 90 cm
Ovakoy	1	-1	179	712.163,70	4.067.992,97	Quarternary Clastics	90 cm >soil> 50 cm
Oyuk	7	105	533	705.872,40	4.062.641,77	Clastics and Carbonates	50 cm >soil> 20 cm
Oyunlar	9	176	533	706.520,51	4.075.829,08	Neritic Limestone-2	50 cm >soil> 20 cm
Ozdemir	7	196	1164	772.936,87	4.085.409,99	Quarternary Clastics	soil > 90 cm
Ozluce	8	182	1171	730.239,94	4.080.270,87	Quarternary Clastics	50 cm >soil> 20 cm
Ozpinar	10	120	696	719.910,07	4.066.106,02	Clastics and Carbonates	50 cm >soil> 20 cm
Palamut	7	253	131	711.398,32	4.031.737,95	Clastics and Carbonates	90 cm >soil> 50 cm
Palamut	16	355	928	807.507,00	4.071.709,73	Quarternary Clastics	50 cm >soil> 20 cm
Palamutbeleni	15	257	389	781.050,13	4.037.856,94	Clastics and Carbonates	20 cm >soil> 0 cm
Palamutcukuru	3	203	741	757.622,39	4.025.779,24	Neritic Limestone-2	no soil
Pasali	2	-1	250	709.976,37	4.070.751,57	Quarternary Clastics	90 cm >soil> 50 cm
Patlangic	4	348	19	692.434,40	4.055.310,39	Neritic Limestone-2	no soil
Patlangic	6	124	1135	725.725,34	4.080.502,14	Quarternary Clastics	50 cm >soil> 20 cm
Pinarbasi	12	183	723	719.380,11	4.022.488,76	Neritic Limestone-1	90 cm >soil> 50 cm
Pinarbasi	12	235	865	740.874,37	4.014.706,02	Clastics and Carbonates	50 cm >soil> 20 cm
Pinarbasi	14	157	680	730.633,21	4.012.211,86	Clastics and Carbonates	50 cm >soil> 20 cm
Pinargozu	14	106	1417	710.101,30	4.084.471,58	Pliocene Clastics	no soil
Pirhasanlar	1	-1	1034	755.941,06	4.062.788,69	Quarternary Clastics	soil > 90 cm

Ragip	16	154	183	804.464,70	4.021.384,91	Clastics and Carbonates	20 cm >soil> 0 cm
Resiller	1	-1	2	797.230,97	4.025.054,80	Quarternary Clastics	soil > 90 cm
Sakirler	1	-1	1104	744.667,40	4.049.939,37	Clastics and Carbonates	river channel deposits
Sakizli	20	260	805	694.268,13	4.029.331,89	Neritic Limestone-2	50 cm >soil> 20 cm
Salkimli	23	179	773	755.529,60	4.038.295,26	Quarternary Clastics	50 cm >soil> 20 cm
Salur	1	-1	1051	749.477,61	4.073.045,17	Clastics and Carbonates	90 cm >soil> 50 cm
Salur	9	147	529	791.165,87	4.031.651,41	Clastics and Carbonates	20 cm >soil> 0 cm
Salur	10	119	33	804.806,46	4.032.411,75	Quarternary Clastics	50 cm >soil> 20 cm
Sapsal	13	165	369	805.882,60	4.025.559,21	Clastics and Carbonates	50 cm >soil> 20 cm
Sararlar	16	162	456	790.080,24	4.044.690,30	Neritic Limestone-2	no soil
Saribelek	1	-1	740	721.182,81	4.017.291,83	Neritic Limestone-1	90 cm >soil> 50 cm
Saribelen	10	234	1221	729.537,18	4.035.274,61	Clastics and Carbonates	soil > 90 cm
Saribelen	11	163	751	723.321,89	4.016.991,75	Quarternary Clastics	50 cm >soil> 20 cm
Saricali	14	98	1358	735.412,30	4.040.408,53	Clastics and Carbonates	50 cm >soil> 20 cm
Saricasu	4	242	92	795.162,88	4.034.915,39	Melange	50 cm >soil> 20 cm
Saricik	8	126	1050	801.471,06	4.061.254,80	Clastics and Carbonates	no soil
Sariimamlar	2	-1	133	713.180,19	4.050.569,20	Quarternary Clastics	90 cm >soil> 50 cm
Sarikavak	1	-1	5	797.960,09	4.031.449,47	Melange	90 cm >soil> 50 cm
Sarikavak	1	-1	33	796.229,01	4.030.797,71	Clastics and Carbonates	50 cm >soil> 20 cm
Sarikavak	10	78	62	789.272,43	4.024.429,77	Quarternary Clastics	50 cm >soil> 20 cm
Sarilar	1	-1	1050	752.329,59	4.058.542,41	Neritic Limestone-2	90 cm >soil> 50 cm
Sarilar	3	27	476	749.040,34	4.015.967,08	Quarternary Clastics	no soil
Sarisofular	3	96	199	710.042,40	4.069.124,96	Quarternary Clastics	soil > 90 cm
Sarisuleymenlar	7	285	166	711.951,10	4.063.132,84	Clastics and Carbonates	90 cm >soil> 50 cm
Sariyer	10	157	271	715.230,87	4.059.726,21	Neritic Limestone-2	20 cm >soil> 0 cm
Sariyer	18	133	773	788.134,14	4.050.251,40	Quarternary Clastics	50 cm >soil> 20 cm
Sarmasik	11	143	265	807.734,53	4.034.682,93	Melange	50 cm >soil> 20 cm
Sarnicbasi	9	260	349	718.789,64	4.014.967,72	Quarternary Clastics	50 cm >soil> 20 cm
Sarnicli	15	186	508	761.588,18	4.028.454,39	Clastics and Carbonates	50 cm >soil> 20 cm
Sarniconu	17	219	1170	732.333,49	4.022.111,24	Neritic Limestone-1	20 cm >soil> 0 cm
Sazak	2	-1	211	694.241,91	4.078.651,32	Melange	90 cm >soil> 50 cm
Sazak	4	233	961	718.179,58	4.059.752,88	Clastics and Carbonates	90 cm >soil> 50 cm
Sazak	10	127	908	794.535,17	4.059.681,17	Clastics and Carbonates	soil > 90 cm
Sazak	10	156	1001	708.100,34	4.065.359,50	Clastics and Carbonates	no soil
Sazak	13	286	544	762.567,33	4.033.318,74	Quarternary Clastics	20 cm >soil> 0 cm
Sazak	16	265	657	723.129,16	4.034.324,14	Quarternary Clastics	50 cm >soil> 20 cm
Sazlik	11	18	325	789.868,14	4.047.027,08	Neritic Limestone-2	no soil
Seki	4	151	539	699.364,97	4.030.810,57	Pelagic Units	20 cm >soil> 0 cm
Seki	8	284	1187	736.890,23	4.076.319,88	Neritic Limestone-2	50 cm >soil> 20 cm
Sekiyakasi	8	190	437	703.938,89	4.075.045,97	Quarternary Clastics	50 cm >soil> 20 cm
Semsi	9	92	1466	734.679,16	4.040.175,42	Clastics and Carbonates	50 cm >soil> 20 cm
Senir	13	146	492	717.153,12	4.020.734,60	Clastics and Carbonates	90 cm >soil> 50 cm
Seydiler	6	30	138	711.755,96	4.060.300,13	Quarternary Clastics	90 cm >soil> 50 cm
Seyhkavagi	7	222	1247	722.150,95	4.039.742,67	Clastics and Carbonates	20 cm >soil> 0 cm
Seyhkoy	6	135	53	793.129,91	4.030.806,43	Clastics and Carbonates	soil > 90 cm
Seyhkoy	14	151	662	787.296,39	4.046.428,23	Neritic Limestone-2	no soil
Seyitaliler	2	-1	460	749.507,59	4.014.375,69	Neritic Limestone-1	90 cm >soil> 50 cm
Sinekcibeli	12	107	1399	736.422,16	4.042.302,47	Clastics and Carbonates	20 cm >soil> 0 cm
Sinir	3	283	157	713.787,27	4.044.235,69	Quarternary Clastics	20 cm >soil> 0 cm
Sinneli	12	233	1005	736.870,34	4.022.685,60	Clastics and Carbonates	no soil

Sirali	4	176	538	792.940,52	4.055.168,74	Melange	no soil
Sirimli	8	182	129	797.300,50	4.034.894,32	Clastics and Carbonates	50 cm >soil> 20 cm
Sirlengic	1	-1	8	796.186,58	4.027.203,65	Quarternary Clastics	20 cm >soil> 0 cm
Sivisler	2	-1	512	750.646,30	4.019.994,86	Clastics and Carbonates	50 cm >soil> 20 cm
Sivlimce	15	123	1536	742.713,05	4.056.556,71	Clastics and Carbonates	no soil
Siyamlar	2	-1	353	704.300,84	4.073.481,59	Quarternary Clastics	50 cm >soil> 20 cm
Sogut	16	238	1465	728.801,38	4.058.773,75	Neritic Limestone-2	20 cm >soil> 0 cm
Sogutcuk	11	93	1355	738.677,97	4.050.511,02	Clastics and Carbonates	50 cm >soil> 20 cm
Sogutcuma	15	295	1472	801.510,38	4.066.154,53	Clastics and Carbonates	50 cm >soil> 20 cm
Sogutlu	6	225	1394	699.021,75	4.076.502,09	Clastics and Carbonates	no soil
Sogutlu	7	70	937	808.993,00	4.062.453,16	Clastics and Carbonates	20 cm >soil> 0 cm
Sogutlu	19	97	885	726.334,90	4.036.961,01	Neritic Limestone-2	50 cm >soil> 20 cm
Sogutludere	13	233	410	706.346,16	4.075.074,17	Quarternary Clastics	20 cm >soil> 0 cm
Sulukemer	14	255	152	782.235,67	4.034.467,39	Clastics and Carbonates	90 cm >soil> 50 cm
Sumeli	2	63	238	767.255,95	4.017.466,67	Neritic Limestone-1	90 cm >soil> 50 cm
Sunnet	18	160	802	718.783,58	4.022.403,19	Clastics and Carbonates	90 cm >soil> 50 cm
Sutlegen	13	146	1353	734.578,92	4.037.028,54	Clastics and Carbonates	90 cm >soil> 50 cm
Suvecik	17	172	470	742.235,24	4.027.293,87	Clastics and Carbonates	50 cm >soil> 20 cm
Suvecik	21	118	663	741.166,71	4.027.568,94	Clastics and Carbonates	50 cm >soil> 20 cm
Tahtaci	3	161	91	814.297,43	4.084.178,12	Clastics and Carbonates	50 cm >soil> 20 cm
Tahtacilar	13	157	82	709.832,51	4.035.576,10	Quarternary Clastics	90 cm >soil> 50 cm
Taranir	14	181	471	760.562,05	4.036.667,97	Clastics and Carbonates	20 cm >soil> 0 cm
Tartisik	11	283	995	720.678,62	4.050.180,92	Quarternary Clastics	20 cm >soil> 0 cm
Tasagil	8	69	1126	798.820,46	4.060.482,95	Melange	no soil
Tasdibi	10	157	1051	802.886,39	4.070.002,08	Melange	50 cm >soil> 20 cm
Tasli	14	88	752	740.591,57	4.025.704,86	Clastics and Carbonates	50 cm >soil> 20 cm
Tavullar	1	-1	1039	753.368,17	4.062.102,47	Clastics and Carbonates	90 cm >soil> 50 cm
Tekircik	16	166	843	738.324,85	4.019.699,71	Clastics and Carbonates	no soil
Tekke	12	126	494	804.210,39	4.031.654,13	Clastics and Carbonates	50 cm >soil> 20 cm
Tekkekoy	0	-1	1040	756.496,40	4.056.295,63	Neritic Limestone-1	soil > 90 cm
Temel	9	337	1219	733.733,28	4.073.937,22	Melange	50 cm >soil> 20 cm
Tespili	10	117	990	720.897,76	4.037.430,60	Clastics and Carbonates	20 cm >soil> 0 cm
Tikencik	3	169	1321	726.021,83	4.035.834,77	Clastics and Carbonates	50 cm >soil> 20 cm
Tirmanlar	6	352	516	752.946,11	4.023.495,45	Neritic Limestone-2	no soil
Topalak	6	257	463	796.801,14	4.047.720,31	Pelagic Units	50 cm >soil> 20 cm
Topcular	10	154	1521	736.838,57	4.046.994,91	Clastics and Carbonates	50 cm >soil> 20 cm
Toplar	8	280	175	712.101,74	4.061.656,14	Clastics and Carbonates	90 cm >soil> 50 cm
Topluca	12	55	652	700.093,35	4.075.468,82	Neritic Limestone-2	no soil
Toptas	11	209	177	799.269,38	4.035.018,05	Clastics and Carbonates	50 cm >soil> 20 cm
Torunlar	16	100	273	797.722,41	4.036.448,59	Clastics and Carbonates	50 cm >soil> 20 cm
Tugluc	22	159	180	765.579,98	4.015.998,87	Neritic Limestone-1	90 cm >soil> 50 cm
Tumtum	1	-1	8	705.724,02	4.023.495,42	Quarternary Clastics	soil > 90 cm
Turbe	9	282	265	715.451,13	4.047.062,26	Pliocene Clastics	20 cm >soil> 0 cm
Turuncova	1	-1	14	781.742,22	4.026.419,57	Quarternary Clastics	20 cm >soil> 0 cm
Tuzburnu	7	307	1137	743.829,71	4.048.503,98	Clastics and Carbonates	20 cm >soil> 0 cm
Ucarlar	13	271	1094	720.099,03	4.042.558,51	Quarternary Clastics	50 cm >soil> 20 cm
Uckuyu	23	187	478	726.351,83	4.011.547,11	Neritic Limestone-1	50 cm >soil> 20 cm
Ucpinar	9	319	993	721.159,28	4.051.667,19	Quarternary Clastics	20 cm >soil> 0 cm
Uctepe	20	68	76	782.692,17	4.020.778,81	Neritic Limestone-1	no soil
Ugrar	4	103	242	742.969,87	4.019.635,78	Clastics and Carbonates	soil > 90 cm

Ugurlu	8	272	140	710.622,42	4.057.415,39	Quarternary Clastics	20 cm >soil> 0 cm
Ulualan	8	239	1057	720.833,15	4.056.973,91	Quarternary Clastics	20 cm >soil> 0 cm
Ulugol	10	225	81	717.937,72	4.013.532,00	Neritic Limestone-1	90 cm >soil> 50 cm
Ulupinar	8	120	379	807.319,57	4.041.922,86	Clastics and Carbonates	20 cm >soil> 0 cm
Urer	2	-1	461	755.714,61	4.015.238,22	Neritic Limestone-2	90 cm >soil> 50 cm
Uzumlu	4	352	512	699.627,90	4.067.608,75	Neritic Limestone-2	50 cm >soil> 20 cm
Uzumlu	6	260	332	715.684,75	4.021.953,21	Quarternary Clastics	50 cm >soil> 20 cm
Uzundamlar	14	139	576	795.515,86	4.055.886,41	Melange	50 cm >soil> 20 cm
Uzunyurt koyu-f	10	307	135	689.506,03	4.039.541,73	Neritic Limestone-2	no soil
Yagcilar	9	300	129	703.926,92	4.030.689,42	Neritic Limestone-1	soil > 90 cm
Yagcilar	15	273	266	741.762,83	4.006.593,81	Neritic Limestone-2	50 cm >soil> 20 cm
Yaka	11	34	82	780.511,25	4.025.328,36	Quarternary Clastics	50 cm >soil> 20 cm
Yakabag	7	165	203	703.537,31	4.039.374,17	Pliocene Clastics	50 cm >soil> 20 cm
Yakaciftlik	5	258	1037	761.721,56	4.059.722,05	Quarternary Clastics	50 cm >soil> 20 cm
Yakacik	10	142	560	694.056,48	4.070.895,58	Pelagic Units	90 cm >soil> 50 cm
Yakacik	11	18	1266	732.025,63	4.073.354,63	Pelagic Units	no soil
Yakacik	20	192	467	702.275,73	4.061.956,81	Melange	no soil
Yakakoy	11	263	832	719.584,79	4.048.932,90	Quarternary Clastics	20 cm >soil> 0 cm
Yakalilar	8	156	1229	728.981,51	4.083.464,85	Neritic Limestone-2	50 cm >soil> 20 cm
Yalancilar	19	121	210	793.703,29	4.033.250,83	Clastics and Carbonates	90 cm >soil> 50 cm
Yali	1	-1	3	800.628,18	4.021.896,09	Quarternary Clastics	soil > 90 cm
Yalnizdam	12	192	1133	752.621,21	4.073.206,02	Neritic Limestone-2	50 cm >soil> 20 cm
Yalnizkoy	12	267	440	780.160,19	4.041.410,76	Clastics and Carbonates	20 cm >soil> 0 cm
Yamac	3	85	46	809.310,36	4.031.688,66	Clastics and Carbonates	river channel deposits
Yanikaagil	11	113	202	702.972,34	4.038.864,58	Pliocene Clastics	50 cm >soil> 20 cm
Yanikdam	8	290	270	715.561,99	4.058.918,96	Pelagic Units	50 cm >soil> 20 cm
Yanikdam	15	114	1236	797.596,21	4.071.419,85	Clastics and Carbonates	50 cm >soil> 20 cm
Yanikkoy	7	134	353	699.734,46	4.035.409,35	Quarternary Clastics	50 cm >soil> 20 cm
Yaniklar	3	225	51	686.547,48	4.064.397,39	Melange	90 cm >soil> 50 cm
Yaniklar	3	264	358	796.868,86	4.053.959,34	Quarternary Clastics	soil > 90 cm
Yaprakli	19	167	1276	749.328,48	4.079.665,38	Clastics and Carbonates	50 cm >soil> 20 cm
Yarbascandiri	4	113	900	804.957,42	4.073.198,08	Melange	90 cm >soil> 50 cm
Yarbasi	1	-1	8	710.425,91	4.065.089,46	Clastics and Carbonates	90 cm >soil> 50 cm
Yarbasi	4	62	172	789.726,64	4.024.825,47	Quarternary Clastics	50 cm >soil> 20 cm
Yarbasi	24	142	813	730.244,79	4.018.561,71	Quarternary Clastics	50 cm >soil> 20 cm
Yarimca	14	175	808	724.505,47	4.012.672,49	Neritic Limestone-1	no soil
Yarimdam	13	313	661	716.739,38	4.024.013,67	Neritic Limestone-2	50 cm >soil> 20 cm
Yavu	1	-1	1055	750.539,13	4.056.110,94	Quarternary Clastics	90 cm >soil> 50 cm
Yavukoy	4	186	462	754.241,00	4.015.364,20	Neritic Limestone-1	90 cm >soil> 50 cm
Yaylakaya	10	198	75	770.492,06	4.017.703,28	Neritic Limestone-1	50 cm >soil> 20 cm
Yaylakuzdere	11	75	923	806.275,03	4.053.029,39	Clastics and Carbonates	no soil
Yazir	8	141	857	766.356,78	4.040.967,10	Clastics and Carbonates	90 cm >soil> 50 cm
Yelken	2	-1	106	703.537,08	4.034.102,12	Quarternary Clastics	50 cm >soil> 20 cm
Yenbey	10	68	327	807.355,99	4.035.703,54	Melange	50 cm >soil> 20 cm
Yenicekoy	5	229	39	801.426,06	4.023.295,32	Clastics and Carbonates	soil > 90 cm
Yenikisla	7	78	1128	785.360,00	4.045.285,66	Neritic Limestone-1	no soil
Yenikoy	19	168	606	733.517,71	4.011.834,54	Neritic Limestone-1	50 cm >soil> 20 cm
Yerayak	7	133	1315	737.616,75	4.044.784,69	Clastics and Carbonates	20 cm >soil> 0 cm
Yesilce	20	314	704	716.659,88	4.023.740,11	Neritic Limestone-2	50 cm >soil> 20 cm
Yesilkoy	1	-1	20	712.948,42	4.018.204,53	Quarternary Clastics	soil > 90 cm

Yikik	12	153	172	706.550,45	4.046.183,36	Quarternary Clastics	50 cm >soil> 20 cm
Yilmazli	11	138	1068	749.619,28	4.076.050,65	Quarternary Clastics	90 cm >soil> 50 cm
Yogunkoyu	7	309	949	800.998,37	4.055.207,07	Clastics and Carbonates	no soil
Yorenler	19	141	1388	753.006,32	4.078.630,54	Quarternary Clastics	90 cm >soil> 50 cm
Yukaribeycik	12	120	865	806.659,47	4.045.494,12	Quarternary Clastics	50 cm >soil> 20 cm
Yukaribeymelek	11	229	188	773.232,44	4.020.323,77	Quarternary Clastics	50 cm >soil> 20 cm
Yukariderekoy	17	243	732	703.242,87	4.078.447,45	Clastics and Carbonates	no soil
Yukariguzoren	18	243	1158	802.033,07	4.041.297,65	Neritic Limestone-2	no soil
Yukarikuzca	15	266	1080	797.668,18	4.069.566,98	Melange	50 cm >soil> 20 cm
Yukariugrak	8	75	272	742.822,04	4.020.978,27	Clastics and Carbonates	50 cm >soil> 20 cm
Yuksekyer	1	-1	9	709.215,57	4.024.708,41	Quarternary Clastics	soil > 90 cm
Yumrutas	14	231	1361	732.450,61	4.020.256,89	Clastics and Carbonates	20 cm >soil> 0 cm
Yumrutas	16	125	806	723.160,15	4.037.992,07	Quarternary Clastics	50 cm >soil> 20 cm
Yurek	10	275	159	701.462,79	4.075.985,11	Melange	50 cm >soil> 20 cm
Yurek	18	195	615	686.999,60	4.067.825,57	Neritic Limestone-2	50 cm >soil> 20 cm
Yuva	8	186	1054	746.676,59	4.067.771,76	Quarternary Clastics	no soil
Yuvaderesi	15	144	394	712.718,55	4.072.876,53	Clastics and Carbonates	20 cm >soil> 0 cm
Yuvalilar	31	268	154	782.826,85	4.028.289,77	Neritic Limestone-1	no soil
Yuvatilar	3	117	1187	740.380,70	4.048.551,30	Quarternary Clastics	soil > 90 cm
Zeybekleryani	17	98	1437	735.876,34	4.048.645,21	Clastics and Carbonates	50 cm >soil> 20 cm
Zeytin	15	262	887	768.106,57	4.024.803,04	Neritic Limestone-1	no soil
Zikirciler	9	235	118	711.134,41	4.049.648,68	Quarternary Clastics	20 cm >soil> 0 cm
Ziyanlar	11	119	136	794.081,69	4.034.189,21	Clastics and Carbonates	50 cm >soil> 20 cm
Zorlar	2	-1	172	707.923,62	4.057.037,14	Pelagic Units	soil > 90 cm
Zorlar	13	303	1496	740.537,49	4.077.182,10	Melange	50 cm >soil> 20 cm
Zumrutova	1	-1	1051	751.158,84	4.054.499,44	Quarternary Clastics	90 cm >soil> 50 cm

APPENDIX-B

The nearest distances of the ancient settlements to modern settlements.

Ancient Settement	Nearest modern settlement	Distance (m)
TELMESSUS	Fethiye	6
KARYMLASSOS	Kayakoy	101
PINARA	Minare	78
XANTHOS	Kinik	465
TYBRISSOS	Inisdibi	675
TEIMIOUSA	Kaleucagiz	36
ISTLADA	Inisdibi	1078
KYANEAI	Yavukoy	350
TRYSA	Hisar	60
MYRA	Sumeli	295
ANDRIAKE	Tugluc	2543
GAGAI	Yali	791
APOLLONIA	Kilicli	972
PHELLOS	Cukurbag	942
KANDYBA	Cataloluk	232
ARSADA	Arsakoy	896
ISLAMLAR	Islamlar	1655
APERLAI	Kilicli	4110
CADIANDA	Uzumlu	1628
SIMENA	Kaleucagiz	1513
ARYKANDA	Arif	996
PYDNAI	Gavuragili	1670
HOYRAN	Hoyran	711
SOURA	Tugluc	249
ARNEAI	Guncali	252
OINOANDA	Incealiler	1149
ARAKSA	Oren	516
SIDYMA	Asar	50
PATARA	Gelemis	1235
LIMYRA	Yuvalilar	1961
KORYDALLA	Kumluca	424
RHODIAPOLI	Seyhkoy	732
OLYMPOS	Cirali	975
AKALISSOS	Asardede	345
KORMOS	Karabuk	568
IDEBESSOS	Karaagac	259
PHASELIS	Egelkoyu	3190
ISINDA	Belenli	451
ANTIPHELLO	KAS	547
TLOS	Kale	152
NISA	Sutlegen	827
LETOON	Kumluova	410
HACIMUSALA	Hacimusalar	759
SEMAHOYUK	Bozhoyuk	107

APPENDIX-C

The nearest distances of ancient settlements to ancient settlements.

Ancient Settlement	Nearest ancient settlement	Distance (m)
TELMESSUS	KARYMLASSO	5878
KARYMLASSO	TELMESSUS	5878
PINARA	SIDYMA	11824
XANTHOS	LETOON	2773
TYBRISSOS	ISTLADA	1745
TEIMIOUSA	SIMENA	1523
ISTLADA	TYBRISSOS	1745
KYANEAI	HOYRAN	4575
TRYSA	HOYRAN	3983
MYRA	SOURA	2090
ANDRIAKE	SOURA	2785
GAGAI	KORYDALLA	9080
APOLLONIA	APERLAI	3412
PHELLOS	ANTIPHELLO	5148
KANDYBA	PHELLOS	8474
ARSADA	TLOS	9182
ISLAMLAR	HACIMUSALA	7258
APERLAI	APOLLONIA	3412
CADIANDA	ARAKSA	13173
SIMENA	TEIMIOUSA	1523
ARYKANDA	IDEBESSOS	13729
PYDNAI	LETOON	7334
HOYRAN	ISTLADA	2769
SOURA	MYRA	2090
ARNEAI	ARYKANDA	18389
OINOANDA	ARAKSA	15664
ARAKSA	CADIANDA	13173
SIDYMA	PYDNAI	9159
PATARA	LETOON	7526
LIMYRA	RHODIAPOLI	10022
KORYDALLA	RHODIAPOLI	2507
RHODIAPOLI	KORYDALLA	2507
OLYMPOS	PHASELIS	15197
AKALISSOS	IDEBESSOS	4123
KORMOS	AKALISSOS	4434
IDEBESSOS	AKALISSOS	4123
PHASELIS	OLYMPOS	15197
ISINDA	ANTIPHELLO	5353
ANTIPHELLO	PHELLOS	5148
TLOS	ARSADA	9182
NISA	KANDYBA	14602
LETOON	XANTHOS	2773
HACIMUSALA	ISLAMLAR	7258
SEMAHOYUK	HACIMUSALA	20076

APPENDIX-D

The nearest distances of modern settlements to modern settlements.

Modern settlement	Nearest Modern settlement	Distance (m)
Hanonu	Dutdere	1676
Dutdere	Hanonu	1676
Pinargozu	Magrisad	5271
Cogmen	Kavacik	2813
Kavacik	Armutalani	1856
Dariyeri	Cal	2941
Armutalani	Karacaoren	1016
Karacaoren	Armutalani	1016
Cal	Hisaragzi	1677
Hisaragzi	Cal	1677
Kizilbucak	Sazak	1611
Karacortmek	Arpacik koyu	1610
Arpacik koyu	Kesik	436
Kesik	Arpacik koyu	436
Koru	Sogutlu	2114
Sazak	Kizilbucak	1611
Sogutlu	Topluca	1489
Topluca	Yurek	1463
Yurek	Topluca	1463
Yukariderekoy	Yurek	3038
Sekiyakasi	Siyamlar	1605
Oyunlar	Sogutludere	775
Sogutludere	Oyunlar	775
Magrisad	Hanonu	2004
Kizilbel	Karaagacli	1716
Karaagacli	Yuvaderesi	837
Yuvaderesi	Karaagacli	837
Belen	Oren	1486
Pasali	Sarisofular	1628
Eskigacak	Oren	1977
Incealiler	Eskigacak	2391
Oren	Belen	1486
Ovakoy	Ceylan	1010
Ceylan	Ovakoy	1010
Aglar	Ovakoy	1355
Sarisofular	Bayat	1161
Narlik	Bungus	1897
Bayat	Orta koyu	959
Kizilcakoy	Ecebeli	2693
Yarbasi	Cukurceylan	1286
Kiziloru	Kirsecik	1562
Cayan koyu	Siyamlar	678
Kilicotu	Ecebeli	1911
Uzumlu	Ecebeli	2942
Bucak	Kizilbel	434
Ecebeli	Kilicotu	1911
Incir koy	Boyukoy	1255
Boyukoy	Incir koy	1255

Yakacik	Boyukoy	2658
Siyamlar	Cayan koyu	678
Kizilbel	Bucak	434
Cenger	Bagarasi	1464
Bagarasi	Cenger	1464
Guney	Bagarasi	2522
Karayer	Guney	2576
Yurek	Guney	2668
Yaniklar	Koymat	2636
Kargi	Koymat	2394
Koymat	Kargi	2394
Karagedik	Yaniklar	2774
Gunlukbasi	Eskibahce	2070
Kislacik	Kertmec	2747
Kertmec	Kislacik	2747
Cerdin	Hisaragzi	2917
Ocaklar	Eskibahce	2323
Eskibahce	Gunlukbasi	2070
Camkoy	Calica	2066
Emirler	Eldirek	1177
Eldirek	Emirler	1177
Karaculha	Camkoy	2382
Calica	Bucak	1263
Bucak	Karapinar	1251
Karapinar	Bucak	1251
Kizilkaya	Esenkoy	671
Esenkoy	Kizilkaya	671
Gursu	Patlangic	1093
Patlangic	Gursu	1093
Gokceovacik	Catallar	1600
Catallar	Gokceovacik	1600
Fethiye	Gursu	3036
Hisaronu	Gokceovacik	1904
Keciler koyu	Ebuhora	804
Gokben	Bozyer	2403
Bozyer	Gokben	2403
Belcegiz	Hisaronu	2648
Ebuhora	Keciler koyu	804
Kayakoy	Kinalikoyu	364
Belenkoy	Keciler koyu	1549
Kinalikoyu	Kayakoy	364
Zorlar	Ugurlu	2725
Ugurlu	Kemer	1333
Cobanlar	Gebeler	2780
Kontes	Akbuk	1337
Akbuk	Kontes	1337
Kucukhuyuk	Kincilar	1039
Kincilar	Gerisburnu	1031
Gerisburnu	Kincilar	1031
Kemer	Ugurlu	1333
Seydiler	Toplar	1399
Dolasma	Kabapinar	1214
Sarisuleymenlar	Cukurceylan	1424

Dolasma	Dolasma	1294
Kabapinar	Sariyer	587
Sariyer	Kabapinar	587
Yanikdam	Sariyer	873
Catak	Guney	1872
Sazak	Dikmendi	1024
Dikmendi	Sazak	1024
Bogazsazi	Kuzca	835
Guney	Kuzca	524
Cobanalani	Martli	907
Karabiyik	Sariimamlar	1842
Gebeler	Sariimamlar	1796
Murucak	Hacilar	1282
Akinlar	Tartisik	1179
Hacilar	Murucak	1282
Gunesli	Sariimamlar	936
Kale	Karahasanlar	1082
Karahasanlar	Kale	1082
Yakakoy	Tartisik	1660
Gokpinar	Karahasanlar	1427
Alikaya	Turbe	982
Turbe	Alikaya	982
Duger	Deveciler	1310
Deveciler	Kale	1169
Camurkoy	Hafizlar	1393
Cingenkoy	Hafizlar	1002
Zikirciler	Gocmenler	1504
Kocaoglan	Cingenkoy	1213
Gocmenler	Zikirciler	1504
Hafizlar	Cingenkoy	1002
Asarcik	Kargicak	2122
Caltiozu	Karaahmetler	1754
Karaahmetler	Kocaoglan	1612
Sariimamlar	Gunesli	936
Uzunyurt koyu-f	Kizilcakaya	760
Kizilcakaya	Uzunyurt koyu	760
Kabak	Uzunyurt koyu	1657
Hisar	Kizilcakaya	1564
Alinca	Ikiagirli	2325
Karaagac	Alinca	2475
Avlan	Ikiagirli	826
Ikiagirli	Avlan	826
Gey	Sakizli	2871
Bogazici	Avlan	1548
Asar	Gozlukuyu	1652
Gozlukuyu	Seki	1431
Izzettin	Yanikkoy	738
Yanikkoy	Izzettin	738
Darbogaz	Izzettin	1225
Kizilcakoy	Seki	1870
Alahoca	Golbent	1521
Seki	Gozlukuyu	1431
Golbent	Alahoca	1521

Esen-Kestep	Yanikaagil	2576
Yelken	Kanca	1597
Eskikoy	Mollaveli	2190
Yagcilar	Golbent	1702
Mollaveli	Bozukbahce	1739
Karamusalar	Aydinlar	711
Kanca	Yelken	1597
Demirler	Balkica	1755
Palamut	Kocayer	1136
Bozukbahce	Kocayer	1143
Tahtacilar	Demirler	2269
Aklar	Palamut	2504
Aydinlar	Dogular	496
Dinek	Aydinlar	1486
Gozlengic	Balli	621
Kabapinar	Karadurmus	1134
Hasircilar	Cukurincir	1131
Calica	Dogular	846
Karadurmus	Kabapinar	1134
Baglica	Karadurmus	1960
Kocaesli	Kabapinar	1171
Dogular	Aydinlar	496
Cavdir	Dinek	2586
Kinik	Karakoy	884
Karakoy	Kinik	884
Karadere	Tumtum	2059
Tumtum	Kumluova	1373
Kumluova	Tumtum	1373
Yuksekyer	Kinik	1157
Caykoy	Yesilce	2571
Gocebeler	Ada	507
Sakizli	Bel	770
Gavuragili	Bukcegiz	3030
Balli	Gozlengic	621
Bukcegiz	Baglica	2145
Ada	Gocebeler	507
Kerimler	Ovagelemis	995
Ambarlibuk	Ovagelemis	970
Ovagelemis	Ambarlibuk	970
Gelemis	Ambarlibuk	2892
Uzumlu	Senir	1909
Yesilkoy	Kalkan	4580
Senir	Islamlar	814
Yesilce	Yarimdam	284
Yarimdam	Yesilce	284
Kozagac	Akarkuyu	2161
Sunnet	Pinarbasi	603
Islamlar	Senir	814
Pinarbasi	Sunnet	603
Akarkuyu	Kozagac	2161
Korganoz	Ikizce	903
Bezirgan	Saribelek	1279
Kalkan	Hacikaralar	1664

Hacikaralar	Sarnicbasi	562
Sarnicbasi	Hacikaralar	562
Ulugol	Ordu	1270
Ordu	Sarnicbasi	863
Ekincik	Yanikkoy	2034
Yakabag	Yanikaagil	761
Yanikaagil	Yakabag	761
Arifler	Cakallar	2308
Karaomerler	Akdambeleni	1200
Akdambeleni	Karaomerler	1200
Korubuku	Balkica	1245
Balkica	Korubuku	1245
Mezgit	Kayadibi	905
Kayadibi	Mezgit	905
Arsakoy	Ucarlar	1612
Ardicburun	Tespili	1879
Tespili	Karabel	742
Camizlar	Mezgit	1215
Eldirek	Yakalilar	1540
Karagozler	Kurtlar	362
Emirler	Yakalilar	1789
Erdevil	Kurtlar	1080
Cobanlar	Patlangic	1018
Kurtlar	Karagozler	362
Yakalilar	Eldirek	1540
Kavaklidere	Ozluce	2122
Patlangic	Cobanlar	1018
Ahat	Patlangic	1688
Ilyaslar	Patlangic	1907
Kinik	Ozluce	1150
Dont	Kinik	2789
Ozluce	Kinik	1150
Karabel	Belarasi	2907
Belarasi	Karabel	2907
Incealiler	Ceylankoy	3127
Ceylankoy	Kalkantas	944
Yakacik	Kalkantas	1078
Kalkantas	Ceylankoy	944
Temel	Oren	589
Oren	Temel	589
Kontas	Kincilar	618
Kirisburnu	Oren	2054
Kincilar	Kontas	618
Korler	Kincilar	2347
Seki	Gedik	1161
Zorlar	Nurlu	2197
Gedik	Seki	1161
Cukurceylan	Dont	2803
Nurlu	Zorlar	2197
Bogalar	Kabalar	1832
Kabalar	Kirkgedik	1678
Kayabasi	Atlidere	3788
Atlidere	Kirkgedik	1571

Yaprakli	Yilmazli	3627
Yilmazli	Eskihisar	975
Yorenler	Derekoy	1919
Eskihisar	Bayir	255
Kinali	Belen	870
Bayir	Eskihisar	255
Belen	Bayir	398
Salur	Bayir	2697
Derekoy	Yorenler	1919
Yalnizdam	Kinali	2378
Kisla	Yalnizdam	3611
Imircik	Yuva	2447
Yuva	Imircik	2447
Gecit	Imircik	2470
Elmali	Gokpinar	3870
Macun	Derekoy	2102
Haciyusuflar	Bozcabayir	1921
Bozcabayir	Haciyusuflar	1921
Kocapinar	Gokpinar	3657
Dudenkoy	Eymir	1952
Eymir	Dudenkoy	1952
Pirhasanlar	Beyler	2134
Bayralar	Beyler	2693
Yakaciftlik	Bayralar	3534
Tekkekoy	Akcainis	2548
Akcainis	Akcainis	335
Karamik	Tekkekoy	3194
Zumrutova	Yavu	1726
Degirmenkoy	Yavu	861
Yavu	Degirmenkoy	861
Eseler	Yavu	1217
Sarilar	Hacimusalar	1172
Islamlar	Ahatli	2902
Ahatli	Dutyakasi	1163
Akcay	Ahatli	1988
Hacimusalar	Sarilar	1172
Kuzukoy	Yuva	3335
Mursal	Tavullar	2278
Kizilca	Hacimusalar	2254
Akcainis	Akcainis	335
Beyler	Pirhasanlar	2134
Dogus	Ahatli	1233
Dutyakasi	Ahatli	1163
Sivlimce	Dogus	1442
Bogazcik	Belenli	1493
Belenli	Sogutcuk	1350
Cobanlar	Sogutcuk	748
Sogutcuk	Cobanlar	748
Agilli	Kilicli	909
Kilicli	Agilli	909
Sakirler	Tuzburnu	1663
Afsar	Sakirler	1727
Gombe	Cobanlar	1410

Bayindir	Kizilagac	1502
Mehmelcikyani	Yuvatilar	833
Yuvatilar	Mehmelcikyani	833
Tuzburnu	Kizilagac	1403
Kizilagac	Tuzburnu	1403
Zeybekleryani	Caykoy	603
Caykoy	Zeybekleryani	603
Topcular	Cemle	1335
Sogut	Boyali	3096
Boyali	Cokek	2210
Akcalan	Cokek	1362
Cokek	Akcalan	1362
Buyuksoyle	Gecmen	2555
Gecmen	Buyuksoyle	2555
Bozhoyuk	Gokpinar	4582
Golova-Mugren	Ikizler	2277
Cukurelma	Cobanisa	3929
Ikizler	Golova-Mugren	2277
Karakoy	Ikizler	3360
Cobanisa	Ozdemir	3432
Ozdemir	Cobanisa	3432
Caglarca	Geyikbayiri	1024
Citdibi	Cinarcik	2699
Cinarcik	Armutcu	930
Golderesi	Yarbascandiri	1160
Gokceler	Palamut	1315
Palamut	Incircik	339
Incircik	Palamut	339
Armutcu	Filler	483
Filler	Armutcu	483
Yarbascandiri	Golderesi	1160
Tasdibi	Kozdibi	747
Kozdibi	Tasdibi	747
Havuzonu	Asagiorencik	2025
Orencik	Kucukdarica	1914
Sogutcuma	Kozaca	1755
Kozaca	Sogutcuma	1755
Asagiorencik	Kucukdarica	1941
Kucukdarica	Karaosmanlar	1742
Karaosmanlar	Kucukdarica	1742
Bostanalani	Kozarasi	540
Alabas	Ovacik	1410
Kozarasi	Agalar	478
Hocaoglu	Agalar	921
Agalar	Kozarasi	478
Ovacik	Alabas	1410
Darici	Hocaoglu	1053
Asagigolcuk	Saricik	1123
Saricik	Asagigolcuk	1123
Kucukdarica	Hocaoglu	1841
Karaerik	Kozaca	1863
Tasagil	Domenyeri	597
Domenyeri	Tasagil	597

Culfa	Incircik	1587
Incircik	Bartu	857
Bartu	Gurcu	856
Gurcu	Bartu	856
Kuzca koyu	Bartu	2058
Karasini	Sazak	1447
Sazak	Karasini	1447
Golcuk	Tasagil	2142
Uzundamlar	Yaniklar	2355
Golcuk koyu	Yogunkoyu	1225
Aglica	Cinarcik	1874
Yogunkoyu	Cinarcik	1006
Cinarcik	Yogunkoyu	1006
Yaniklar	Uzundamlar	2355
Gunesli	Ovacik	4023
Yaylakuzdere	Gunesli	5042
Cukurca	Akcagil	282
Akcagil	Cukurca	282
Hollece	Cukurca	827
Hatipolen	Akcagil	786
Kirankosk	Altinyaka	666
Inciragaci	Yaniklar	2702
Calti	Kizilarmut	2038
Altinyaka	Kirankosk	666
Kizilburun	Altinyaka	831
Sirali	Uzundamlar	2673
Gol	Dumluca	1569
Dumluca	Camurlu	806
Camurlu	Dumluca	806
Koyunyatak	Cubuklu	932
Kirkdirek	Koyunyatak	964
Sariyer	Karaagac	1193
Karaagac	Sariyer	1193
Cubuklu	Koyunyatak	932
Gurdek	Koyunyatak	1175
Sogutlu	Ovacik	2120
Goynuk	Dedeler	5289
Beldibi	Bahcecik	1339
Bahcecik	Beldibi	1339
Gedeller	Gokdere	2556
Gokdere	Gedeller	2556
Tahtaci	Akdamlar	1949
Akdamlar	Korler	1565
Meyilli	Korler	414
Korler	Meyilli	414
Cakirlar	Meyilli	2164
Orta	Arapsuyu	1007
Hurma	Cakirlar	3246
Arapsuyu	Orta	1007
Dedeler	Kemer	2344
Aslanbucak	Asagikuzdere	1437
Kemer	Dedeler	2344
Karabucak	Asagikuzdere	1743

Kiris	Camyuva	1604
Asagikuzdere	Aslanbucak	1437
Kecili	Asagikuzdere	1770
Camyuva	Deniz	819
Bogurtlenlioz	Deniz	1090
Deniz	Camyuva	819
Beycik	Beycik	1782
Ulupinar	Beycik	2181
Yukariguzoren	Kuyrukluin	1779
Iceriovacik	Disovacik	1647
Golcuk	Karasar	278
Karasar	Golcuk	278
Kuyrukluin	Yukariguzoren	1779
Disovacik	Kadikoy	1506
Kadikoy	Incirlik	991
Guzoren koyu	Kizilcaonus	2329
Incirlik	Kadikoy	991
Balikci	Kizilcaonus	1185
Kizilcaonus	Torunlar	1162
Baysikoy	Saricasu	1946
Ballik	Cayagzi	1888
Hacilar	Cayici	694
Bozyer	Hacilar	2210
Cayici	Hacilar	694
Akdere	Cayagzi	685
Gokler	Karaagac	834
Karaagac	Gokler	834
Akcaalan	Gokler	2298
Yalnizkoy	Kargicik	748
Kargicik	Yalnizkoy	748
Gokbuk	Curukin	484
Curukin	Gokbuk	484
Palamutbeleni	Belbasi	1058
Belbasi	Palamutbeleni	1058
Bagbeleni	Harleni	947
Catallar	Kirserik	952
Akcay	Akyaka	630
Akyaka	Akcay	630
Kirserik	Catallar	952
Kiltepe	Kiyilar	861
Kiyilar	Kiltepe	861
Kizilcakaya	Kiyilar	2139
Adala	Mersincik	2927
Gokceyaka	Belbasi	1888
Alacadag	Aligani	830
Mersincik	Alacadag	832
Kayadibi	Cavdir	1870
Aligani	Alacadag	830
Sulukemer	Belbasi	2624
Kavakli	Yalancilar	2421
Salur	Seyhkoy	2138
Saricasu	Ziyanlar	1302
Ziyanlar	Yalancilar	1012

Yalancilar	Haciomerler	827
Haciomerler	Yalancilar	827
Karamiklar	Haciomerler	857
Seyhkoy	Karamiklar	2008
Sirimli	Torunlar	1610
Kozyani	Ilyaskoy	1133
Toptas	Kozyani	1578
Torunlar	Kizilcaonus	1162
Icecek	Dalca	932
Erentepe	Dalca	741
Sarikavak	Sarikavak	1850
Besikci	Kemerler	870
Asarpinar	Erentepe	1344
Dalca	Erentepe	741
Yenbey	Sarmasik	1089
Sarmasik	Hacilaryeri	827
Salur	Tekke	963
Tekke	Belen	619
Kumlucayazari	Cay	779
Hacilaryeri	Sarmasik	827
Yamac	Hamballar	2201
Cay	Kumlucayazari	779
Belen	Tekke	619
Hamballar	Cay	1374
Gokcealan	Karsik	1658
Cavus	Bahceler	2034
Karsik	Gokcealan	1658
Beykonak	Ilica	1762
Sapsal	Cavus	2363
Bahcebasi	Ortakoy	758
Ilica	Bahcebasi	1014
Ortakoy	Bahcebasi	758
Canakci	Ilica	1312
Resiller	Corus	1541
Caydagildigi	Hizirkaya	922
Haciveliler	Sarikavak	1425
Sirlengic	Hatapcilar	1365
Sarikavak	Kumluca	1180
Kucuk	Kumluca	788
Hatapcilar	Sirlengic	1365
Corus	Kavak	1249
Kavak	Corus	1249
Kemerler	Besikci	870
Hizirkaya	Caydagildigi	922
Eskicami	Haskoy	1289
Haskoy	Eskicami	1289
Yarbasi	Sarikavak	602
Sarikavak	Yarbasi	602
Inciragaci	Haskoy	2163
Koruca	Eskicami	2087
Yuvalilar	Cavdir	1997
Turuncova	Iskele	1553
Iskele	Yaka	790

Hallac	Arif	1160
Arif	Hallac	1160
Cavdir	Kayadibi	1870
Yaka	Iskele	790
Keslik	Kayadibi	2799
Asaronu	Arif	2532
FINIKE	Uctepe	743
Yukaribeymelek	Armutalan	1665
Belen	Kireli	2471
Kireli	Belen	2471
Beymelek	Akdam	344
Koskerler	Yaylakaya	1775
Yaylakaya	Nuriler	1483
Armutalan	Yukaribeymelek	1665
Nuriler	Burun	398
Akdam	Beymelek	344
Burun	Nuriler	398
Kucukkum	Kumkoy	1536
Cayagzi	Akdere	685
Yali	Yenicekoy	1611
Ragip	Karaoz	2218
Karaoz	Ragip	2218
Cakmak	Bahceler	1221
Basaribelen	Saribelen	2342
Sogutlu	Belen	1071
Belen	Sogutlu	1071
Tikencik	Figla	790
Saribelen	Basaribelen	2342
Figla	Tikencik	790
Akdag	Semsi	1571
Semsi	Saricali	769
Saricali	Semsi	769
Kabaseki	Sinekcibeli	888
Sinekcibeli	Kabaseki	888
Cevizlik	Arma	584
Nodar	Cevizlik	590
Arma	Cevizlik	584
Karahuseyinler	Nodar	695
Kazapinar	Sutlegen	1866
Beldibi	Sutlegen	2273
Sutlegen	Kazapinar	1866
Gursu	Gedikbasi	871
Camiyani	Gedikbasi	479
Dereleryakasi	Kemer	1830
Kizilyaka	Suvecik	682
Koyyuzu	Mersintepe	783
Fette	Akkoru koyu	2177
Mersintepe	Suvecik	687
Suvecik	Bucakkemer	648
Kemer	Madrasyakasi	248
Madrasyakasi	Kemer	248
Akkoru koyu	Kizilkaya	404
Hidirhoca	Ortabag	1091

Gedikbasi	Camiyani	479
Dogantas	Salkimli	1724
Salkimli	Dogantas	1724
Ortabag	Hidirhoca	1091
Kocayer	Ortabag	2078
Arapkoyu	Taranir	2484
Guncali	Kocaduz	612
Taranir	Dagbag	2017
Dagbag	Buyuktaranir	1155
bel	Yazir	2824
Buyuktaranir	Kargicak	804
Kargicak	Sazak	651
Namaztasi	Karadag	1832
Karadag	Namaztasi	1832
Inisdibi	Sarnicli	1236
Dirgenler	Tirmanlar	4377
Cagman	Inisdibi	2044
Sarnicli	Inisdibi	1236
Yazir	bel	2824
Palamutcukuru	Ayiveliler	1758
Karabel	Inisdibi	3473
Ayiveliler	Ahmetler	1283
Ahmetler	Ayiveliler	1283
Goynuk	Beloren	2819
Tirmanlar	Belencik	2197
Fakiciftligi	Ortagecit	516
Ortagecit	Fakiciftligi	516
Camlica	Kasaba	874
Incirli	Belencik	1825
Akcakuyu	Belkonak	474
Emirler	Kasaba	1901
Belencik	Gurceyit	847
Gurlu	Gurceyit	738
Belkonak	Akcakuyu	474
Kese	Golbasi	802
Golbasi	Cerler	609
Inisdibi	Nizamlar	626
Cerler	Golbasi	609
Gurceyit	Gurlu	738
Sivisler	Belkonak	1002
Gokceyazi	Koristen	715
Kuzburun	Cerler	1197
Koristen	Gokceyazi	715
Derekoy	Godeme	1205
Karakuyu	Ikikuyu	808
Kocayer	Koklumese	931
Gurses	Cakalbayat	1595
Ikikuyu	Karakuyu	808
Koklumese	Kocayer	931
Davazlar	Diyne	1355
Cakalbayat	Gurses	1595
Tugluc	Karabucak	1196
Diyne	Davazlar	1355

Kucukcekerler	Kote	1268
Guneyyaka	Agilyani	1294
Sarilar	Agilyani	1201
Ilvit	Cakalbayat	1796
Hoyran	Diyne	1522
Kizilovacik	Urer	1626
Yavukoy	Kocaboynuz	859
Urer	Yavukoy	1479
Kote	Asar	1090
Asar	Yavukoy	870
Kocaboynuz	Yavukoy	859
Nadarlar	Kiziloren	1140
Hisar	Cakalbayat	1695
Kapakli	Hoyran	1711
Agilyani	Sarilar	1201
Aksakallar	Ambararasi	442
Nizamlar	Ambararasi	317
Ahatli koyu	Nizamlar	481
Haciveliler	Ahatli koyu	859
Baglica	Haciveliler	1960
Seyitaliler	Kiziloren	985
Kiziloren	Seyitaliler	985
Ortakoy	Cevreli	843
Cevreli	Asagikoy	318
Asagikoy	Cevreli	318
Inisdibi	Kapakli	2155
Baslica	Ambaryani	598
Kaleucagiz	Asagikoy	2088
Kilicli	Bogazcik	1658
Bogazcik	Kilicli	1658
Belenli	Bayindir	2045
Bayindir	Asar	531
Asar	Bayindir	531
Agalar	Kadirleryakasi	487
Kadirleryakasi	Agalar	487
Yagcilar	Kadirleryakasi	1036
Agilli	Ambaryani	1323
Orulca	Ayisarnici	688
Ayisarnici	Orulca	688
Ambaryani	Baslica	598
Kartin	Ambaryani	1126
Pinarbasi	Ortakuyu	1660
Ortakuyu	Cukurbag	632
Cukurbag	Ortakuyu	632
Dudenagzi	Cukurbag	1145
Cokerencik	Derekoy	765
Derekoy	Cokerencik	765
Gokdere	Arnavutlar	2657
Gokseki	Yenikoy	1961
Karapinar	Kocagundogan	799
Yenikoy	Karapinar	1891
Konali	Derekoy	1055
Kitislar	Ugrar	1697

Tekircik	Baglica	1661
Baglica	Tekircik	1661
Arapyurdu	Yumrutas	553
Kocagundogan	Karapinar	799
Ugrar	Yukariugrak	1351
Boluceagac	Boyacipinar	508
Boyacipinar	Boluceagac	508
Yumrutas	Arapyurdu	553
Hacioglu	Boluceagac	510
Arnavutlar	Boluceagac	746
Gokcebuk	Karataspinari	917
Yarbasi	Arnavutlar	1118
Kocaarmut	Gavurpazari	1000
Kapiagzi	Saribelen	1570
Karataspinari	Gavurpazari	901
Gavurpazari	Karataspinari	901
Uckuyu	Ayranci	1036
Ayranci	Uckuyu	1036
Caglarca	Pinarbasi	1162
Pinarbasi	Caglarca	1162
Gokceoren	Caglarca	2185
KAS	Ayisarnici	1908
Sarniconu	Arapyurdu	1845
Cesme	Dereleryakasi	2246
Kizilkaya	Akkoru koyu	404
Cukurhayit	Kayabasi	972
Sinneli	Baglica	2156
Cataloluk	Cukurhayit	1603
Abazali	Suvecik	697
Bucakkemer	Suvecik	648
Kayabasi	Cukurhayit	972
Yukariugrak	Ugrar	1351
Gomuce	Gursu	4425
Okcuoldugu	Yagcilar	1431
Bel	Sakizli	770
Dodurga koyu	Asar	1682
Gunederesi	Bagbuku	631
Bagbuku	Gunederesi	631
Yanikdam	Bagbuku	982
Kirazyayla	Bagbuku	2311
Yukarikuzca	Yanikdam	1854
Gucukpinar	Kuzca koyu	5883
Ovacik	Cukurkoyu	4859
Cukurkoyu	Ovacik	4859
Yakacik	Kilicotu	3074
Oyuk	Sazak	3514
Sazak	Orta koyu	2175
Orta koyu	Bayat	959
Kirsecik	Kiziloru	1562
Ortakoy	Ozpinar	1740
Arpacik	Arpacik koyu	1699
Cataloluk	Kayacik	1073
Kayacik	Cataloluk	1073

Cemle	Yerayak	1008
Yerayak	Cemle	1008
Kapakli	Mehmelcikyani	1707
Cukurbag	Cobanlar	1263
Kuzca	Guney	524
Kabaagac	Emirler	325
Yikik	Kabaagac	1253
Gavuragili	Kargicak	1612
Emirler	Kabaagac	325
Kapsizlar	Emirler	793
Kargicak	Karabucak	1123
Karabucak	Kargicak	1123
Cakallar	Karabucak	1287
Dip	Gavuragili	2340
Akcaekinlik	Gavuragili	1742
Caykenari	Hortlaklar	2468
Alacat	Yikik	2204
Buyukcali	Baykus	1092
Hortlaklar	Hokkabazlar	578
Hokkabazlar	Hortlaklar	578
Baykus	Buyukcali	1092
Kucukhasanlar	Sinir	1099
Sinir	Kucukhasanlar	1099
Haciosmanlar	Turbe	1479
Kovacik	Bagliagac	1740
Bayramlar	Ucarlar	1663
Kayadibi	Bayramlar	2108
Kayacik	Akinlar	1947
Derekoy	Akcalan	1468
Boyaagaci	Armutagaci	1199
Kemeryeri	Armutagaci	1414
Ozpinar	Kemeryeri	1659
Cukurceylan	Yarbasi	1286
Armutagaci	Boyaagaci	1199
Ulualan	Guney	931
Martli	Cobanalani	907
Bozalan	Ucpinar	1135
Ucpinar	Bozalan	1135
Tartisik	Akinlar	1179
Bagliagac	Kovacik	1740
Ucarlar	Arsakoy	1612
Kozagaci	Kirnic	2217
Kirnic	Hisar	2195
Kuyucak	Kirnic	3613
Oren	Yuva	5274
Kirkgedik	Atlidere	1571
Arif	Kirserik	1902
Harleni	Bagbeleni	947
Baskoz	Arif	3108
Inlice	Kizilagac	1260
Kizilagac	Inciragaci	1006
Asardede	Sazlik	539
Mezgit	Asardede	1571

Karadayilar	Karacaoren	1381
Seyhkoy	Inciragaci	753
Yenikisla	Seyhkoy	2249
Derekoy	Gerenlik	801
Gerenlik	Koyyikigi	473
Koyyikigi	Gerenlik	473
Sararlar	Koyyikigi	1055
Inciragaci	Seyhkoy	753
Karabuk	Karacaoren	734
Karacaoren	Karabuk	734
Sazlik	Asardede	539
Eken	Asardede	793
Kuzpinar	Gerenlik	605
Gozyaka	Karabuk	1749
Karkadin	Golcuk	2517
Topalak	Kizilarmut	696
Kizilarmut	Topalak	696
Guzle	Kizilarmut	2038
Yukaribeycik	Beycik	281
Beycik	Yukaribeycik	281
Kocaduz	Guncali	612
Sazak	Kargicak	651
Cukurkavak	Karagozler	3038
Cukurkavak	Dutdere	2660
Gacakyayla	Ahat	1977
Bungus	Narlik	1897
Ambarkavak	Ortapinar	1365
Ortapinar	Ambarkavak	1365
Toplar	Seydiler	1399
Atliderekoy	Sarisuleymenlar	1866
Gumusyaka	Cukurelma	4074
Bayindir	Gokpinar	3769
Gokpinar	Kocapinar	3657
Tavullar	Kizilca	2264
Armutlu	Afsar	2743
Goltarla	Karamik	7074
Geyikbayiri	Caglarca	1024
Imecik	Ovacik	7109
Avdan	Imecik	7290
Derekoy	Gunederesi	1767
Akcakese	Cinarcik	2702
Narli	Beycik	2345
Akkaya	Topalak	1245
Egelkoyu	Narli	5582
Seyhkavagi	Yumrutas	2021
Yumrutas	Camlikoy	2019
Karabel	Tespili	742
Camlikoy	Sazak	1677
Sazak	Camlikoy	1677
Akyazi	Sazak	4170
Kocayer	Palamut	1136
Cukurincir	Hasircilar	1131
Ikizce	Korganoz	903

Saribelek	Bezirgan	1279
Yarimca	Uckuyu	2162
Suvecik	Kizilyaka	682
Tasli	Kizilkaya	936
Kizilagac	Kayabasi	1458
Kasaba	Camlica	874
Ambararasi	Nizamlar	317
Beloren	Godeme	2021
Godeme	Derekoy	1205
Koybasi	Korganoz	1298
Saribelen	Kapiagzi	1570
Zeytin	Beloren	2576
Alakent	Gokceyazi	1349
Gokceyazi	Karabucak	573
Kale	Gokceyazi	1405
Kumkoy	Kucukkum	1536
Karabucak	Gokceyazi	573
Karatepe	Burun	688
Uctepe	Finike	743
Yenicekoy	Ortakoy	939
Bahceler	Cakmak	1221
Ilyaskoy	Kozyani	1133
Atbuku	Cirali	3703
Minare	Cakallar	1724
Sumeli	Gokceyazi	1109
Kumluca	Kucuk	788
Cirali	Atbuku	3703