PEOPLE’S PREFERENCES TOWARDS WIND FARMS AT THE COAST OF MUĞLA

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ABSTRACT

PEOPLE'S PREFERENCES TOWARDS WIND FARMS AT THE COAST OF MUĞLA

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Wind farms are rapidly spreading across the globe. As in many other countries, wind energy developments have advanced across Turkey. Muğla, as the sixth province with the highest wind energy potential in this country gets its share by hosting ongoing projects. Currently, there are 9 wind farms in Muğla province, 6 of which are actively working. The number of wind farms in the region is expected to increase due to the government's renewable energy policies. However, the pace of these developments may create social, economic and environmental problems. Muğla is a popular tourism destination both for domestic and international travelers. The tourism sector in this area gets its strength from unique environmental values of the province. Besides its high amount of forested areas, the province has also the longest shoreline of the country. However, an increase in the number of wind farms may become a threat to the sustainability of these values. This study investigates opinions and choices of two main stakeholders of tourism sector -tourists and tourism employees- on wind farms through a structured questionnaire survey conducted at Muğla Province. Evaluating these opinions and possible impacts of wind turbines on the coastal tourism are the aims of the study. Also, tourists and tourism employees' preferences about site selection of the wind farms are investigated using Geographic Information Systems. After analysis of questions, site selection maps are generated for each sample group. Results show that any impact that can harm the environment would negatively affect the tourism sector of the province. This study also sets an example for further studies with its applicability on different parts of the globe, which share similar characteristics with that of Muğla province.

Keywords: Wind Turbines, Geographic Information Systems, Tourism, Muğla

ÖZ

İNSANLARIN MUĞLA KIYILARINDAKİ RÜZGAR SANTRALLERİNE YÖNELİK TERCİHLERİ

TÜZGEL, Yılmaz Bahadır

Yüksek Lisans, Jeodezi ve Coğrafi Bilgi Sistemleri Bölümü
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Rüzgar santralleri dünya çapında hızla yayılmaktadır. Diğer birçok ülkede olduğu gibi Türkiye'de de rüzgar enerjisi yatırımları oldukça artmış durumdadır. Ülkedeki en fazla rüzgar enerjisi potansiyeline sahip altıncı il olan Muğla da bu devam eden projelerden payına düşeni almaktadır. İlde, mevcutta varolan 9 rüzgar santralinden 6'sı aktif olarak çalışmaktadır ve bu sayıların, mevcut politikalar gereği, gelecekte artacağı öngörülmektedir. Diğer yandan, bu tür projelerin hızla çoğalması sosyal, ekonomik ve çevresel sorunlar yaratabilir. Muğla ise hem yerli hem de yabancı turistler için popüler bir bölge olmakla birlikte bu bölgedeki turizm sektörü, gücünü ilin eşsiz çevresel değerlerinden almaktadır. Yüzölçümünün büyük bölümünü kaplayan ormanların yanı sıra ülkenin en uzun kıyı şeridi de bu ildedir. Fakat rüzgar santrallerinin sayısındaki artış bu değerlerin sürdürülebilirliğine bir tehdit oluşturabilir. Bu çalışma turizm sektörünün iki ana paydaşı olan turistlerin ve turizm sektörü çalışanlarının rüzgar santralleri hakkındaki görüşlerini ve seçimlerini yapılandırılmış bir anket metodu ile incelemektedir. Çalışmanın amacı, bu görüşleri ve rüzgar türbinlerinin turizm üzerine muhtemel etkilerini araştırmaktır. Buna ek olarak, katılımcıların rüzgar santrallerinin yer seçimleri hakkındaki fikirleri Coğrafi Bilgi Sistemleri kullanılarak yansıtılmaktadır. Anket sorularına verilen cevaplar analiz edildikten sonra iki katılımcı grup için de yer seçimi haritaları oluşturulmaktadır. Çalışmanın sonuçları göstermektedir ki çevresel değerlere zarar verebilecek herhangi bir etki, ilin turizm sektörünü de olumsuz etkileyecektir. Bu çalışma ayrıca dünyada Muğla iliyle benzer özelliklere sahip başka yerler için de uygulanabilirliği ile örnek oluşturmaktadır.

Anahtar kelimeler: Rüzgar Türbinleri, Coğrafi Bilgi Sistemleri, Turizm, Muğla

To my family,

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LIST OF ABBREVIATIONS

DEM	: Digital Elevation Model
GHG	: Greenhouse Gas
GIS	: Geographic Information Technologies
GMES	: Global Monitoring for Environment and Security
GWEC	: Global Wind Energy Council
HAWT	: Horizontal axis wind turbines
RES	: Renewable Energy Systems
TWEA	: Turkish Wind Energy Association
VAWT	: Vertical axis wind turbines
WEC	: World Energy Council

CHAPTER 1

INTRODUCTION

There has been 130 years since the establishment of the first electricity generating wind turbine by James Blythe in 1887. Since then, wind energy systems have been improved significantly that they become a solid alternative against conventional fossil fuel plants.

With the rapid increase of population, development of industry and technology, the energy need increased at all around the world. Usage of fossil fuels for energy generation has been the most prevalent practice. However, the effects of these conventional practices seem very harmful to our world which embraces both human and natural life. For this reason, Renewable Energy Systems (RES) gained remarkable importance for the last decade, especially after Kyoto Protocol. This protocol, held in 1997, started to take effect by 2001 when 178 countries, including Turkey, agreed to adopt it.

As a signatory country of Kyoto Protocol, Turkey has to deal with climate change and limited fossil fuel resources. According to National Greenhouse Gas Inventory Report of Turkey (TurkStat, 2017) total greenhouse gas (GHG) emissions have increased 123.7% from 1990 to 2015, and the main share of 2015's emission is credited to the energy sector with 82.73 percentage (TurkStat, 2017). This shows the significance of RES in Turkey.

Turkey has a wind energy potential (Bilgili & Şimşek, 2012) and there has been a rapid effort to benefit from it. Unfortunately, efforts of making policies and laws on the wind energy issue are not that rapid. Conservation policies are neglected while usage policies come to the forefront (Yetiş et al., 2015; Muğla

Environmental Platform, 2017). This shortcoming makes a way for conflicts in terms of both economic and social. For instance, establishment of wind turbines without preliminary studies may create negative effects higher than initially planned positive effects in tourism sector so the cities with big tourism sector can suffer from the situation. The subject of this thesis focuses on this kind of problem.

1.1. Problem Definition

Wind is one of the main renewable energy resources in the world and Turkey has an exceptional capacity for this energy resource (Bilgili & Şimşek, 2012). The country has got wind energy policy to increase wind energy capacity and covered an important distance especially in the last decade. According to the Global Wind Report of Global Wind Energy Council (GWEC) (2017), 1,387 MW was added to the country's electric capacity in 2016, bringing the total capacity to 6,081 MW. This progress gets up Turkey to 3rd largest annual onshore wind market in Europe and 7th largest globally in that year (GWEC, 2017). Current capacity has risen to 6,872 MW through 2018, as shown in Figure 1 (TWEA, 2018a).

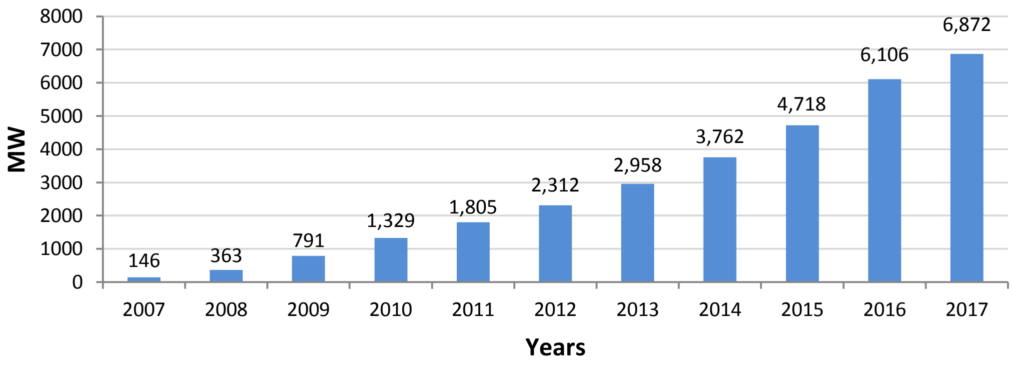


Figure 1: Cumulative wind power plant installations in Turkey (TWEA, 2018a)

The government has a target capacity of 20 GW for the year of 2023 (GWEC, 2017). This means the number of the wind turbines will increase through the following years. This foresight brings some questions and problems with itself.

Installation of many turbines will eventually affect the nature and human life. Seven commonly mentioned negative impacts of wind turbines are relevant to these problems and questions: Noise, shadow flicker effect, impacts on wildlife and avian, electromagnetic interference, microclimate change, land requirement and misuse, and visual impact (Saidur et al., 2011; Abbasi & Abbasi, 2011; Katsaprakakis, 2012; Henningsson et al., 2013; Tabassum-Abbasi et al., 2014; Dai et al., 2015; Kaldellis et al., 2016).

These negative impacts should be taken into consideration while planning the suitable lands for the wind farms. Otherwise, they may negatively affect nature, people, and economy in both short and long-term.

While some negative impacts (such as noise, shadow flicker effect, and death of flying creatures) are taking more attention, there are fewer studies on other impacts. One of these less studied impacts is visual integrity and/or aesthetics. This kind of impact mostly shows up in the cities with high-density residential areas or areas with the high touristic or scenic value. Because the installment of wind turbines requires land, development of large-scale wind farms carries significant risks for sustainable tourism development. The installment of more turbines may also affect tourists/residents' assessment of their environments in terms of its visual characteristics. This critical change would affect the touristic value of areas and may cause a decay of the tourism income in the following years.

The districts of Muğla Province, Datça, Marmaris and Bodrum, are some of the most popular tourism destinations in Turkey with their blue flag beaches, large-scale tourism facilities, unique nature and heritage sites. Furthermore, Muğla Province has got the longest shoreline among all coastal provinces (Muğla Metropolitan Municipality, 2015). At the same time, this province has a high potential for renewable energy, mostly wind and solar (General Directorate of Renewable Energy, 2015). Like some other coastal areas of Turkey, the number of wind turbines in Muğla Province has been rapidly increasing (Aydın, 2015;

Yıldırım & Bektaş, 2015; Özçam 2016 etc). Both conservation of its unique natural resources, and benefiting from them put this province on the fence. Importance of proper decision making process comes to prominence at this point. Before installing an energy system, making comprehensive analysis is a must for ensuring sustainability of nature, the health of the living and economy of the society. Moreover, even though shifting to RES is a global trend and it is seen necessary for a clean, sustainable planet, there are local objections against these systems because of their side effects (Özçam 2016; Aydın, 2015; Yıldırım & Bektaş, 2015). Therefore, for sustainable development it is crucial for planners and policy-makers to understand ordinary public's (e.g., locals, tourists and tour operators) opinions about where and how the wind turbines are installed.

1.2. Objectives

In this thesis, site selection of the wind turbines on the shoreline in Muğla province, where the tourism is one of the main income resources of the region, will be studied. It aims to receive spatial and visual opinions from the two important stakeholders of the coastal tourism sector -tourists and tourism employees- about impacts of wind turbines on the coastal tourism, and evaluate these opinions from their perspective.

A survey study and Geographic Information Technologies (GIS) based analysis method are proposed to draw spatial conclusions about how different social groups approach the problem of wind farm siting in different types of coastal areas (e.g., forested landscapes and agricultural areas).

1.3. Research Questions

This thesis asks two main questions:

1. "In general terms and more specifically for Muğla Province, what do the tourists and tourism employees think about wind turbines?"
2. "From the tourists and tourism employee's point of view, which locations should be preferred for wind farms at the coastal areas of Mugla Province?"

These two research questions are supported by the following sub-questions:

- Are the respondents aware of the wind turbines' existence and their negative effects?
- Which negative effects are more influential according to them?
- How do socio-demographic profiles of the respondents affect their choices?

The research requires self-reported data to be collected from a sample of tourists and tourism employees. Additionally, spatial data are needed to carry out analysis and visualizations which reflect the choices of the sample groups.

1.4. Structure of the Thesis

The thesis begins with a short explanation of the current wind energy situation in the world and Turkey, within a frame of increasing number of wind energy developments and possible negative effects of the wind energy systems. Then, it proceeds to the details concerning the study by problem definition, objectives and research questions.

The second chapter provides a literature review on wind energy systems. It discusses the negative effects of these systems with a special emphasis on their impacts on tourism. For the negative impacts, noise, shadow flicker effect, threats on wildlife and avian, electromagnetic interference, changing microclimate, misuse of lands and visual disturbance are mentioned. Impact of the wind energy systems on tourism is also detailed by reviewing featured previous case studies.

The third chapter provides information about the study area, Muğla Province. Information on environmental characteristics, demographic and economic features, tourism, and finally wind energy situation of the province are given respectively. Wind energy potential of the area is emphasized.

In the fourth chapter, the method of the study is explained in detail. The development of the structured survey, implementation of it, and sample sizes are demonstrated with the questions of the survey. Additionally, the geographical data set composed of Digital Elevation Model and shapefiles of the province are listed. Next, different uses of GIS in environmental management are summarized by giving examples of different studies across the world and used GIS tools in the study are explained at the end of the chapter. Then, an explanation of site selection analysis is provided. Lastly, overview analyses of the sample are made through the information gathered from conducted surveys.

In the fifth chapter, the results of both survey questions and site selection analysis are demonstrated. Survey results are shown through graphics reflecting overall results in general, and results of each respondent group (tourists and tourism workers) in specific. Similarities and differences between results are explained. Then, site selection analyses are carried out to obtain final results. As final outputs, maps are generated separately for two sample groups and for whole respondents.

In the last chapter, the results obtained from the previous chapter are evaluated and discussed within the framework of the study. Derived conclusions are listed to answer research questions of the thesis. In the end, implications for planning and research are provided to steer researchers, policymakers and decision makers to apply similar studies on the areas sharing common situations and to look after the balance between use and protection of these areas.

CHAPTER 2

LITERATURE REVIEW

2.1. Renewable Energy Systems and Wind Energy

While increasing demand for energy is inevitable, global use of fossil fuels (such as gas, oil, and coal) has increased in parallel. These conventional resources generate high amounts of greenhouse gas GHG emissions, which aggravate global warming. Climate change, ocean acidification, and security of energy supply are becoming the main concerns for future of our planet. This situation directed societies to provide alternative and sustainable energy solutions. RES has gained a huge importance in the last decade because of obvious negative changes caused by fossil fuel use and high carbon emissions. World Energy Council (WEC) stated that there will be a remarkable increase in production of renewable energy towards 2030 with the current renewable energy policies (WEC, 2016). Most common RES are geothermal, biomass, hydropower, solar and wind.

Today, one of the most mature, common and affordable RES is wind energy systems. Benefitting from the kinetic energy of moving air, the wind energy usage has almost two thousand years history. Varying from transport to agriculture, final use of wind energy is electricity production today. Especially because of the oil crisis in the 1970s, the wind has considered as one of the energy resources to reduce dependency on fossil fuels. After the erection of the first wind farms in the 1980s in California (Bilgili & Şimşek, 2012), the total global wind power installation reached 539,581 MW at the end of 2017 (see Figure 2), according to the latest Global Energy Wind Report of Global Wind Energy Council. Countries from all around the world make big investments on wind energy systems (GWEC, 2018).

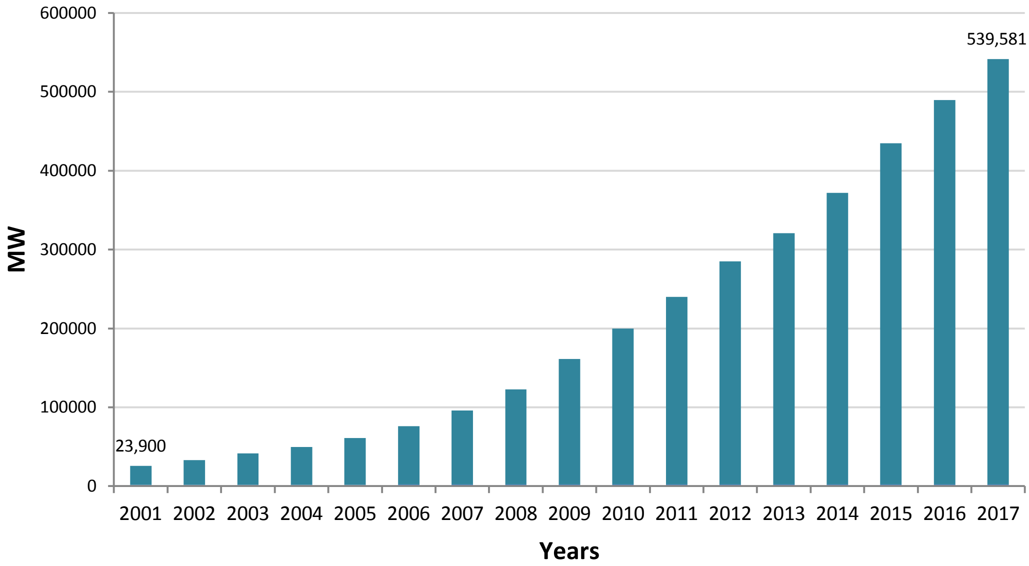


Figure 2: Global cumulative wind power plant installations (GWEC, 2018).

Modern wind energy systems simply convert kinetic energy of the wind to the mechanical or electrical energy. The turbines of the systems are classified into two categories according to their axis of rotation. These are horizontal axis wind turbines (HAWT) and vertical axis wind turbines (VAWT). Most of the present-day commercial turbines are HAWT with three blades (see Figure 3) due to stability, visual acceptability, and production efficiency reasons (Mathew, 2006).

Figure 3: A picture of three-bladed HAWTs, May 2017

Like any other RES, wind energy systems have advantages in terms of economy, environmental and human health, and sustainable development. The first of the major benefits is to reduce greenhouse gas and air pollutant emissions by replacing conventional systems, and the second one is relatively less water consumption during operation; unlike most other power generation systems (Edenhofer et al., 2011, Abbasi & Abbasi, 2012). According to the IPCC Working Group's Special Report on Renewable Energy Sources and Climate Change Mitigation, fossil-fuel based energy resources cause at least four times more greenhouse gas emissions than wind energy usage (Edenhofer et al., 2011). Abbasi & Abbasi (2012) states that wind systems are the most nature-friendly energy system in comparison with any other energy systems, including solar, biomass and hydroelectric.

Wind energy systems also have negative impacts due to their size, engine, material, design, and way of operation. Wind energy structures are getting bigger day by day; the biggest wind turbines are already taller than 100 meters (Edenhofer et al., 2011). It is estimated that their size or height would increase in the following decade. Furthermore, they are not implemented as single structures.

For commercial purposes, they are deployed as groups called "wind farms" on the selected area. In other words, the existence of wind turbines without causing any noticeable side effects, is impossible. Large-scale technology stationing always comes with environmental trade-offs. Both onshore and offshore farm constuctions and operations affect environment in terms of habitat and ecosystem modifications (Edenhofer et al., 2011), causing microclimate changes (Tabassum-Abbasi et al., 2014), and creating visual disturbance (Dai et al., 2015).

2.2. Negative Impacts of Wind Energy Systems

Wind turbines have a number of negative effects, such as noise, threat on wildlife and microclimatic change which are explained one by one briefly in the following sections.

2.2.1. Noise

Noise is one of the most discussed negative impacts of wind turbines. Long-duration and repetitive noise can be very annoying that would cause health issues such as anxiety, headaches, and sleeping disorders (Pedersen, 2004; Punch & Pabst, 2010; Henningsson et al., 2013). Humans are not the only creatures affected by the noise. Some animal species including mammals and fishes that are acoustically sensitive are also affected negatively by the wind turbine sounds directly or indirectly. High, broadband or low frequency sounds of turbines cause them to leave their living environments, more vulnerable to predation, and less able to communicate properly (Nedwell & Howell, 2003; Tougaard et al., 2005; Carstensen et al., 2006; Dolman et al., 2007; Dolman & Simmonds, 2010; Tabassum-Abbasi et al., 2014). There are two parts of a wind turbine, which emits noise: gearbox and rotating blades. The most disturbing noise effect is the repeating sound induced by rotor blades meeting with flowing air. The noise goes up with the increasing wind speed. Although they both cause a similar level of noise, the sound of turbines is stated as more annoying than traffic noise. Establishment of wind turbines on the fields with low background sounds may be the reason for this situation. The impact would be more annoying during evenings and nights (Henningsson et al., 2013). On the other hand, this effect can be reduced for offshore turbines by true aero-dynamical design and use of proper materials for rotor blades while manufacturing (Kaldellis et al., 2016). Moreover, there are recommendations and planning guides from Europe and United States to help reduce the noise impacts of wind energy systems (Ramírez-Rosado et al., 2008; Haugen, 2011; Edenhofer et al., 2011; Bakker et al., 2012; Aydin et al., 2013; Cave, 2013; Toja-Silva et al., 2013; IFC, 2015).

2.2.2. Shadow Flicker Effect

Shadow flicker effect is moving shadow effect of the constantly rotating blades of wind turbines on observers. It mostly depends on the weather condition and position of the sun in the sky. The effect is related to various factors such as the location of the observer, local topography, daily sun positions, cloud intensity, and rotation frequency of the blades. Bright and sunny days cause shadow formation of the objects and it is also valid for the wind turbines, naturally. While the turbines are getting larger and taller, their area of impact widens. If they are sited close to the living areas, their moving shadows will pulsate in the homes especially which take direct sunlight (Saidur et al., 2011). It could be annoying for both ordinary people (Katsaprakakis, 2012) and people with photosensitive epilepsy (Harding et al., 2008). This effect disappears when there is no strong sunlight; even so, it is important to take this effect into consideration while planning the location of wind energy systems.

2.2.3. Impacts on Wildlife and Avian Mortality

Not just the noise they emit, but also with their large sizes and moving blades, the wind turbines pose a threat to wildlife; mostly to avifauna. The turbines directly cause bird or bat fatalities due collisions of these creatures to the turbine parts and electrical shocks. Furthermore, they indirectly cause negative impacts on wildlife and avifauna by threatening their habitats if they are intended to build without adequate environmental and planning analysis. Planning wind farm facilities near sensitive areas like wetland surroundings and migratory routes would harm their lifecycle (van Haaren & Fthenakis, 2011). There are two simple but important practices to prevent or at least reduce the negative impacts on flora and fauna. Clearing of vegetation for one single wind turbine and its facilities can excess 5000 m^2 area (Yetiş et al., 2015). This means changing ecology and creating the potential for soil disruption. Proper design and site selection of the turbines comes to prominence on this issue. Turbines can become more visible to the avian through careful design and material selection regarding habitats (Şimşek, 2014). Also reducing the speed of the turbine blades can work, at least during migration and mating seasons (Şimşek, 2014). Proper site selection is another practice to reduce side effects of the wind energy systems.

2.2.4. Electromagnetic Interference

Wind energy systems can distort the signals of telecommunication transmitters or receivers due to their growing size, electronic parts and turbine blades (Katsaprakakis, 2012; Toja-Silva et al., 2013). Air Traffic Control radars, weather radars, maritime radars, fixed radio links, and broadcasting services are some of the radio communication services that are affected by the electromagnetic interference of the wind energy systems nearby. The effect of interference can be reduced or prevented after settling of the facilities but this is a technically complex and expensive solution (Angulo et al., 2014). Precautions are better solutions; simply, choosing right places when settling beside the use of proper materials and proper design beforehand.

2.2.5. Microclimate Change

When moving wind masses meet the wind turbine blades, they lose a considerable amount of momentum to the turbines due to a friction. Even if it is basically the functioning of electrical energy production by wind turbines, it also causes a change of climates on low scales. It changes local temperature and moisture in the air. Zhou et al. (2012) worked over satellite data of a region between the years of 2003-2011 and found 0.72 °C warming per decade and linked this trend with spatial distribution patterns of the wind farms. Wang and Prinn (2010) simulated the effects of large-scale wind farms and foreseen that wind farms could cause changes in temperature up to 1 °C over land installations. Additionally, Walsh-Thomas et al. (2012) found that south and east downwind regions of the wind farms are generally warmer than other regional parts of the wind farms.

Kondili and Kaldellis (2012) state that this change could affect agriculture in positive ways through cost reduction of crop desiccation. However, according to Tabassum-Abbasi et al. (2014), change of microclimate would rebound to agriculture in terms of cost increase of proper practices, such as irrigation. Both Leung and Yang (2012) and Tabassum-Abbasi et al. (2014) agree that these local climate changes will spread as long as the scale of wind farms expands.

2.2.6. Land Requirement and Misuse

Wind energy systems need approximately 200-5000 m^2 of land per MW installed (Möller, 2006). According to Fthenakis and Kim (2009), they are the most environmentally benign energy systems in terms of field per annual GW electrical productivity. Table 1 shows approximate land requirements for different energy systems (Katsaprakakis, 2012).

Table 1: Approximate land occupation for different energy systems (Katsaprakakis, 2012)

Energy Systems	Land Occupation (m^2 years/GWh of produced energy)
Biomass	380000
Nuclear	300000
Coal	1290-25200
Natural Gas	4200
Hydro	2350-25000
Photovoltaic	9900
Wind	2040

The clearance of areas for wind farm developments could affect the living. Such developments may also pose a risk for the transformation of forests and agricultural areas. Excessive deforestation practices would harm the habitats of wildlife eventually. Also, the soil in agricultural areas could lose its fertility resulting from inadequate planning or settlement of numerous wind turbines. For this reason, Yetiş et al. (2015) suggest that wind turbines should not be located in fields with high forest or degraded high forest status.

2.2.7. Visual Impact

Apart from the shadow flicker effect, wind turbines have a visual impact on their environments (Wolsink, 2007). Henningsson et al. (2013) found that wind turbines are perceived and visually assessed differently by different socio-demographic groups (Henningsson et al., 2013). They are almost unnoticeable with their height and big blades. However, visual impact is the least considered effect while planning for the wind energy systems in many countries.

The landscape is a complex issue because it is not only about the physical features of the place, but also about the people's place interactions and values (e.g., culture, beliefs, and memories). For this reason, problems related to the landscape are studied by researchers from diverse disciplines including planning, archeology, psychology, sociology, economy and more. Scholars from different disciplines approach the problem from different perspectives and they give different answers to how the landscape analysis should be processed (Henningsson et al., 2013).

Opinions and factors affecting scenic perceptions can be identified in general frames. When evaluating visual effects of the turbines, the question should not be the whether wind turbines are beautiful or not. Surveying the possible consequences, levels of impacts and visual characteristics should be the main focuses. This approach is more convenient when working on natural landscapes rather than altered landscapes (NRC, 2007).

Katsaprakakis (2012) listed common objective parameters for evaluation of the visual impact of wind farms as follows:

Normal operation of the wind farm: Usefulness of the wind turbines according to whether they are working or not at a specific time.

Model and color of the installed wind turbines: Visual uniformity of components of the wind turbine including types of towers (tubular or lattice), number of blades, and colors of them.

Size of the wind turbines: Longer turbines are generally more visible and visually dominant even if the weather is not clear.

Installation site of the wind farm: Geomorphologic characteristics of the installation area are very efficient on the zone of visual effect of a wind farm.

The natural aesthetics of the installation area: The areas with natural beauties are more defended by the people than the other ones such as rocky areas.

Several different areas with different characteristics around the installation area: The areas with specific significance, such as touristic destinations, can create barriers around a wind farm installation area.

2.3. Wind Energy Systems and Their Impact on Tourism

Wind turbines have both positive and negative effects on the economy. One of the affected sectors is, arguably tourism (Riddington et al., 2010; Lilley et al., 2010; Bidwell, 2013; Broekel & Alfken, 2015). By negatively affecting the natural environment, onshore and offshore wind farm development may result in a decrease in tourism demand. While the majority of the studies concluded that there are no or very limited negative visual impacts of the turbines, few of them found a negative relationship between the existence of wind turbines and economic activities. Broekel and Alfken (2015) prove there is a negative relationship between wind turbines existence and tourism demands in many regions of Germany. Also, researchers such as Riddington et al. (2010), and Lilley et al. (2010) showed the negative economic impacts of wind turbines on tourism by evaluating the willingness of the visitors to visit areas with a view of the wind farms and to accommodate in the vicinity of these areas.

On the other hand, there are several countries which already have experienced large-scale establishment of wind farms and have made versatile feasibility studies on the turbines and tourism relation. According to the report by Glasgow Caledonian University (2008), these studies show the effect of wind turbines is very limited or even none. A common point of these countries is having a big tourism sector based on scenery and coastal tourism. Not just the UK countries like England, Scotland, and Wales but also Denmark, Sweden, Norway, Germany, U.S.A. and Australia are the examples from the report.

MORI Scotland (2002) conducted face-to-face interviews with 307 tourists in five locations around the country of Scotland. These locations are chosen because of both concentrated existence of wind turbines at that time, and landscape value which creates attraction to the tourists. The objective of the study was to evaluate the tourists' choices and perceptions in terms of motivation to visit the area, positive and negative aspects of the area, and impressions of the wind farms. Then they summarized the results which show the impacts of wind farms. Their existence creates the negative effect at very low level (8%) and that would not affect the majority of the tourists for possible future visits to the area (91%) (MORI Scotland, 2002).

The company of NFO Worldgroup showed a slightly different approach in Wales while performing Investigation into the Potential Impact of Wind Farms on Tourism study in 2003 by asking opinions of key organizations and personals in addition to the tourists (NFO Worldgroup, 2003). It was important to gather opinions of people from different environments so the company undertook Hall Tests with 266 visitors from 8 different places across Wales. The reasons for visiting Wales, opinions on renewable and wind energy developments, the image of the wind turbines on the landscape, and location choices for future wind farm developments are asked to the visitors. The answers to the questions are demonstrated as tables. The negative attitudes against the wind farms on coastal areas were exceptional with 43% agreement rate. Also, 11% of the respondents stated that they would stay away from the areas with wind turbines for a second visit. In the light of these answers, the authors concluded that development of wind farms may harm the tourism in the future (NFO Worldgroup, 2003).

Another study from the United Kingdom, The Potential Impact of Fullabrook Wind Farm Proposal is conducted by The Geography Research Unit at the University of the West of England and directed by Professor Cara Aitchison

(2004). The main focus of the study was to predict potential impact of proposed wind farm development at Fullabrook, England, an attraction point for tourists with its authentic landscape and coastal towns. The study group made interviews at three locations; two of the locations already had wind farms while the other one was closer to a wind farm project site at Fullabrook. The results were in favor of the wind farm development as there was no overall negative response to possible future visits, no explicit impact on the tourist experience, and no overall decline in the expenditure of the tourists (Aitchison, 2004).

National Tourism Development Authority of Ireland surveyed 1300 tourists including both domestic and overseas to assess the impact of wind farms on tourism (Fáilte Ireland, 2008). The results summarized under the topics of awareness, perceived impact on sightseeing, impact on beauty, and future visits to the area. Although there was generally a positive opinion on wind energy system developments, view of one out of seven tourists was negative. Hence, the authors indicate that taking up the challenge requires good planning at the site selection, design and pre-planning consultation stages (Fáilte Ireland, 2008).

Glasgow Caledonian University, Scotland published a report for the Scottish Government in 2008 on the impacts of tourism more in an economic context (Riddington et al., 2008) different than the studies mentioned above. With the help of GIS, the number of tourists who may see the wind turbines is calculated by the viewshed analysis. Later, it is tried to identify the reactions of affected tourists by surveying approximately 400 tourists in direct interviews and 700 in an internet survey. Finally, the economic impact is derived by a model called DREAM in the light of the two sources: Change in the number of tourists likely to visit those areas where the wind turbines built on, and declining in the level of encouragement to pay for a room with the scenery. According to the results, the decline in the tourism income and number of jobs in the tourism sector would be at very low levels such as 0.1% of full-time tourism jobs, even though there would be a remarkable reduction in possible future visits to the area (Riddington et al., 2008). Two years after that report, Riddington, McArthur, Harrison and Gibson published an article named Assessing the Economic Impact of Wind Farms on Tourism in Scotland: GIS, Surveys and Policy Outcomes (2010). GIS was used as main tool to predict the approximate number of tourists that may come into visual contact with wind farm sites. A large-scale internet survey was also conducted seeking attitudes of the tourists towards existing or planned wind farms. Finally, they applied a model to calculate net economic impact at local and country levels, by combining possible changes in both visiting and accommodation expenditures of the tourists. Results show that there would be losses of income by tourism at levels between 1.89% and 5.77% in four locations. Additionally, the authors strongly recommend use of GIS and conducting surveys in tourism related researches.

Ladenburg (2010) evaluated the attitudes against offshore wind farms by analyzing the responses of a sample of more than 1000 people with a model having personal information inputs like gender, income, level of education, and information of visual contact with wind turbines such as beach visit frequency and types, view to the turbines. He found different results for different inputs. Specifically, visit types and frequency highly affect the attitudes towards wind turbines. In overall, a vast majority of the respondents have positive opinions on offshore wind farms (Ladenburg, 2010).

Lilley, Firestone and Kempton (2010) surveyed more than 1000 respondents to display the effect of wind power installations on coastal tourism. The survey instrument, included professionally simulated photos of wind turbines, was for the investigation of change in beach visitation behaviors if there would be offshore wind farms close to these beaches. The instrument also was shaped through four different distances (1,5 km, 10 km, 22 km, and out of sight) for establishment of wind turbines. The results show that the tourists are more tend to switch their regular beaches if the offshore wind turbines are sited closer to these beaches. They also made a logit regression model of tourists' tendency for visiting the beach if wind farms existed 10 kilometers away from the coast (Lilley et al., 2010). Another important study about the impact of offshore wind farms on coastal tourism is from France. Westerberg, Jacobsen and Lifran (2013) performed a study of valuation of the visitor preferences about wind farms and willingness to spend money for touristic activities close to the turbines. They asked more than 300 individuals to select their preferred alternatives for a touristic destination by using Choice Experiment Method, and analyze the results using Latent Class Model. Similar to the findings of Lilley et al. (2010), the general conclusion shows that willingness to pay is higher in the areas where the wind turbines are farther from the coast (Westerberg et al., 2013).

Frantál and Kunc (2011) appraised the possible negative impacts of wind turbines on both landscape and tourism potential at the affected areas of Czech Republic, an inland country. The methodology was composed of standardized questionnaires and semi-structured interviews with 156 tourists and 73 local business representatives. They concluded that the negative influence of wind turbines on the tourism destination choice is minor as well as their impact on the experience of the tourism is negligible.

Vendula Braunova (2014) investigated the impact of wind energy systems on tourism at the island of Gotland, Sweden. Structured questionnaires made with a sample size of 735 respondents during their visit to Gotland, seeking their impressions on the visual features associated with wind turbines in the landscape, and their willingness for a possible revisit the area. The results show that most of the tourists (92%) did not be troubled with the existence of the wind turbines, and their decision to return was not affected negatively at an absolute level (98%) by the wind turbines.

Broekel and Alfken (2015) performed a comprehensive quantitative empirical study on the relation between wind turbines and tourism demand in Germany. Taking into consideration the wind turbines in vacation municipalities and in their geographic surroundings, and using spatial regression techniques, for inland municipalities, they proved that there is a negative relation between wind turbines located in the vicinity of municipalities and tourism demand for these municipalities.

The effects of the wind turbines on tourism are subject of investigation for different countries with tourism sectors based on coastal and natural characteristics. Table 2 summarizes the results from studies examining the impact of wind farm developments on tourism. Findings indicate that the negative effects of the wind turbines on tourism sector would be low level for short term. However, there are still a group of malcontent people because of the wind farm deployments. For this reason, comprehensive analysis before site selection should be performed carefully, and planning policies should be structured accordingly.

Table 2: Reviewed studies

Name of the Study	Year	Country	Institute/ Author	Method	Conclusion
Tourist Attitudes towards Wind Farms Research Study Conducted for Scottish Renewables Forum & the British Wind Energy Association	2002	Scotland	MORI Scotland	Face-to-face interviews with 307 tourists in five locations	The existence of wind farms creates the negative effect at very low level (8%) and that would not affect the majority of the tourists for possible future visits of the area (91%).
Investigation into the potential Impact of Wind Farms on Tourism in Wales	2003	Wales	NFO WorldGroup	Literature and case studies review, consultations with key actors, Hall Tests with 266 visitors	The negative attitudes against the wind farms on coastal areas were at 43% agreement rate. Also, 11% of respondents stated that they would stay away from the areas with wind turbines for a second visit. The authors pretended that development of wind farms may harm the tourism in the future.

Table 2: Continued

Name of the Study	Year	Country	Institute/ Author	Method	Conclusion
Fullabrook Wind Farm Proposal, North Devon: Evidence Gathering of The İmpact of Wind Farms on Visitor Numbers and Tourist Experience	2004	England	The Geography Research Unit, Faculty of the Built Environment , University of West of England, Bristol. Conducted by Cara Aitchison	Face-to-face interviews with 379 tourists in three locations.	There was no overall negative response to possible future visits, no explicit impact on the tourist experience, and no overall decline in the expenditure of the tourists
Visitor Attitudes On The Environment – Wind Farms	2008	Ireland	Fáilte Ireland (National Tourism Development Agency)	Face-to-face interview with 1,300 tourists, both domestic (25%) and overseas	Although there was a generally positive opinion on wind energy system developments, view of one in seven tourists was negative.
The economic impacts of wind farms on Scottish tourism A report for the Scottish Government	2008	Scotland	Geoff Riddington, David McArthur, Tony Harrison, Hervey Gibson, Kevin Millar	The number of tourists who may see the wind turbines is calculated by the viewshed analysis. Surveying approximately 400 tourists in direct interviews and 700 in an internet survey. The economic impact is derived by a model called DREAM.	The decline in the tourism income and number of jobs in the tourism sector would be at very low levels such as 0.1% of full-time tourism jobs
Assessing the Economic Impact of Wind Farms on Tourism in Scotland: GIS, Surveys and Policy Outcomes	2010	Scotland	Geoff Riddington, David McArthur, Tony Harrison, Hervey Gibson	A large-scale internet survey, GIS and a model; to calculate net economic impact at local and country levels	A very small but significant negative economic impact; losses of income by tourism at levels between 1.89% and 5.77%.

Table 2: Continued

Name of the Study	Year	Country	Institute/ Author	Method	Conclusion
Attitudes towards offshore wind farms—The role of beach visits on attitudeand demographic and attitude relations	2010	Denmark	Jacob Ladenburg	Analyzing attitudes from a sample consisting of more than 1000 respondents.	A vast majority of the respondents have positive opinions on offshore wind farms.
The Effect of Wind Power Installations on Coastal Tourism	2010	U.S.A.	Meredith Blaydes Lilley, Jeremy Firestone, Willett Kempton	Survey more than 1000 respondents providing with photo-simulations to display the effect of wind power installations on coastal tourism.	The tourists are more tend to switch their regular beaches if the offshore wind turbines are sited closer to these beaches.
Wind turbines in tourism landscapes Czech Experience	2011	Czech Republic	Bohumil Frantál, Josef Kunc	Composed of standardized questionnaires and semi-structured interviews with 156 tourists and 73 local business representatives.	The negative influence of wind turbines on the tourism destination choice is minor as well as their impact on the experience of the tourism is negligible.
The case for offshore wind farms, artificial reefs and sustainable tourism in the French mediterranean	2013	France	Vanja Westerberg, Jette Bredahl Jacobsen, Robert Lifran	Choice Experiment Method: A standardized questionnaire survey of tourists in the study areas, The results are analyzed through Latent Class Model	The general conclusion shows that willingness to pay is higher in the areas where the wind turbines are farther from the coast.
Impact Study of Wind Power on Tourism on Gotland	2014	Sweden	Vendula Braunova	Structured questionnaires made with a sample size of 735 respondents	The most of tourists (92%) did not be troubled with the existence of the wind turbines, and their decision to return did not be affected negatively at an absolute level (98%) by the wind turbines.
Gone with the wind? The impact of wind turbines on tourism demand	2015	Germany	Tom Broekel, Christoph Alfken	Creating a multi-variable model to detect relationship between choises of tourists and existing of wind turbines	There is a negative relation between wind turbines located in the vicinity of municipalities and tourism demand for these municipalities.

Assessing the impacts and results of wind farm settlement on tourism is a complicated issue. For example, aesthetic values and landscapes are hard to price. Peters et al. (as cited in Broekel & Alfken, 2015) explain the possible negative effect by stating that technical materials of the wind turbines may create negative attraction in front of natural landscapes. According to Henningsson et al. (2013), visitors who look for untouched nature and landscape are often more annoyed when they see a factitiously altered scene. Tourism may be affected differently in different scales such as local, regional and national. Additionally, similar studies examining the effects of wind farms on tourism are from the Western Europe and Northern America countries. Some of these countries are already familiar with the wind turbines for decades. However the wind energy systems are spreading around the world with the concern of global warming and climate change. The effects of these energy systems may be based on further factors such as cultural characteristics or authenticity of different places. Hence, more case-specific studies from different parts of the world are needed on the subject.

CHAPTER 3

STUDY AREA: MUĞLA

This chapter gives information about the study area, Muğla; its environmental characteristics, economic situation and tourism statistics in order to understand general dynamics of the city. Then, it draws a picture of current wind farm potential and related developments.

Turkey has been showing an effort to increase renewable energy share in electricity production by providing support to renewable energy investments in recent years. Wind energy has become one of the most popular clean energy choices because of remarkable wind energy potential in some parts of the country (Bilgili & Şimşek, 2012). More wind energy farms have risen among certain cities in the last decade than previous, and there are many incoming wind farm project proposals at the municipal level. Muğla is one of these regions, which attracts wind energy investments. These investments generally seem to be profit oriented rather than focusing on environmental conservation so they may create conflicts between stakeholders such as local people, visitors and investors (Özçam, 2016).

Muğla Province, composed of 13 districts (Bodrum, Dalaman, Datça, Fethiye, Kavaklıdere, Köyceğiz, Marmaris, Menteşe/Muğla Central District, Milas, Ortaca, Seydikemer, Ula and Yatağan), offers more than just its renewable energy potential; it is also known with its unique nature, unpolluted air and active tourism sector. This coastal region hosts thousands of tourists annually from different parts of the world. A large variety of touristic facilities address every kind of people. In the past, because of its unique features, some tourists have decided to move to Muğla permanently. Not just the Turkish people, but also people coming from abroad have bought dwellings in this part of the country. While some of these dwellings have been used as permanent residential buildings, others have been used as summerhouses.

Increasing number of large-scale investments such as wind farms would inevitably affect the province to different degrees. These developments may create economic opportunities, but they can also disturb the tourism sector, which is one of the biggest income resources of city.

3.1. Muğla and Its Environmental Characteristics

Muğla province stands as a part of both Aegean and Mediterranean regions of Turkey. The Aegean Sea is on the west and the Mediterranean Sea is on the south of the province while the province is surrounded by Antalya on the east, Burdur on the northeast, Denizli, and Aydın on the north (see Figure 4).

Figure 4: Muğla Province, the study area

The terrain of the province is very rugged, being mostly composed of mountains and highlands. Mediterranean climate and continental climate are two typical climates seen in the province, and these two are intergrading through shorelines of the region. Receiving the substantially high amount of rain mainly in the winter months, is another climate characteristic of Muğla because of the positioning of Menteşe Mountains (Ekinci, 2016). Muğla is the second province with the most precipitation in the country. This provides lush vegetation including both forests and maquis (Bahar, 2008). Forestlands cover a considerable amount of fields with approximately 68% of the total surface area in the province (General Directorate of Forestry, 2018).

The province is also known for its shoreline length, which is the longest in the country with 1479 kilometers. Its shoreline boundary to the sea is more than its border with the land. This shoreline is very indented; there are various types of sandbanks, peninsulas, bays, coves, and islets following each other (Muğla Metropolitan Municipality, 2015). Combining with the existence of Mediterranean climate, especially, temperatures more than 26 ^{o}C in the months of July and August is the main reason of the province's high potential for traditional summer tourism.

Rugged terrain and indented shoreline creating attractive environmental features, and historical remains from various civilizations are other reasons making Muğla popular. 26.7% of its surface area is declared as protected areas composed of specially protected environment areas, natural sites, national parks, archeological and historical sites (Yetiş et al., 2015). Total surface area of specially protected environment areas in this region represents more than half of the country's specially protected environment areas (Yetiş et al., 2015). Besides, the province has a very rich biodiversity that enables various touristic activities such as agro-tourism.

Due to insufficient transportation facilities, the region maintained its rural characteristics except for shoreline districts where main tourism facilities exist (Bahar, 2008). This situation creates an advantage in terms of preserving unique nature and values of the province including beautiful landscapes, fresh air, undistorted ecosystem, numerous historical and natural sites, and national parks.

3.2. Demographic and Economic Features

According to address-based population registration system data of Turkish Statistical Institute (TurkStat, 2018a), Muğla province is the 24th biggest among the provinces of Turkey with its population at 938,751. It has shown an unsteady increase over the last 10 years, mainly because of the migration trend towards coastal districts (see Figure 5). This trend will probably continue. Currently, 51.02% of the total population is male, while 48.92% is female.

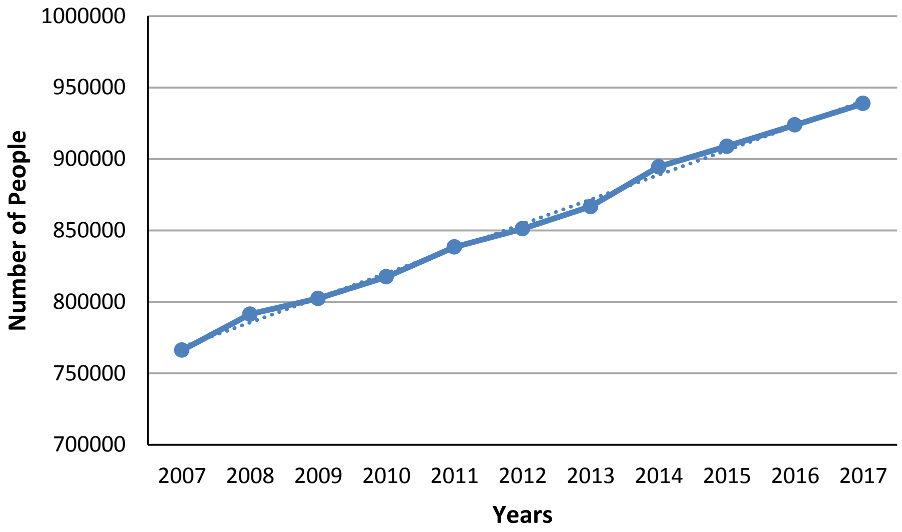


Figure 5: Population change of Muğla between 2007 and 2017 (TurkStat, 2018a)

Young population, composed of 15-19 and 20-24 age groups, is equivalent to 13.02% of the total population of the city. Unfortunately, young people percentage is slightly decreasing. Percentage of the young population was 15.13% in 2007 (see Figure 6). Total number of these two age groups has remained at the same levels (between 115,910 and 122,244) while the whole population of the province have gone up from 766,156 to 938,751 (TurkStat, 2018a). This is probably due to the migration of the young people from rural parts of Muğla to other cities for educational, social or economic activities. Although the city and its districts have great tourism facilities, employment in tourism sector cannot appeal to everyone.

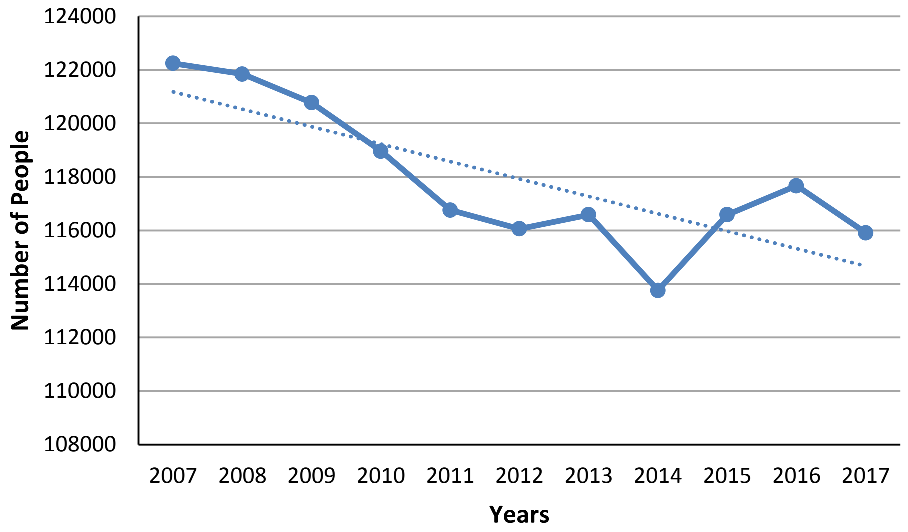


Figure 6: Changes in number of young population in Muğla between 2007 and 2017 (TurkStat, 2018a)

The most crowded districts of Muğla are coastal districts, unsurprisingly. Bodrum, Fethiye, Milas, Menteşe and Marmaris are the first five districts with the most populations (TurkStat, 2018a).

Muğla is the 8th most developed province of Turkey, according to 2013 Socio-Economic Development Report of Ministry of Development (Ministry of Development, 2013). Tourism, which constitutes the popularity of the province, is the number one economic sector of Muğla. Locals represent almost half of the employment (47.6%) in this sector (Yanardağ & Avcı, 2012). This means there is a remarkable migration from other cities for employment in Muğla.

This province is also very suitable for agriculture, husbandry and related industries. Mild and rainy climate of the region makes the soil and air convenient for agricultural activities. The transportation network is problematic due to the rugged geography of the region. This characteristic makes Muğla unfavorable to host big-scale industries and urbanization. Hence, the amount of internal migration to Muğla for employment remains at low levels, except in tourism (Ekinci, 2016). Additionally, Muğla has some rich deposits in terms of ores such as lignite coal, chrome and marble. These resources create additional economic sector for the city.

To sum up, Muğla is an attractive destination point in terms of tourism because of its geographical position, climate, ecology, agricultural lands and heritage sites. It provides a green living environment, a mild climate proper for both touristic and agricultural activities. Also, its mineral deposits bring additional economic dynamism to the city.

3.3. Tourism

Three of Turkey's most visited tourism destinations are İstanbul, Antalya and Muğla respectively (GEKA, 2015). During the last 10 years, more than 30 million people have visited Muğla and its popular tourism destinations including Bodrum, Marmaris, Datça, Milas, Fethiye, and Dalaman (Muğla Provincial Directorate of Culture and Tourism, 2017). Economic development of the province is highly connected to the tourism sector.

Along with the coastal tourism, Muğla has facilities for different touristic activities such as culture, yacht tourism, blue cruise, underwater diving, thermal tourism, plateau tourism, cave tourism, mountain and nature walk, paragliding, jeep safari, horse riding, winter tourism, and congress tourism. Total bed amount is more than 260 thousand at more than 3600 rest area. Also, there are numerous beaches along the coastline of Muğla, and 100 of them are blue-flagged (Muğla Provincial Directorate of Culture and Tourism, 2017).

Having the longest coastline of the country, Muğla is also popular with "Blue Cruises". "Blue Cruises" or "Blue Voyages" are the cultural, recreational and commercial purposed voyages mainly along the southwestern coasts of Turkey. Guests can enjoy natural beauties like beaches and coves together with many ancient ruins such as harbors, small cities, mausoleums, tombs and columns. The span of the trip can vary from one day to one week. First voyages started and spread from Bodrum as a touristic activity in the 1960s. Fishermen and spongers of Bodrum used their fishing boats as first cruise boats. With the improvement of technology and increasing demand, more suitable boats were made, and that led to these days' gulet-type schooners, which are associated with blue cruises. Today, blue cruises have a great contribution to not just Muğla's but also Turkey's tourism in terms of economy, promotion and image. Increasing demands for the cruises are satisfied with the investments and product development efforts by the government (Yilmaz & Yetgin, 2016).

History of Muğla started almost 5000 years ago, and the region has changed hands between numerous civilizations like Carian, Egyptian, Scythian, Assyrian, Dorian, Persian, Macedonian, Roman, Byzantine, and finally Turkish (Bahar, 2008). Remains of all these civilizations have formed the historical and cultural heritage of the city through today. Moreover, the province has preserved its rich natural assets such as beautiful landscapes, high amount of green areas, untouched beaches, clean environment, and sea. These heritages and assets make Muğla one of the world's unique areas to visit. This situation itself can simply show why tourism carries such an importance in the province and why it has a bigger potential.

3.4. Wind Energy at Muğla

With 5171 MW of theoretical potential at 50 meters height, Muğla has the highest 6th wind energy potential among the provinces of Turkey, according to data taken from General Directorate of Renewable Energy. First 10 provinces with the highest theoretical potential listed in Table 3.

Table 3: First 10 provinces with the highest potential (General Directorate of Renewable Energy, 2015)

Rank	Province	Theoretical Potential (MW)
1	Balıkesir	13827
2	Çanakkale	13013
3	İzmir	11854
4	Manisa	5302
5	Samsun	5222
6	Muğla	5171
7	Tekirdağ	4627
8	İstanbul	4177
9	Bursa	3882
10	Mersin	3531

General Directorate of Renewable Energy (2015) also shared maps of wind capacity factor for all provinces including Muğla. As can be seen in the Figure 7, in particular, western parts of the province have a higher potential for wind energy. Also, it can be said that Milas, Bodrum, Datça, and Marmaris districts have the highest potential. These are also some of the most popular coastal districts for tourists.

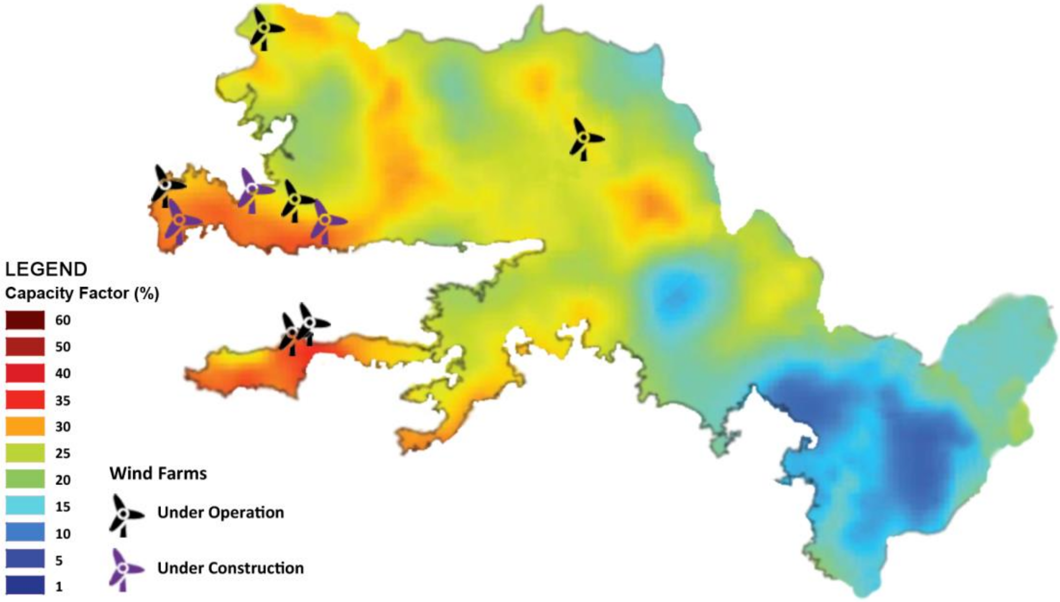


Figure 7: Wind capacity factor map of Muğla (General Directorate of Renewable Energy, 2015; TWEA, 2018b)

According to General Directorate of Renewable Energy (2015), there are 6 wind farms running actively in Muğla. Total installed power capacity of these farms is equal to 184.75 MW (TWEA, 2018a). This number is apparently far from the estimated wind energy potential. Hence, new wind farm projects and investments are expected. Existing and future wind farms in the province are listed in Table 4.

Table 4: Current and future wind farms of Muğla Province (General Directorate of Renewable Energy, 2015)

Wind Farm Name	Province, District	Installed Capacity (MW)	Status
Muğla Fatma	Muğla, Menteşe	70	Active
Dares Datça	Muğla, Datça	42	Active
Karova	Muğla, Bodrum	30	Active
Akbük 2	Muğla, Milas	20	Active
Muğla Datça	Muğla, Datça	12	Active
Geriş	Muğla, Bodrum	11	Active
Güllük	Muğla, Bodrum	33	Under Construction
Akyar	Muğla, Bodrum	15	Under Construction
Alapınar	Muğla, Bodrum	0.8	Under Construction

3.5. Concluding Remark

Against being a renewable energy source and bringing some environmental benefits with respect to thermal energy sources, wind farms may experience resistance from local people or tourists visiting the region if not planned properly. Such a situation has been experienced in İzmir. Like Muğla, İzmir is another coastal province in the Aegean region of Turkey, which has a high wind energy potential. The current installed capacity of wind farms in Izmir is 1331.50 MW from 45 wind farms (TWEA, 2018). These large-scale investments at the province started to disturb, annoy and negatively affect the residents of Izmir due to poor planning practices (e.g., non-participatory planning environment). The negative effects of the turbines unexpectedly had cast a shadow on the positive effects. As a result, the local people of İzmir started to show resistance against large-scale, gigantic-height wind turbines carrying terrifying moving blades causing lots of noise and visual pollution (Aydın, 2015; Yıldırım & Bektaş, 2015; Özçam 2016). To avoid a similar situation in Muğla province, timely and detailed analysis should be carried out before finalizing development plans. Stakeholder opinions should be taken into account with a public participation approach instead of top-down decisions. This thesis focuses on two important stakeholders of the tourism sector in Muğla; tourists themselves and tourism employees.

This chapter revealed a number of important points about the tourism and wind energy potential of Muğla province. Muğla is very rich in terms of natural, historical and cultural values. The shoreline of the province, which includes a significant amount of forests and agricultural areas, is the longest of the country and it is open to various touristic activities. However, because of the high wind potential of the province, the number of the wind farms is increasing in Muğla. Especially, western and coastal parts of the region have a high potential for wind energy. Wind farm developments in these areas may affect the tourism sector negatively or positively. The author believes that because of these points, it is important for researchers to focus on Muğla case to examine tourists and tourism employees’ opinions.

CHAPTER 4

METHOD

Face-to-face structured questionnaires were used to gather information from the respondent groups (tourism employees and tourists). The results provide information on the respondents' general opinions about wind turbines, their negative effects, and where they should be installed. Especially, preferred location results were core inputs for final analysis; the site selection. Additionally, an archive research was conducted to obtain geographic data. These data enable the author to produce two different base maps for the final analysis. One of them was the map of visible areas from the sea. This is done by a Viewshed Analysis through GIS. The other map was the current land use of the province. Site selection analysis and their result maps were generated through these three inputs; results of preferred locations for wind turbines, visible areas from the sea map and land use map. The flowchart of the proposed method is given in Figure 8.

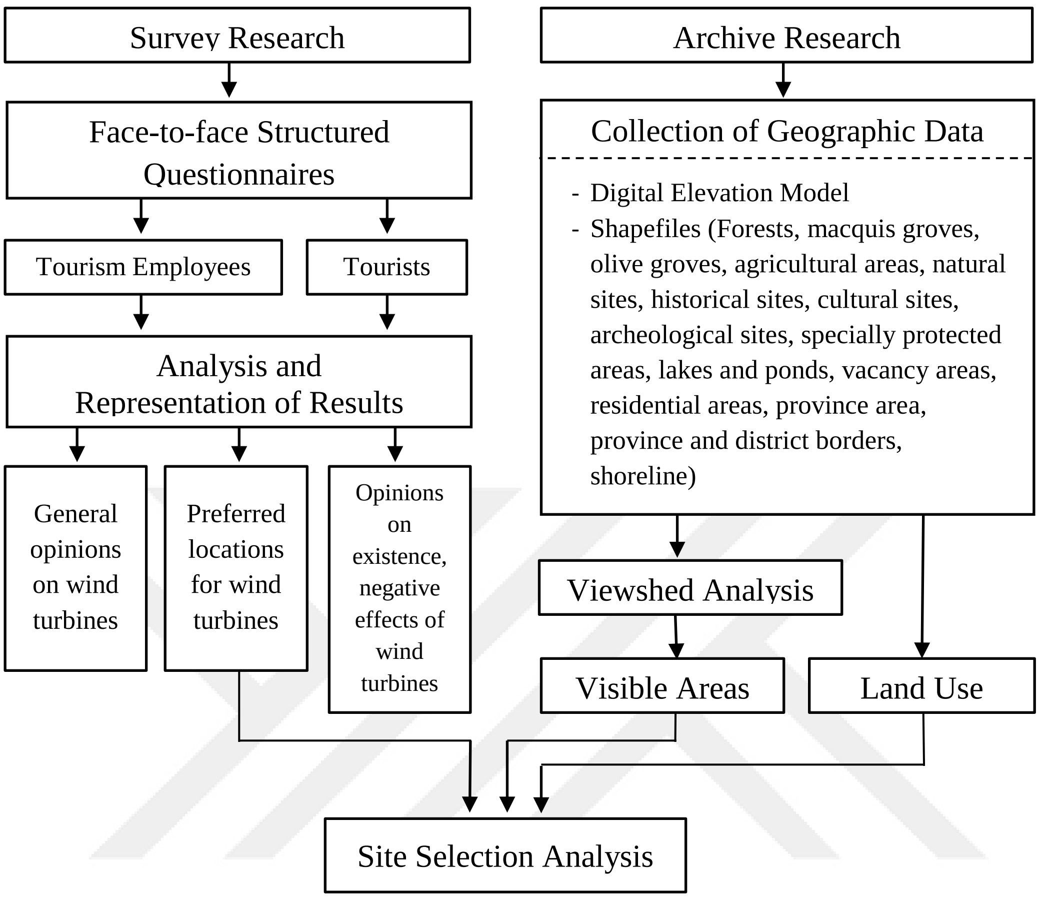


Figure 8: Method flowchart of the study

4.1. Survey Research

The impacts of wind farms on tourism have been discussed almost for two decades with the increasing importance of the wind energy as a renewable energy during this time period. These tall and obtrusive structures had to be established on open areas that can receive enough wind perpetually. Most of the countries, which experienced big-scale wind farm establishments, conducted studies to measure the possible effects of wind farms or to explore attitudes and perceptions of stakeholders such as tourists, tourism companies or tourism employees towards these farms. Most of the studies mentioned in Chapter 2 used questionnaire surveys as a research method and made deductions from the results of these surveys (see, e.g., Riddington et al., 2008; Riddington et al., 2010; Ladenburg, 2010; Lilley et al., 2010; Frantál & Kunc, 2011; Westerberg et al., 2013; Braunova, 2014). Some others followed different methodologies, for example, creating a multi-variable model to derive economic impacts (Broekel & Alfken, 2015).

A questionnaire can be defined as a set of questions prepared for a group of target individuals to collect information from these participants. This study asks two major questions: “What are the tourists’ and tourism employees’ opinions on wind turbines?” and, secondly, “what are their preferences about the turbines’ locations?”. To answer these questions, a face-to-face, structured questionnaire survey was conducted. The data collection method enabled the author to learn the opinions of each individual without any researcher bias and to collect standardized data for the statistical analysis.

4.1.1. Instrument Development

The author developed the survey for two different groups: The tourists including both domestic and foreign, and the coastal tourism employees composed of tourism agents and blue cruise captains. With the exception of a few questions, each group was asked to fill out the same questionnaire (for a copy of the questionnaires used for tourists and tourism employees, please see Appendix A and B, respectively).

The questionnaires were composed of three main sections. For the tourists, it begins with visiting/accommodation questions. These questions included data on, for example, frequency, location and reasons for the visit (please see Table 5). The second section was about the respondents’ awareness of the wind turbines and their attitudes towards them. Additionally, choices about location of the wind turbines were asked in this section. The final section was about the socio-demographic characteristics of the respondents. First two sections also included some sub-questions requiring comments on the related subject of the study. The only difference between the questionnaires for tourists and tourism employees was the first section. While the tourist questionnaires asked visiting/accommodation questions, the tourism worker questionnaires included questions about details of their jobs.

Table 5: First sections of the survey questionnaires

No.	Survey Questions for the Tourists	Survey Questions for the Tourism Employees	Question Type
1	Do you own an estate in Muğla province (summerhouse/timeshare property etc.)?	Do you own an estate in Muğla province (summerhouse/timeshare property etc.)?	Yes-No
2	Have you been in Muğla province for touristic or business purposes before?	How many days per week do you work in Muğla?	Open-ended
3	Annually, how often do you visit Muğla province?	How long have you been in this business in Muğla?	Open-ended
4	How long have you stayed in Muğla?	N/A	Open-ended
5	Have you gone on a cruise along the coast of Muğla before?	N/A	Yes-No

In the second section of the survey, in order to answer the first research question of this thesis ("What are the tourists' and tourism employees' opinions on wind turbines?"), the author asked eight common questions to both groups. These questions are listed in Table 6.

Table 6: Second section of the survey questionnaires

No.	Common Survey Questions	Question Type
6	Have you noticed the wind turbines along the coasts of Muğla province?	Yes-No
6.1	If your answer is Yes, does the existence of wind turbines annoy you?	Yes-No
6.2	If it annoys you, what are the reasons?	Open-ended
7	What is your opinion on wind energy systems?	Multiple choice (Positive, Neutral, Negative)
8	What are your ideas about the positive impacts of wind turbines?	Open-ended
9	What are your ideas about the negative impacts of wind turbines?	Open-ended
10	If you compare fossil fuels (coal, petrol, natural gas etc.) with renewable energy resources (wind, sun etc.) for energy generation, how would you rate the importance of the use of renewable energy resources?	5-point Likert scale (1: Not Important - 5: Very Important)

Table 6: Continiued

No.	Common Survey Questions	Question Type
11	Below, the most known negative impacts of wind energy systems are listed. Please rate the importance of these effects for you. ○ Noise ○ The threat for the ecosystem (death of flying livings like birds, bats etc.) ○ Disturbing visual integrity ○ Jamming of TV and radio signals through creating a magnetic field ○ Flicker effect and vibration (constantly moving shadows and/or vibrations in homes) ○ Changing microclimate (such as drying air) ○ Replacing forest areas ○ Replacing agricultural areas	5-point Likert scale (1: Not Important – 5: Very Important)

There were also two additional questions for the tourism employees. These were:

- *Do you think that the existence of wind farms affect your business negatively?* (Yes-No)
- *What do you think about the impacts of existence of wind turbines on tourists?* (Multiple choice (Positive, Neutral, Negative))

To answer the second research question, “What are the tourists’ and the tourism employees’ choices about the turbines’ locations?”, the author asked four questions to both groups. These questions are listed in Table 7.

Table 7: Third section of the survey questionnaires

No.	Common Survey Questions	Question Type
12	How would you rate your preference for having wind energy systems along the coasts of Muğla province?	5-point Likert scale (1: Definitely I do NOT - 5: Definitely I DO)
13	Regardless of legal constraints / regulations, if placing wind turbines on various lands is on the agenda, how dense should the wind farms be?	6-point Likert scale (0: None, 1: Sparse - 5: Very Dense)
13.1	What are the reasons behind your choice?	Multiple-selection (Economic, Health, Security, Ecologic, Visual)
14	Below, there are several areas where wind turbines can be built on. Please rate your preference for having wind energy systems on each type of area on a scale from 1 (should not be built) to 5 (could be built). ○ Forest areas ○ Degraded forest lands and macquis groves ○ Areas that do not have any protective status and, without tree or housing ○ Residential areas ○ Olive groves ○ Agricultural areas ○ Wetlands and surrounding protection areas ○ Natural sites and conservation zones ○ Historical, cultural, archeological sites and conservation zones ○ On the sea (Offshore)	5-point Likert scale (1: Should not be built - 5: Could be built)

The last question of Table 7 was the most crucial question for evaluating the respondents' preferences about where the wind turbines should be built. Land use classes, where wind energy systems are frequently located (Aydin, 2009; Yetiş et al., 2015) were listed to survey respondents. The question was supported by manipulated images which show wind turbines in the supposed areas (see Appendix C for the manipulated images used in this study). The images were manipulated in Adobe Photoshop, an image manipulation software. Photographs were obtained from the author's personal archive and internet, mostly showing coastal areas from different parts of Muğla province (e.g., forested areas, rocky areas and so on). Once these photographs were imported to the software, the author made small to radical changes on them, such as adding a very dense wind turbine development to the background/foreground of the image (please see Appendix A and B). In the field-research phase, the survey respondents were asked to evaluate their satisfaction with each image in five-point Likert scale.

The questionnaire was designed in a simple layout. First, the vacation duration and visiting periods for tourists, and business duration and history for the tourism employees were collected. Second, the general and specific opinions of the groups were asked with simple but versatile questions. Then, their demographic information was collected. The question with the images is left to the final part with the intention of motivating the attendant to finish the questionnaire. Most of the respondents seemed happy to be asked about their opinions and to help the researcher. Face-to-face survey has increased the response rate because the author both helped the respondents when they had questions, and encouraged them to complete the survey.

4.1.2. Implementation

Firstly, a pilot survey was conducted during 14-17 May 2017 at Ula district to identify the deficiencies of the questionnaire drafts. During this visit, the spatial data is collected and images of the coastline to be used in the questionnaire were taken. The selected location is a coastal area in Muğla Province where the blue cruise ships moor. This feature of the area causes a flow of mixed touristic groups including both domestic and foreign ones from different parts of the province. After that trial, it is decided that the survey should be conducted face-to-face rather than using online polls, with the aims of maximizing the response rate and leaving no room for misunderstandings.

The structured questionnaire survey was conducted by the author during 22-26 October 2017, weekdays at three locations; Marmaris district center, Datça public beach, and Bodrum ferry port (see Figure 9). These three sites were accessible on foot to tourists and all were located in the city center. Also, Marmaris, Datça and Bodrum have higher wind energy potential than southeastern part of the province (General Directorate of Renewable Energy, 2015). The survey was conducted in October. Although this month of the year was not the peak tourism season, it is considered to be acceptable for a tourism survey in Muğla. There were still plenty of tourists. Tourism agents, touristic activities such as blue cruise journeys were still operational in that time of the year. Concerning the language, the questionnaires are printed in two languages; Turkish and English. After providing the initial information and the consent form, the questionnaire was applied to each respondent group.

Figure 9: Pilot (Ula) and final survey locations (Datça, Marmaris and Bodrum)

Data was collected through convenience sampling method because a quick and inexpensive method was needed due to time and budget limits. The author performed a survey for the tourists at the stated locations, near the beaches and the ferry port. The tourism employees were approached mostly at their workplace, and some of them were at their gulets.

Lastly, collected answers were transferred to Microsoft Excel tables for the final analysis. In total, 110 surveys were filled out by the respondents: 62 from Marmaris, 31 from Datça and 17 from Bodrum. Table 8 shows how many respondents completed the survey from each location.

Table 8: Respondent numbers regarding survey locations

	Marmaris	**Datça**	**Bodrum**	**Total**
Tourist	44 (40%)	29 (26%)	12 (11%)	85 (77%)
Tourism Employee	18 (16%)	2 (2%)	5 (5%)	25 (23%)
Total	62 (56%)	31 (28%)	17 (16%)	**110 (100%)**

4.2. Archive Research

The site selection analysis for the wind farms requires geographic data in this study. Most of the geographic data was needed as shapefiles since GIS was used as an evaluation and visualization tool in this study. The Digital Elevation Model (DEM) of the province was required as a raster. All spatial data, except the DEM, were obtained from Metropolitan Municipality of Muğla.

The spatial data are obtained according to the land use classes which were asked in the questionnaires. Forests, macquis groves, residential areas, olive groves, agricultural areas, water bodies, conservation zones, natural sites, historical sites, cultural sites and archeological sites are all included in the data with 1/25000 scale. Complete data set is listed in Table 9.

The DEM was obtained through land monitoring service of Copernicus Programme. Formerly known as GMES (Global Monitoring for Environment and Security), Copernicus is a European Programme for monitoring the Earth. The system collects data from different sources such as satellites and in-situ sensors. Shared information is under six themes. These themes are land, marine, atmosphere, climate change, emergency, management, and security. DEMs can be found in land components as GeoTIFF files of 1000 x 1000 km tiles with 25 meters resolution (Copernicus, 2016).

Table 9: Complete data set of the study

Data	Data Format	Data	Data Format
Digital Elevation Model (DEM)	Raster, GeoTIFF	Specially protected environment areas	Shapefile, Polygon
Forests	Shapefile, Polygon	Lakes and ponds	Shapefile, Polygon
Macquis groves	Shapefile, Polygon	Vacancy areas	Shapefile, Polygon
Olive groves	Shapefile, Polygon	Sea	Shapefile, Polygon
Agricultural areas	Shapefile, Polygon	Province and district borders	Shapefile, Line
Natural sites	Shapefile, Polygon	Shoreline	Shapefile, Line
Historical, Cultural and Archeological sites	Shapefile, Polygon	Residential areas	Shapefile, Polygon
Province area of Muğla	Shapefile, Polygon		

4.2.1. Geographic Information Systems and Environmental Management

GIS is a useful tool for geographic inquiries. This tool enables obtaining, management, processing, analysis, visualization and storage of a vast amount of geographic data. Today, GIS has a solid capability to integrate environmental analysis and decision support, and this capability brings great abilities for research and environmental management (Yu & Buchanan, 2016).

According to Rodriguez-Bachiller and Glasson (2004), GIS applications and approaches can be grouped into four types in the context of environmental management. The first of these practices is mapping. It consists of very basic level practices for environmental management, using GIS tools to create maps for research and decision-making. Monitoring land use changes in India (Rawat & Kumar, 2015) or Egypt (Hegazy & Kaloop, 2015); mapping of groundwater quality in a city of Turkey (Nas & Berktay, 2010); identification of nearshore aquatic habitat in USA (Nelson et al. 2011) are few examples of this type of approach.

Second type constitutes several popular practices in the use of GIS. Linking GIS with external models is a very common and useful approach which can vary according to the purpose. Impact assessment, proper site selection, and environmental modeling fall into this category (Rodriguez-Bachiller & Glasson, 2004). These practices are vital for maintaining a sustainable environment and/or efficient use of resources. For example, water-related modeling, groundwater (Manap et al., 2013); tsunami risk (Şalap et al., 2011); flood risk (Kourgialas & Karatzas, 2011); and water pollution (Zhang et al., 2011), air modeling, temperature (Cristóbal et al., 2008); air pollution (Elbir et al., 2010); ecology, habitat (Martínez-Freiría et al., 2008); landscape ecology (Lu & Guldmann, 2012); ecologic risks (Malekmohammadi & Blouchi, 2014); ecosystem services (Grêt-Regamey et al., 2008), and other environmental models such as tourism (Ólafsdóttir & Runnström, 2009); agriculture (Mendas & Delali, 2012); landscape (Paudel & Yuan, 2012); climate change (Ashiq et al., 2010); fire risk areas (Adab et al., 2013); soil erosion risk areas (Terranova et al., 2009); solar radiation (Bode et al., 2014); and site selection (Aydin, Kentel & Duzgun, 2010). This thesis highly benefits from this kind of practice of GIS and environmental management frameworks.

Using own functions of the GIS is another way of using GIS within the context of environmental management. In these practices, basic GIS tools are used to help decision making for natural resource and environmental management, without using any other model. Some simple applications by basic functions are as follows; "overlaying" multiple maps to identify overlaps; creating "buffer" zones around some features to identify distances; drawing contour maps for elevation, making "viewshed" analysis to identify visible areas on a certain part of a map, and generating a DEM of an area (Rodriguez-Bachiller & Glasson, 2014).

The last application category is general-purpose environmental management systems. Practices under this category actually consist of combination of all prior type of practices noted above. The reason is that they seek multi-purpose management and, therefore, need a complete range of technical capability (Rodriguez-Bachiller & Glasson, 2014). Designation of Municipal Infrastructure Projects Management and Decision-making Support System is an example (Ru et al., 2013).

To conclude, GIS is a vital tool for carrying out spatial analysis such as site selection. It is not just computer software, but a tool that can be integrated to external models. Such spatial demonstrations become essential during policy development and decision making processes for the environment (Goodchild, 2003). For these reasons, GIS is chosen as the main tool to evaluate people's visual preferences to identify proper areas for wind turbines.

The functions of the used software, ESRI ArcGIS (version 10), in this study are:

Georeferencing: Selecting pixels in the digital image -an air photo, a scanned geologic map, or a picture of a topographic map- and assigning them geographic coordinates to locate it on corresponding real world location by GIS.

Clip: Cutting out a piece of one feature class which use one or more of the features in another feature class. Thus, a new feature class can be created.

Buffer: Buffers are proximity functions which produces a polygon or collection of cells within a specified proximity of a set of features.

Create Fishnet: This tool is used in order to create a feature class which comprises a net of rectangular cells. The spatial extent of the fishnet, the number of rows and columns, and the angle of rotation are basics of creating fishnet. It also creates label points at the centre of each cell.

Intersect: A tool which computes geometric intersection of any number of feature classes and property layers.

Viewshed: It reveals the visible areas that observers see by looking at from one or more points.

Union: Union tool helps to combine two data layers spatially and keeps features from both layers at the same extents.

Raster to Polygon: It is useful for conversion of a raster dataset to polygon features.

Selection: It is useful for extraction of features from an input feature class by selecting manually or using SQL query.

4.3. Site Selection Analysis

Answers to the last question are used for the final analysis. The question asks the respondents to evaluate different land use classes, and rate them in terms of suitability for wind farm establishments. These ratings are gathered to generate site selection maps. After analysis of gathered evaluations, mapping step starts. Firstly, the polygons of all layers are imposed on the DEM of the province. Then, observation points were appointed on the sea for the purpose of obtaining visible shores from the sea. Performing viewshed analysis through DEM raster and observation points brought desired visible areas out. In the third step, the land use polygons were clipped using visible areas layer. Finally, clipped lands merged into one layer and symbolized by both median values of the respondents' choices. Final step generates site selection maps for each respondent group and for whole sample.

4.4. Sample Overview

Given the research questions, the author focused on the survey questions that generated only quantitative data. 110 participants filled out the survey. While 25 of these respondents were tourism employees composed of tourism agents, guides and captains, 85 were tourists. Figure 10 shows the gender distribution of the respondents. Majority of the tourism employees were male and that clearly affected the gender distribution of the sample.

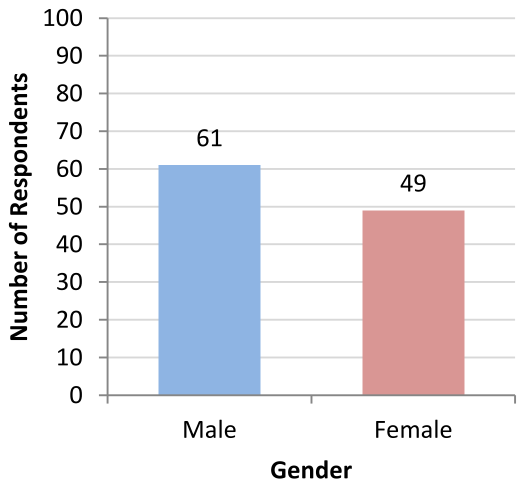


Figure 10: Gender distribution of the sample

During the field research, the author observed that in general, foreign tourists did not want to participate in the survey study. Therefore, 95 of 110 survey respondents were from Turkey. 15 respondents were from abroad, mainly from Germany, Russia, England, and Azerbaijan (see Figure 11).

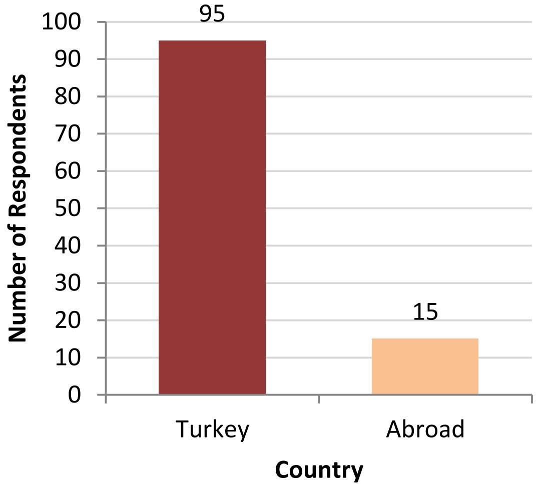


Figure 11: Nationality of the respondents

Figure 12 illustrates the age distribution of the sample. Majority of the respondents are in 18-30 age category, followed closely by 31-40 age category. Numbers of respondents from other age groups are similar. According to Wolsink (as cited by Dalton et al., 2008), age is one of the factors that affect the opinion of individuals on wind turbine establishments.

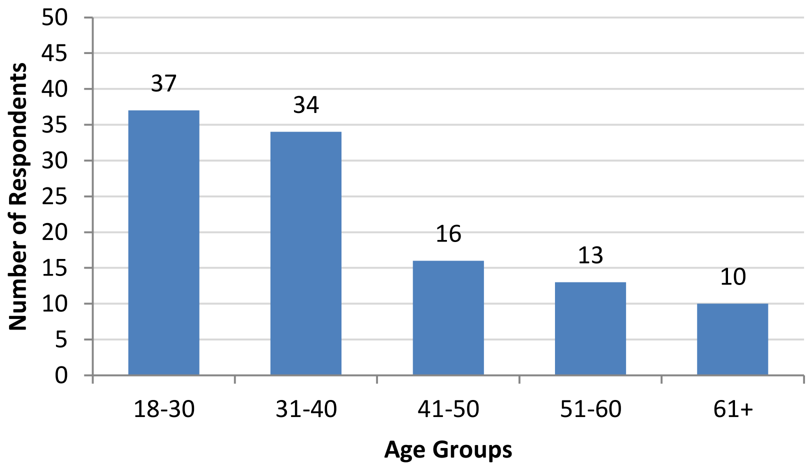


Figure 12: Age groups of the respondents

Figure 13 demonstrates education levels of the respondents. Almost half of them (48%) hold a university degree. Although Frantál and Kučera (2009) state that the respondents' attitudes and opinions are not related with their education levels, the author took this factor into account when analyzing the data.

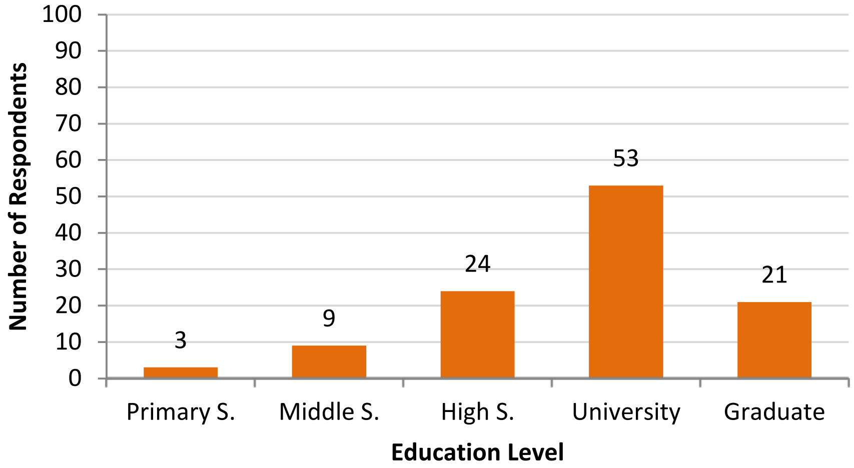


Figure 13: Education levels of the respondents

Among 110 survey respondents, 96 declared their level of income. Figure 14 illustrates the monthly income level of the respondents. Results show that 6% respondents' (n=6) income is between 1 TL and 1999 TL, approximately 61% of respondents (n=67) have income between 2000 TL and 5999 TL. 7% of respondents' (n=8) income level is higher than 6000 TL. According to Confederation of Turkish Trade Unions (2017), poverty limit for a family of four was 5030 TL in Turkey and minimum wage was 1404 TL in October 2017. This indicates that the majority of the survey respondents were economically disadvantaged.

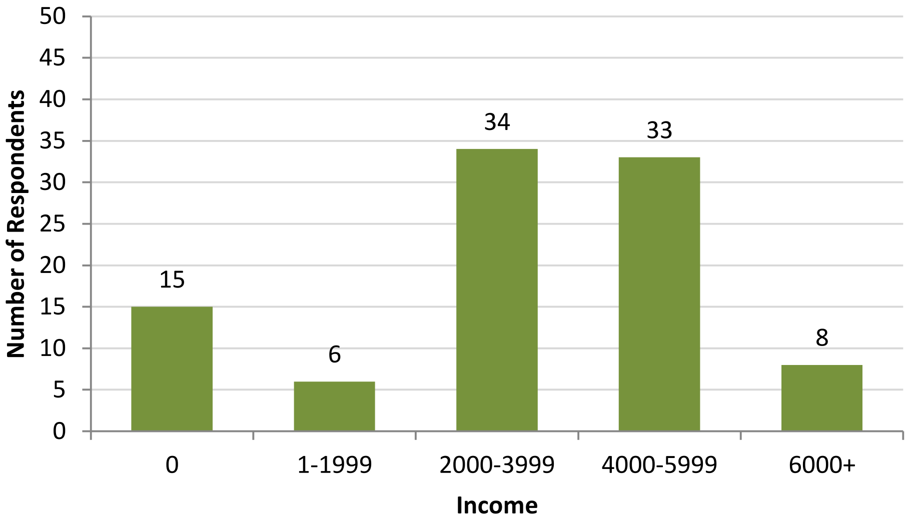


Figure 14: Monthly income levels of the respondents

To answer the research questions of the study, the second and third sections of the survey were analyzed separately. Figures of the next chapter show median values. Jamieson (2004) states that because Likert-type data are ordinal data (in this type of data intervals between statements are not clear), their median should be employed for central tendency measurement; "the mean (and standard deviation) are inappropriate for ordinal data" (Jamieson, 2004).

CHAPTER 5

RESULTS

This chapter presents the results of the survey. The survey aimed to provide answers to the two main research questions of the study: (1) In general terms and more specifically for Muğla Province, what do the tourists and tourism employees think about wind turbines? and (2) From the tourists and tourism employees' point of view, which locations (i.e., which land use classes) should be preferred for installing wind farms at the coastal areas of Muğla Province? It also aimed to answer a number of sub research questions: Are the respondents aware of the wind turbines' existence and their negative effects? Which negative effects are more influential according to them? How are their choices affected by their socio-demographic characteristics? The final output of the study, site selection maps are also presented in this chapter. The results of the study may provide guidance to the authorities in assigning permits to wind farm applications.

5.1. Tourists and Tourism Employees' Ideas About Wind Turbines

More than half (59%) of the survey participants (n=65 out of 110) said that they saw the wind turbines at the shores of Muğla (see Figure 15). Among those who noticed the wind turbines on the coasts of Muğla, 9% (n=10 out of 65) found these turbines annoying.

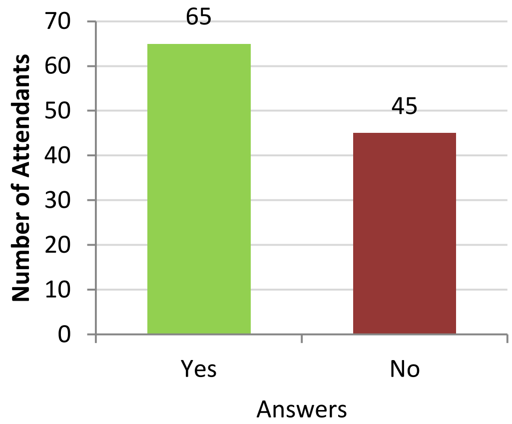
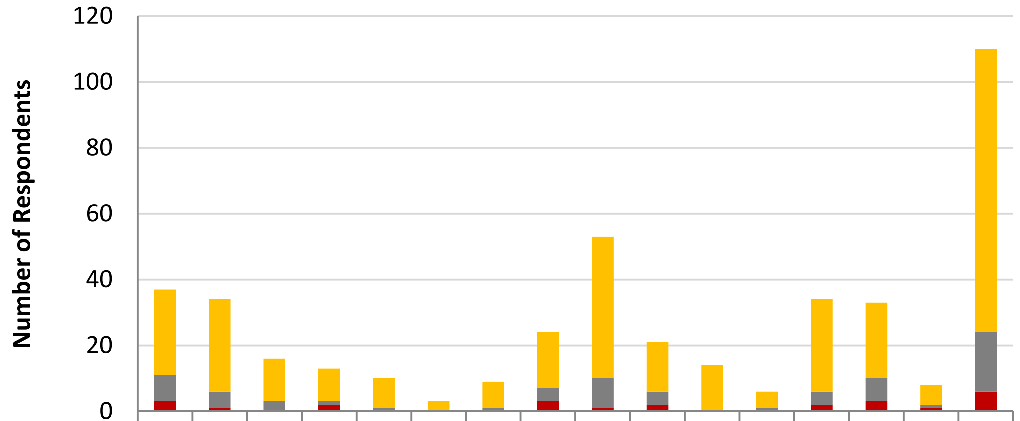


Figure 15: Results of Question 6: Have you noticed the wind turbines along the coasts of Muğla province?

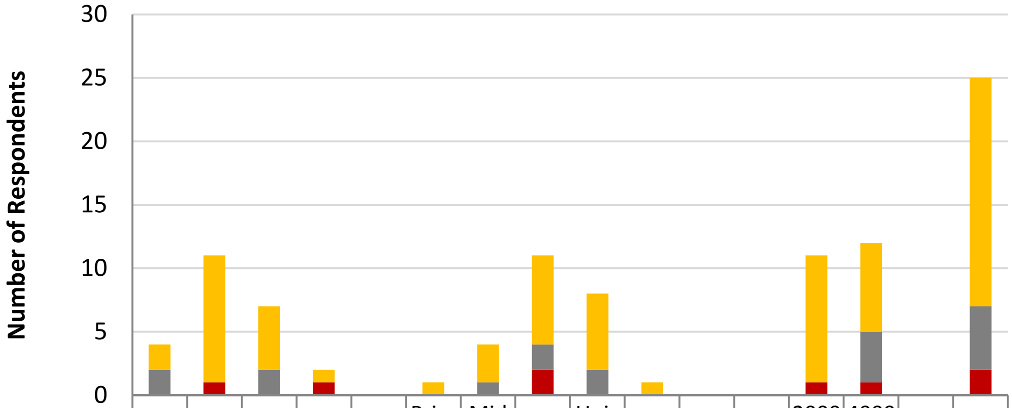
When asked “What is your opinion on wind energy systems?” 78% of the respondents (n=86) said that they have positive outlook on wind turbines while 6% (n=6) indicated their negative perspective over these systems. 16% of the respondents (n=18) indicated that they do not have any positive or negative opinion. Figure 16 demonstrates the participants’ age, level of education and income. This figure shows that almost all socio-demographic groups consider wind energy systems positively. There are a few people in the 18-30 and 31-40 age range, holding undergraduate degree, and earning between 4000-5999 TL per month, who are neutral on the issue.



	Age					Education Level					Income					Total
	18-30	31-40	41-50	51-60	61+	Primary S.	Middle S.	High S.	University	Graduate	0	1-1999	2000-3999	4000-5999	6000+	
Positive	26	28	13	10	9	3	8	17	43	15	14	5	28	23	6	86
Neutral	8	5	3	1	1	0	1	4	9	4	0	1	4	7	1	18
Negative	3	1	0	2	0	0	0	3	1	2	0	0	2	3	1	6

Figure 16: Overall Results of Question 7: What is your opinion on wind energy systems?

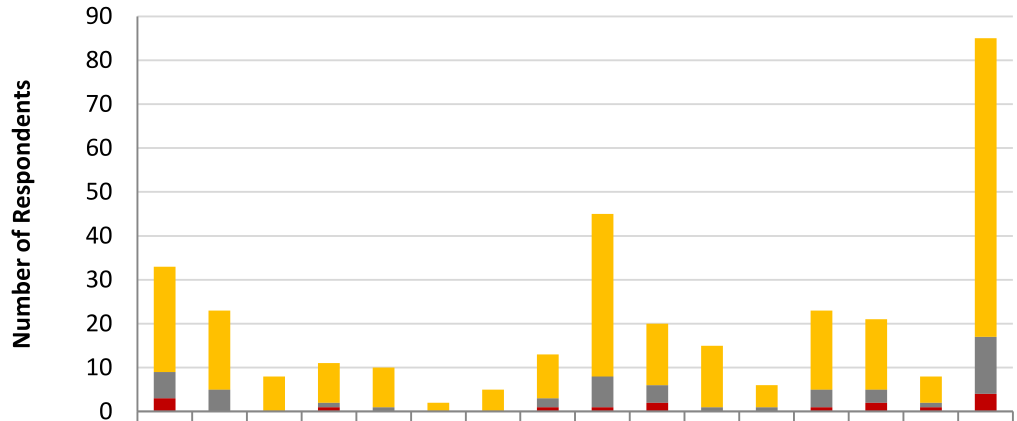
In order to understand the differences between opinions of tourism employees and tourists better, the results are evaluated with respect to the respondent groups. It should be noted that the total number of the tourism employees are 25. According to Figure 17, 72% of the tourism employees (n=18) are positive while 20% are neutral (n=5) and 8% are negative (n=2). 4 of 5 people from 4000-5999 TL income group indicate that they are neutral.



	Age					Education Level					Income					Total
	18-30	31-40	41-50	51-60	61+	Primary S.	Middle S.	High S.	University	Graduate	0	1-1999	2000-3999	4000-5999	6000+	
Positive	2	10	5	1	0	1	3	7	6	1	0	0	10	7	0	18
Neutral	2	0	2	0	0	0	1	2	2	0	0	0	0	4	0	5
Negative	0	1	0	1	0	0	0	2	0	0	0	0	1	1	0	2

Figure 17: Tourism employee results of Question 7: What is your opinion on wind energy systems?

With 85 respondents, tourists are the bigger respondent group. 80% of the respondents (n=68) indicated that they are positive about wind turbines while 15% (n=13) said that they are negative. 5% of the respondents (n=4) remained neutral (see Figure 18). There is a slight increase in favor of wind turbines among the tourists group compared to the tourism employees.



	Age					Education Level					Income					Total
	18-30	31-40	41-50	51-60	61+	Primary S.	Middle S.	High S.	University	Graduate	0	1-1999	2000-3999	4000-5999	6000+	
Positive	24	18	8	9	9	2	5	10	37	14	14	5	18	16	6	68
Neutral	6	5	0	1	1	0	0	2	7	4	1	1	4	3	1	13
Negative	3	0	0	1	0	0	0	1	1	2	0	0	1	2	1	4

Figure 18: Tourist results of Question 7: What is your opinion on wind energy systems?

When asked "If you compare fossil fuels (coal, petrol, natural gas etc.) with renewable energy resources (wind, sun etc.) for energy generation, how would you rate the importance of the use of renewable energy resources?" (1: not important; 5: very important), most of the respondendts rated the renewable energy resources as very important (see Figure 19). Regardless of their age, level of education and income, all sub-groups emphasized the importance of sustainable energy systems with medians equal to 5.00 (see Figure 20).

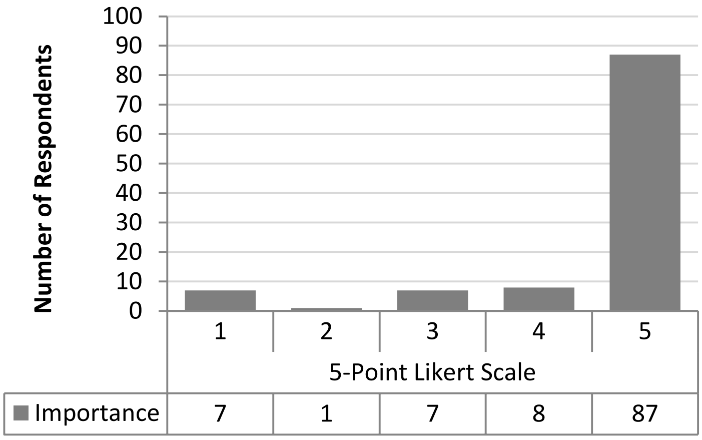


Figure 19: Histogram for Question 10

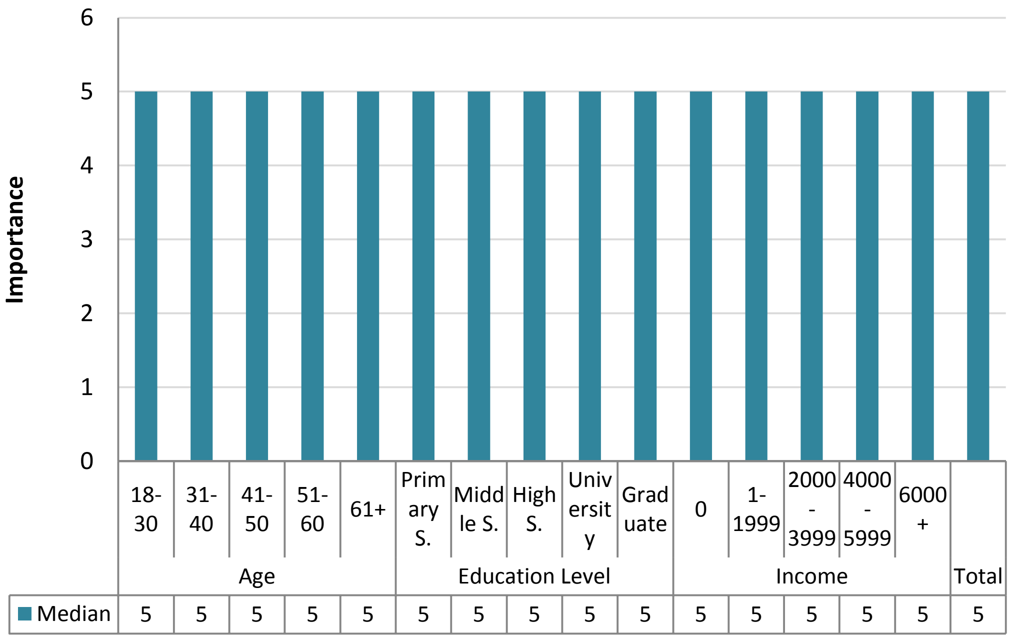


Figure 20: Overall results of Question 10: If you compare fossil fuels (coal, petrol, natural gas etc.) with renewable energy resources (wind, sun etc.) for energy generation, how would you rate the importance of the use of renewable energy resources? (1: Not Important - 5: Very Important)

Figure 21 demonstrates the results of Question 10 only answered by tourism employees. It looks like all sub-groups are on the same page about the importance of renewable energy systems. All median values of the sub-groups are equal to 5.00, except 51-60 level of age which is equal to 4.00.

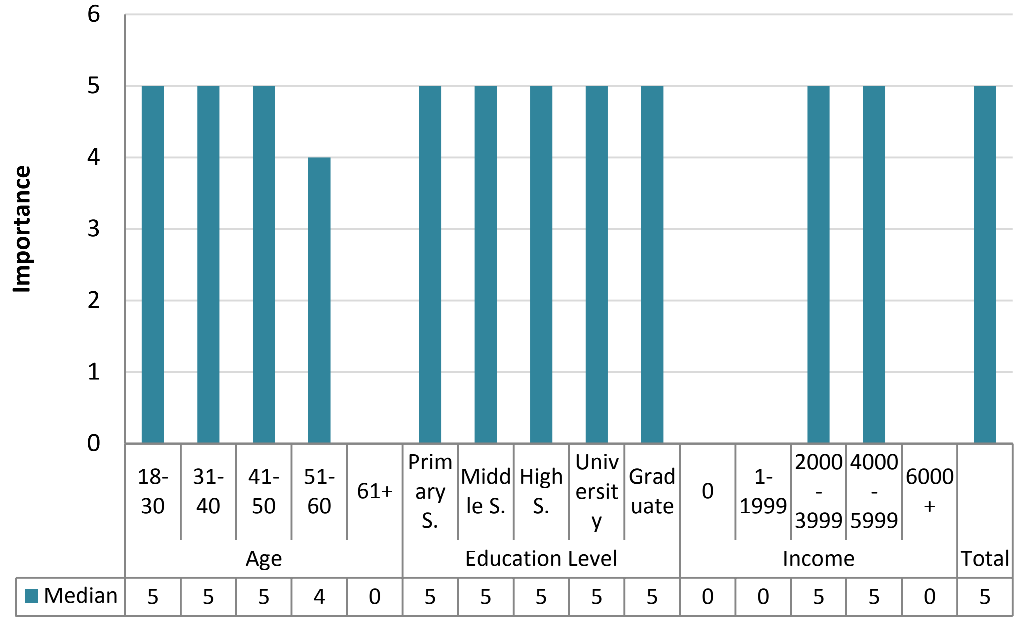


Figure 21: Tourism employee results of Question 10: If you compare fossil fuels (coal, petrol, natural gas etc.) with renewable energy resources (wind, sun etc.) for energy generation, how would you rate the importance of the use of renewable energy resources? (1: Not Important - 5: Very Important)

Results from the tourists are not almost same with the tourism employees in the case of this question (see Figure 22). All of the sub-groups give the highest importance to the use of renewable energy resources instead of conventional energy resources.

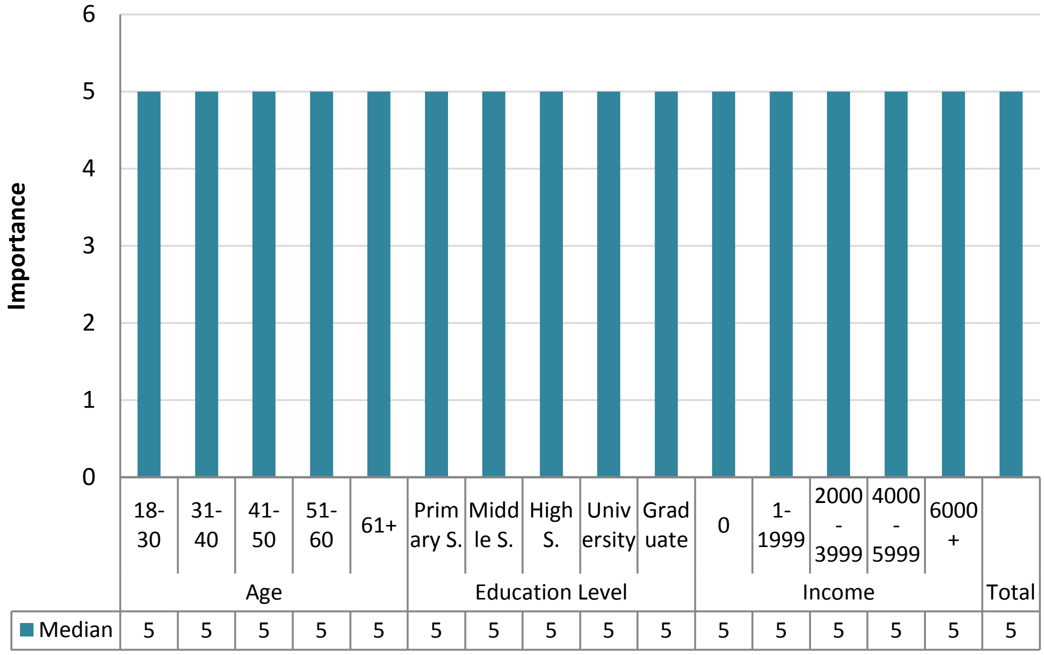
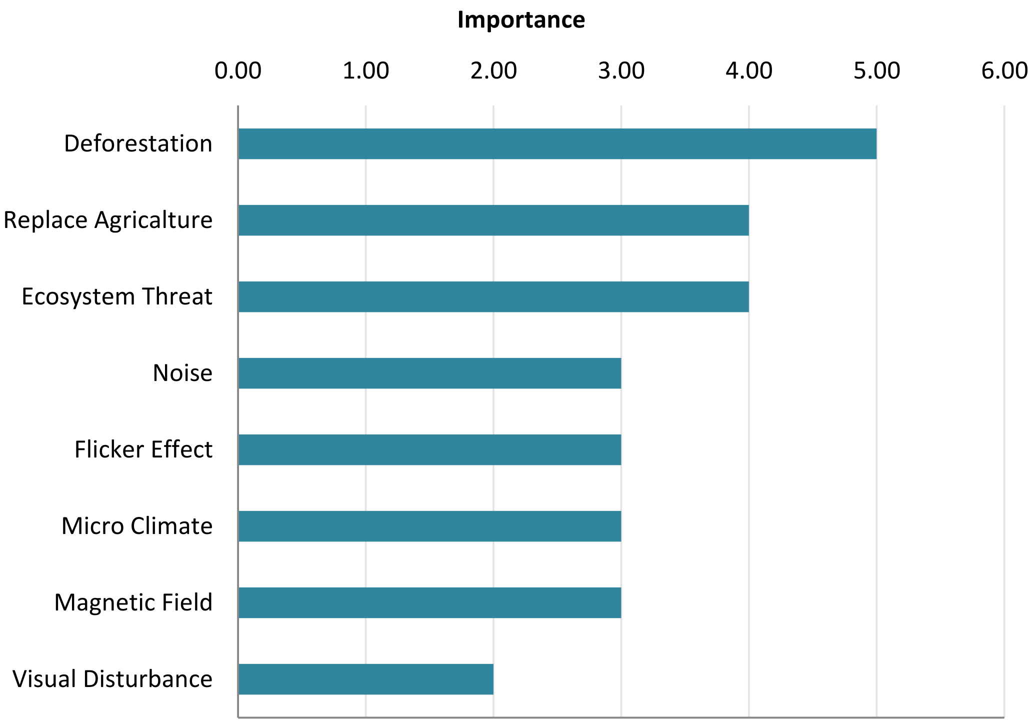


Figure 22: Tourist results of Question 10: If you compare fossil fuels (coal, petrol, natural gas etc.) with renewable energy resources (wind, sun etc.) for energy generation, how would you rate the importance of the use of renewable energy resources? (1: Not Important - 5: Very Important)

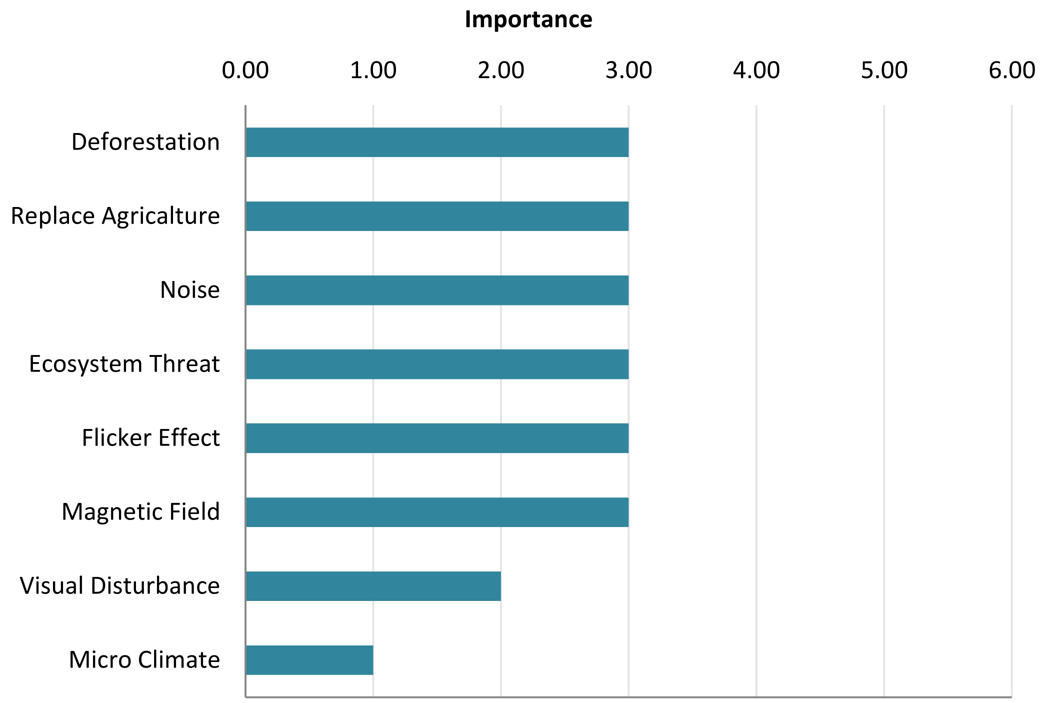
Question 11 asked participants to rate eight negative impacts of the wind turbines (noise, ecosystem threat, visual disturbance, magnetic field generation, flicker effect, microclimate change, deforestation and replacing agriculture) (5-point Likert-type question. 1: not important; 5: very important). Figure 23 shows the results for this question. With regard to the all respondents' opinions, deforestation, replacing agricultural lands, and threat on ecosystem are the three most important negative impacts of the wind turbines. Noise, flicker effect, microclimate change, and generating magnetic field follows these three, respectively. Respondents stated that the visual impact of the wind turbines does not concern them as much as other possible negative outcomes.



	Visual Disturbance	Magnetic Field	Micro Climate	Flicker Effect	Noise	Ecosystem Threat	Replace Agricalture	Deforestation
Median	2.00	3.00	3.00	3.00	3.00	4.00	4.00	5.00

Figure 23: Overall results for Question 11: The most known negative impacts of wind energy systems are listed. Please rate the importance of these effects for you (1: Not Important – 5: Very Important).

According to the opinions of tourism employees, deforestation, replacing agriculture areas, noise, threating ecosystem, flicker effect, and electromagnetic interference by creating magnetic field are rated as important at the same levels (see Figure 24). Interestingly, these levels point out not more than the medium importance (median=3.00). Changing microclimate is brought up to the end. The histograms of these results are given in Figure 25. Results show that people's perceptions each of the negative impacts of wind turbines vary considerably. For example, noise is ranked as not important by seven and very important by eight people. Thus, the median value of 3 in the 5-point Likert scale does not summarize preferences of people effectively. On the other hand, for deforestation there exists a more uniform distribution. Thus, the median value of 3.00 is a better indicator of people's preferences for this impact.



	Micro Climate	Visual Disturbance	Magnetic Field	Flicker Effect	Ecosystem Threat	Noise	Replace Agricalture	Deforestation
Median	1.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00

Figure 24: Tourism employee results of Question 11: The most known negative impacts of wind energy systems are listed. Please rate the importance of these effects for you (1: Not Important – 5: Very Important).

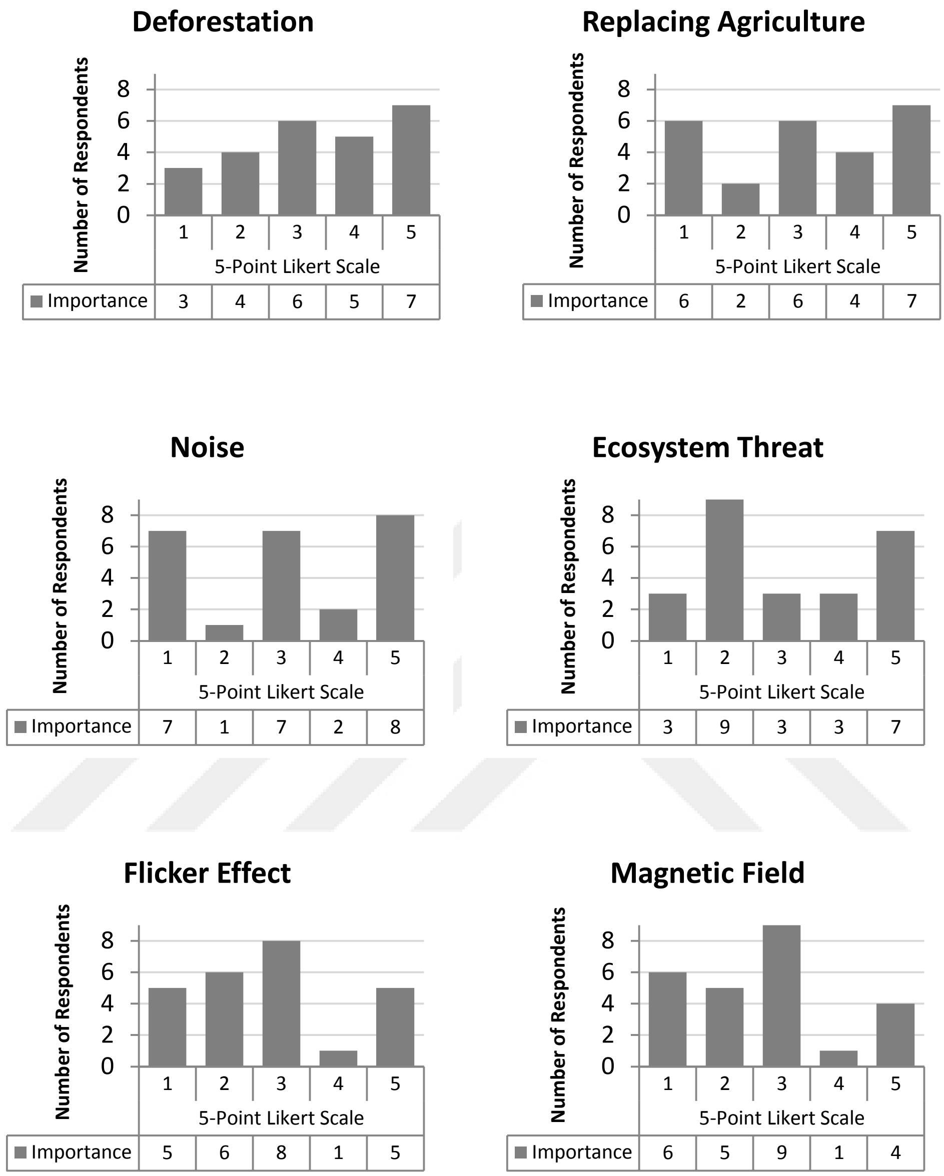
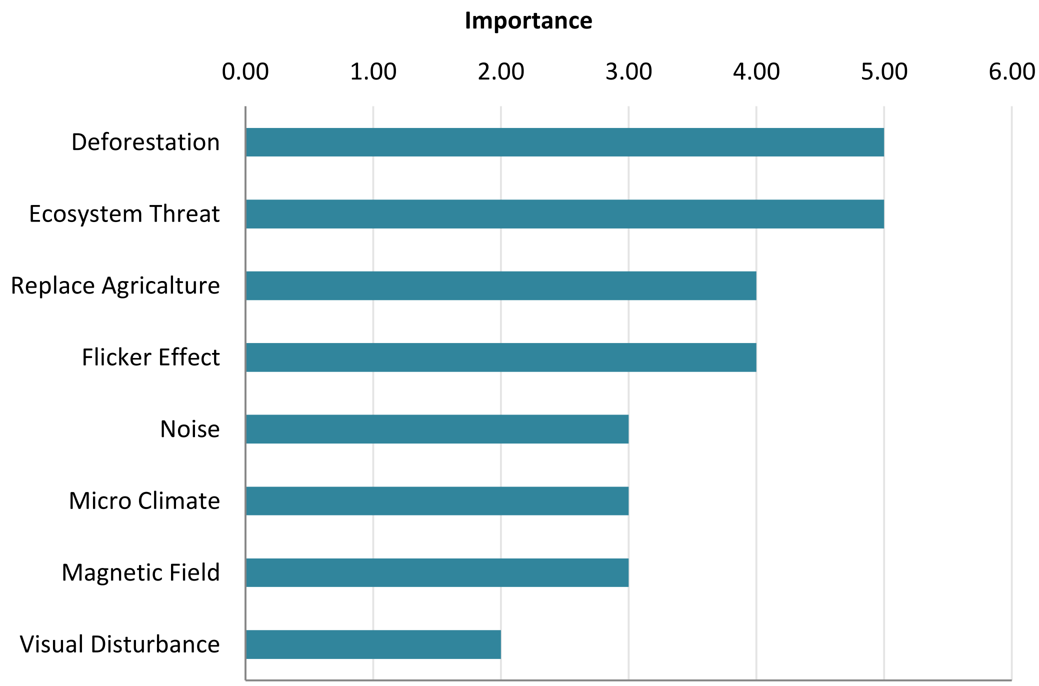


Figure 25: Histograms for the importance given by tourism employees to negative effects of Deforestation, Replacing Agriculture, Noise, Ecosystem Threat, Flicker Effect and Magnetic Field

Deforestation and threating ecosystem are the most important negative effects, according to Figure 26 where the results of the tourists are shown for Question 11. Replacing agriculture and flicker effect are also relatively important negative effects. Rankings of noise, changing microclimate and creating magnetic field display similar rates with those of the overall results. The visual disturbance of the turbines remains as the least important negative effect.



	Visual Disturbance	Magnetic Field	Micro Climate	Noise	Flicker Effect	Replace Agricalture	Ecosystem Threat	Deforestation
Median	2.00	3.00	3.00	3.00	4.00	4.00	5.00	5.00

Figure 26: Tourist results of Question 11: The most known negative impacts of wind energy systems are listed. Please rate the importance of these effects for you (1: Not Important – 5: Very Important).

5.2. Tourists and Tourism Employees' Preferences for Wind Farm Locations

The third section of the survey aimed to understand tourists and tourism employees' preferences for the location of wind farm developments. For that purpose, the respondents were first asked if they are willing to see wind turbines at the shores of Muğla. This was a 5-point Likert-type question (1: Definitely I do NOT; 5: Definitely I DO). According to the Figure 27, the histogram for Question 11, the number of the respondents who want to see the wind turbines are far more than number of the ones who are not willing to see the turbines. Still, the number of uncertain people is also high. Figure 28 shows the median results of the respondents with respect to their socio-economic backgrounds. Interestingly, in spite of putting high importance to use of renewable energy resources in comparison with conventional energy sources, acceptance of the wind turbines at the shores of Muğla is not high. Different than overall results of Question 10 (see Figure 20) which asked participants to rate the importance of renewable energy resources, overall results of Question 12 shows that respondents' preferences on wind energy developments along the coast of Muğla are changing with their level of education and income. The ratings get lower as the level of education increases. Especially, people with university degrees and higher education levels approach cautiously to the presence of these energy systems. The results also display that the willingness to see the wind turbines at the shores of the province has a positive relation with income level. There is not an apparent change related to ages of the respondents. All age groups are willing to see the wind turbines at middle or higher levels.

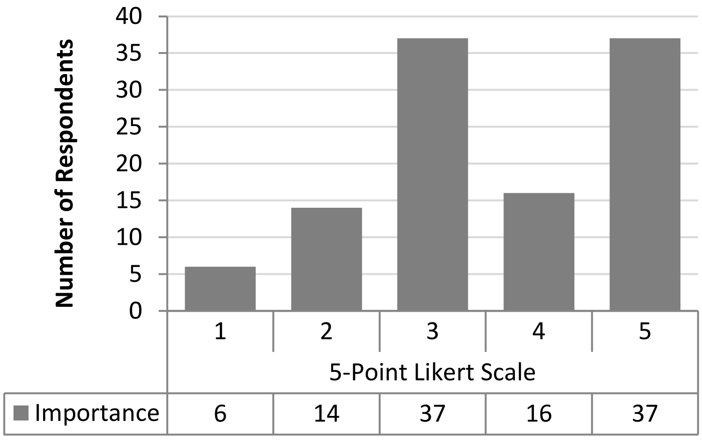


Figure 27: Histogram for Question 12

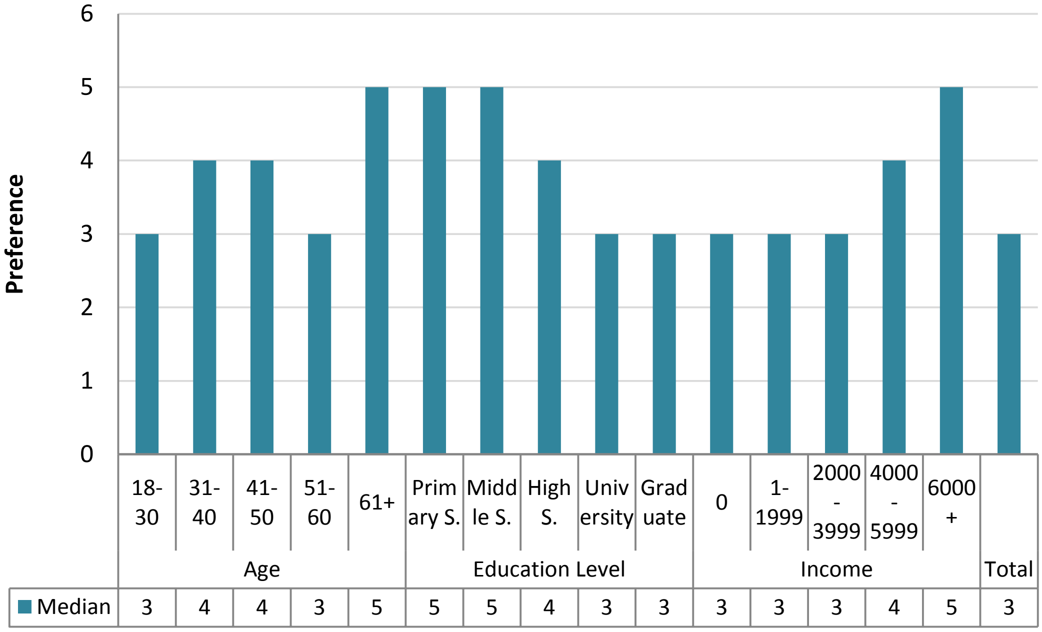
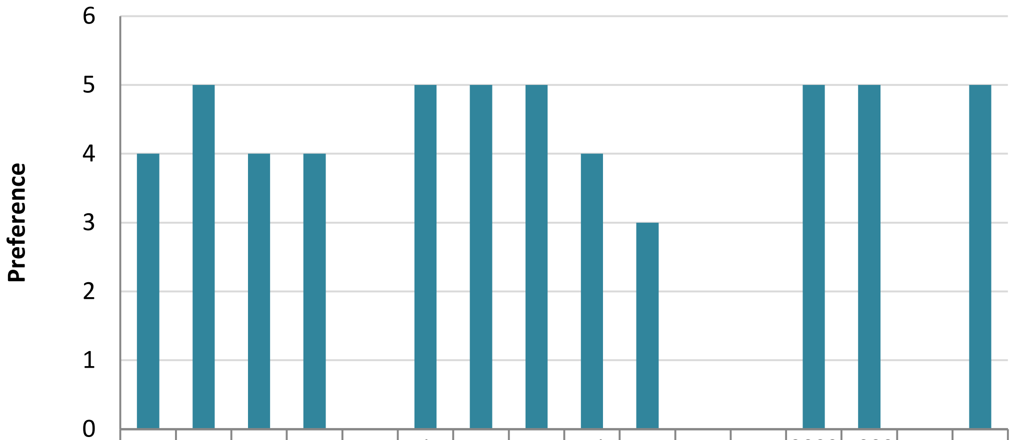


Figure 28: Overall Results of Question 12: How would you rate your preference for having wind energy systems along the coasts of Muğla province? (1: Definitely I do NOT - 5: Definitely I DO)

Tourism employee results of Question 12 are demonstrated in Figure 29. The relation found between the willingness to see the wind turbines at the province and level of education in the case of the overall results can be described as similar for tourists, too. Compared to less educated tourism employees, highly educated tourism employees are less willing to see wind energy developments along the coast of Muğla. Graduate level of education sub-group has the lowest median value (3.00). Values at income groups seem different because not all respondents gave their information of income.



	Age					Education Level					Income					Total
	18-30	31-40	41-50	51-60	61+	Primary S.	Middle S.	High S.	University	Graduate	0	1-1999	2000-3999	4000-5999	6000+	
Median	4	5	4	4	0	5	5	5	4	3	0	0	5	5	0	5

Figure 29: Tourism employee results of Question 12: How would you rate your preference for having wind energy systems along the coasts of Muğla province? (1: Definitely I do NOT - 5: Definitely I DO)

Surprisingly, sub-groups of the tourists mostly show average acceptance of wind turbines because almost all median values of these sub-groups are equal to 3.00, according to Figure 30. Exceptions are 41-50 and 61+ age groups, primary school and middle school level of education groups, and 6000+ TL income group. It can be said that, the willingness to see the wind turbines at the shores of Muğla Province is not related to the given importance to use of renewable energy systems.

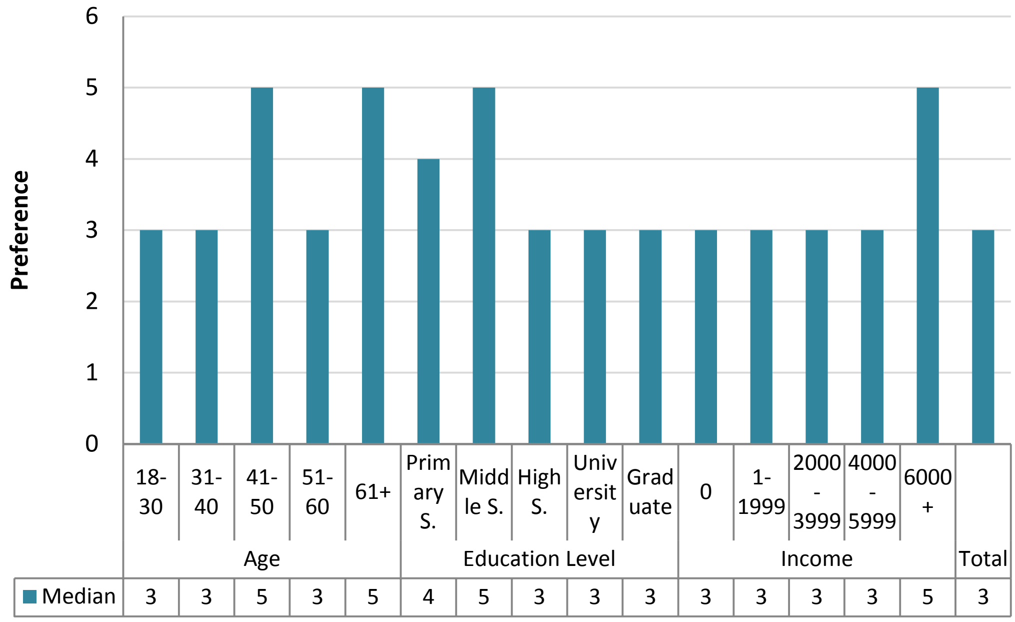


Figure 30: Tourist results of Question 12: How would you rate your preference for having wind energy systems along the coasts of Muğla province? (1: Definitely I do NOT - 5: Definitely I DO)

In Question 13, the respondents were asked "Regardless of legal constraints/regulations, if placing wind turbines on various lands is on the agenda, how dense should the wind farms be?". The respondents were asked to provide their answer on a 5-point likert question (0: None, 1: Sparse, 5: Very Dense). The aim of this question was to measure how density affects visual acceptance of the turbines. The histogram of the answers points out a normal distribution around the median value of 3.00 which is equal to the medium value of the Likert-scale of the question (see Figure 31). The respondents prefer wind turbines to be placed with certain distances from each other despite strong wish to benefit from them (see Figure 32).

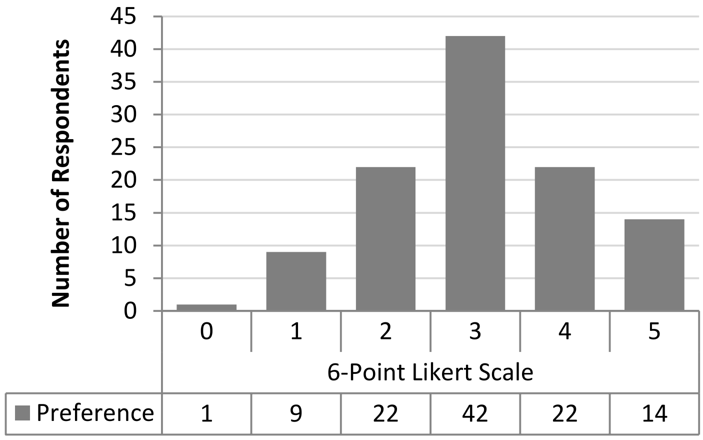


Figure 31: Histogram for Question 13

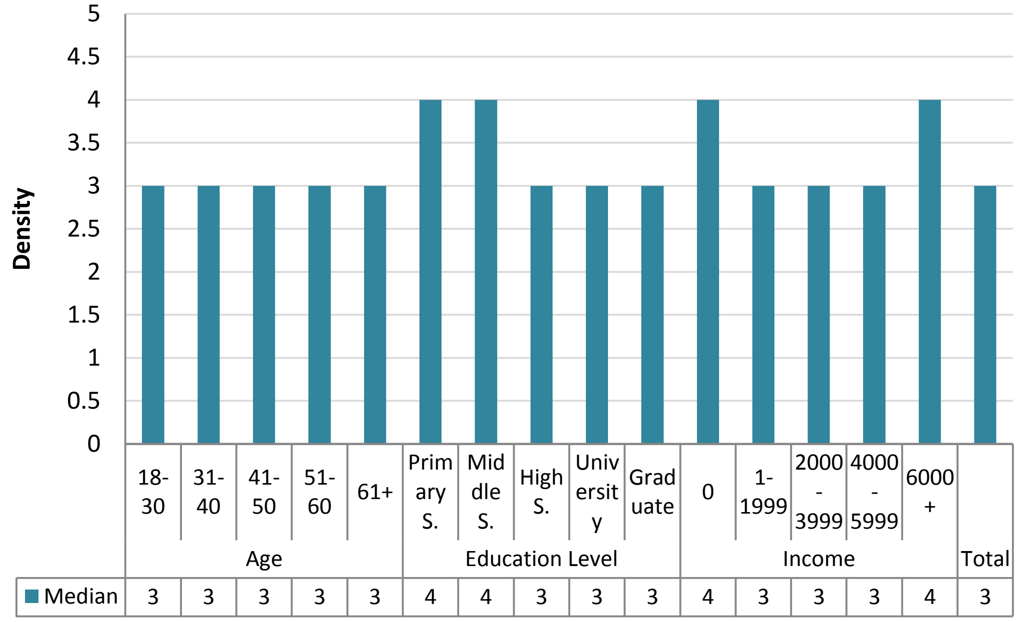


Figure 32: Overall results of Question 13: Regardless of legal constraints / regulations, if placing wind turbines on various lands is on the agenda, how dense should the wind farms be? (0: None, 1: Fewer - 5: Higher)

According to Figure 33, density of the wind farm developments is only related to the level of education negatively. Most of other socio-demographic groups insist on medium density.

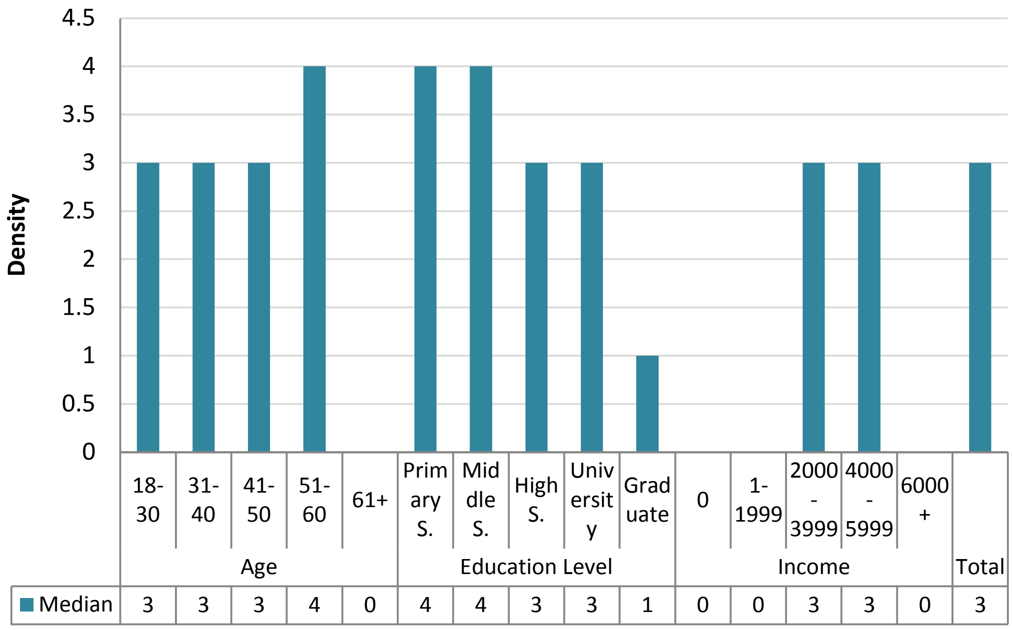


Figure 33: Tourism employee results of Question 13: Regardless of legal constraints / regulations, if placing wind turbines on various lands is on the agenda, how dense should the wind farms be? (0: None, 1: Fewer - 5: Higher)

According to Figure 34, there is almost a common understanding on the density of the turbines regardless of age, level of education and income of the tourists. Most of the tourists want the wind farms in medium density.

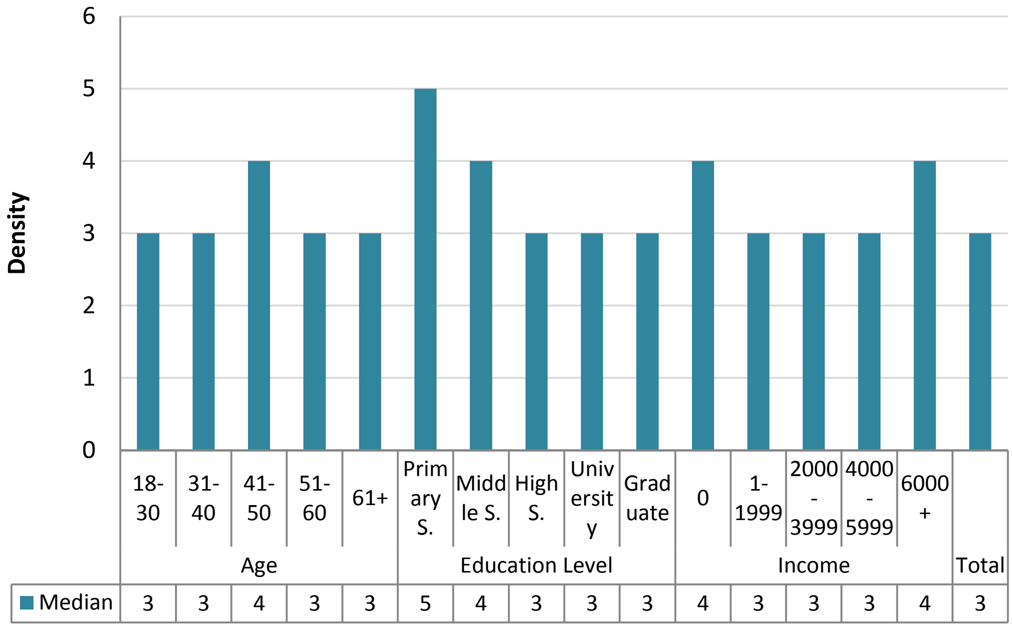


Figure 34: Tourist results of Question 13: Regardless of legal constraints / regulations, if placing wind turbines on various lands is on the agenda, how dense should the wind farms be? (0: None, 1: Fewer - 5: Higher)

Next, the reasons behind the participants' choices were asked in a sub-question (Question 13.1). The author provided a list of pre-defined benefits of wind energy systems to the respondents and asked them to indicate which of these reasons influenced their decisions. These reasons are listed and explained as follows:

Economic: Economic gains or losses through generation of sustainable energy from renewable sources in different scales; from neighborhood to the whole continent or even world. Energy generation efficiency of the turbines also corresponds to this reason.

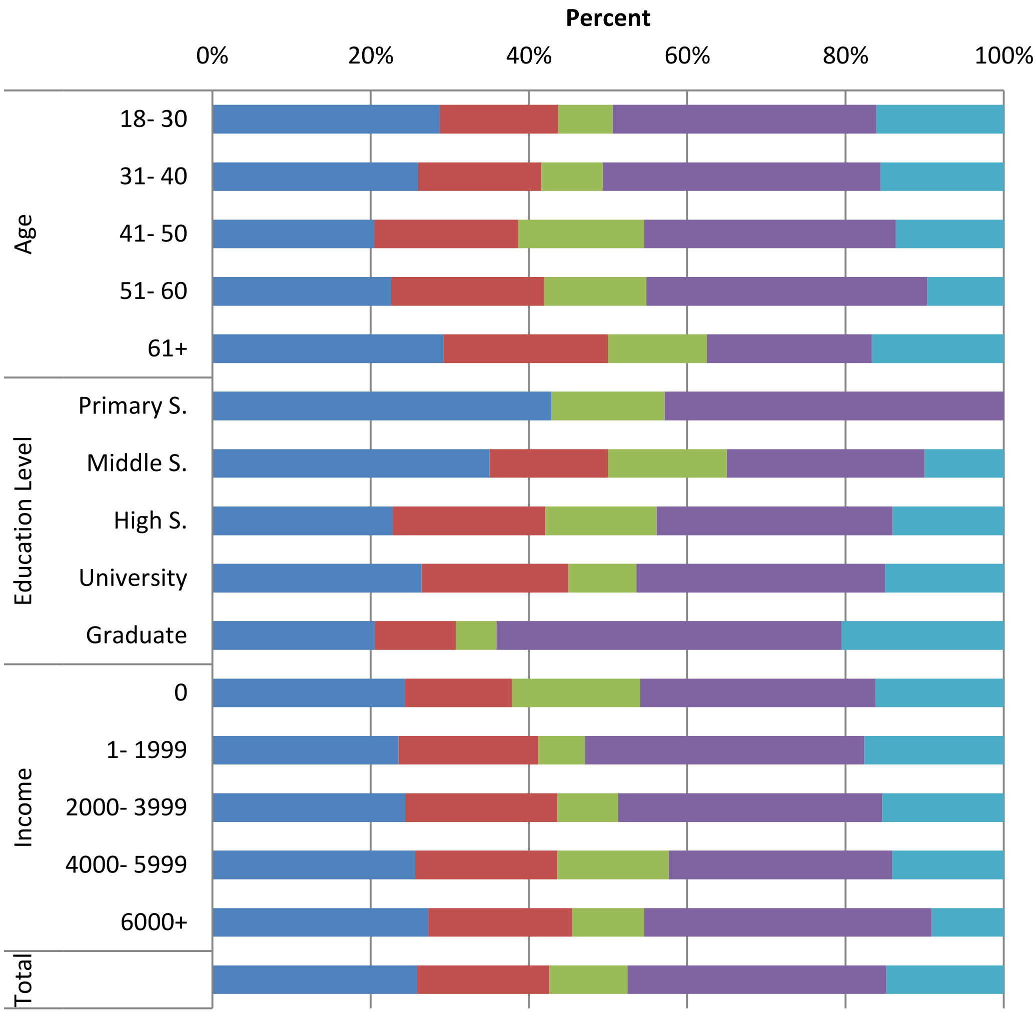
Health: A versatile reason indicating both positive and negative effects. Use of wind turbines would be healthier than the use of, for example, a thermal power plant. On the other hand, wind turbines may affect human health negatively with noise or flicker effects.

Security: Wind turbines are tall structures and they are getting taller while their components are also getting bigger. This may pose dangers during their construction or pose risks in the face of natural disasters.

Ecologic: These power systems are cleaner and more environment-friendly than any other big scale energy systems (Abbasi & Abbasi, 2012). However, even they have negative impacts on the environment which could affect ecologic balance.

Visual: Existence of wind farms may create positive or negative effects in terms of visuality. Whereas some people may found them interesting and regard them as attraction elements on a scene, others think that these structures are disturbing and, therefore, lowering the value of the scene (MORI Scotland, 2002; NFO WorldGroup, 2003).

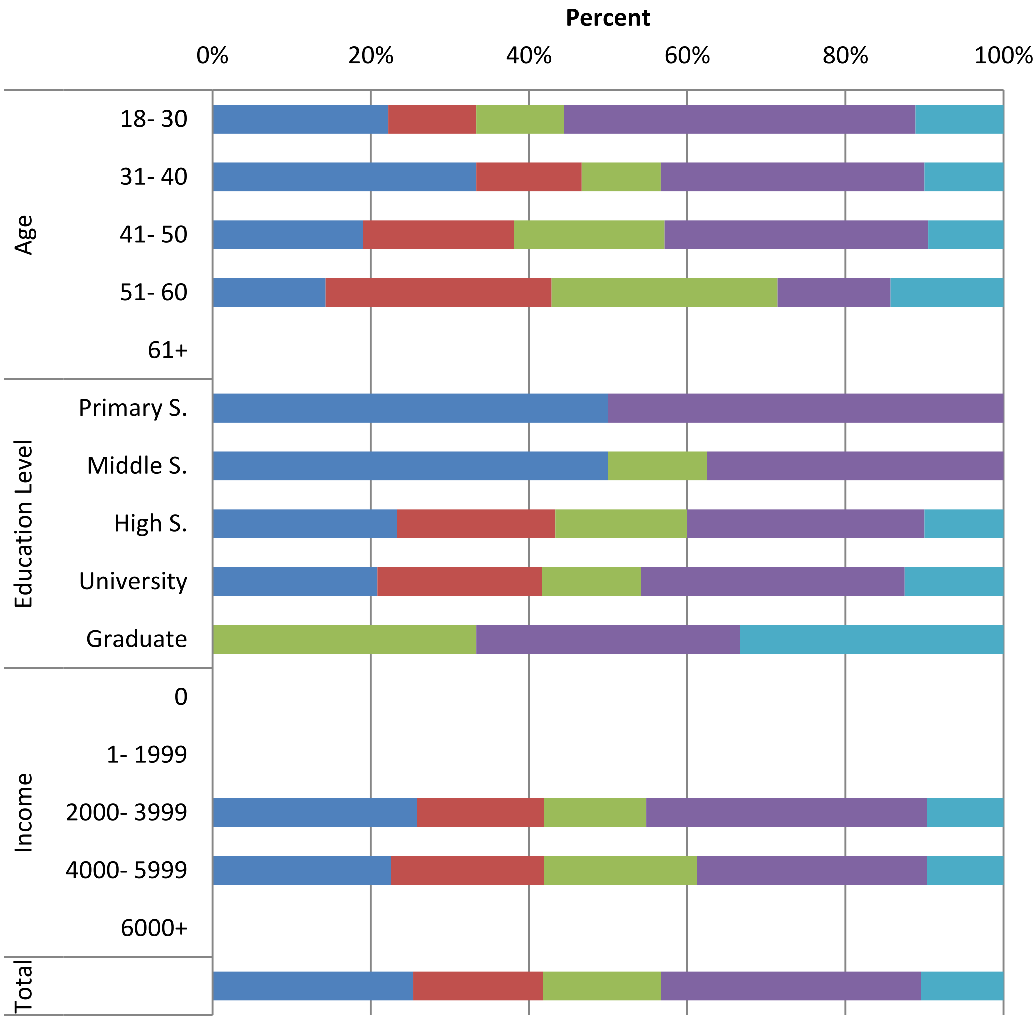
Question 13.1 is the only multiple-choice question in the survey. Figure 35 summarizes the results. “Ecologic” reason leads all the highlighted reasons by being selected 86 times (78% of the respondents). “Economic” reason is also highly pointed out by the respondents (62% of the respondents). “Health” (with 40%), “Visual” (with 36%) and “Security” (with 24%) are following them respectively.



	Total	Income					Education Level					Age				
		6000+	4000-5999	2000-3999	1-1999	0	Graduate	University	High S.	Middle S.	Primary S.	61+	51-60	41-50	31-40	18-30
Economic	68	6	20	19	4	9	8	37	13	7	3	7	7	9	20	25
Health	44	4	14	15	3	5	4	26	11	3	0	5	6	8	12	13
Security	26	2	11	6	1	6	2	12	8	3	1	3	4	7	6	6
Ecologic	86	8	22	26	6	11	17	44	17	5	3	5	11	14	27	29
Visual	39	2	11	12	3	6	8	21	8	2	0	4	3	6	12	14

Figure 35: Overall results of Question 13.1: What are the reasons behind your choice?

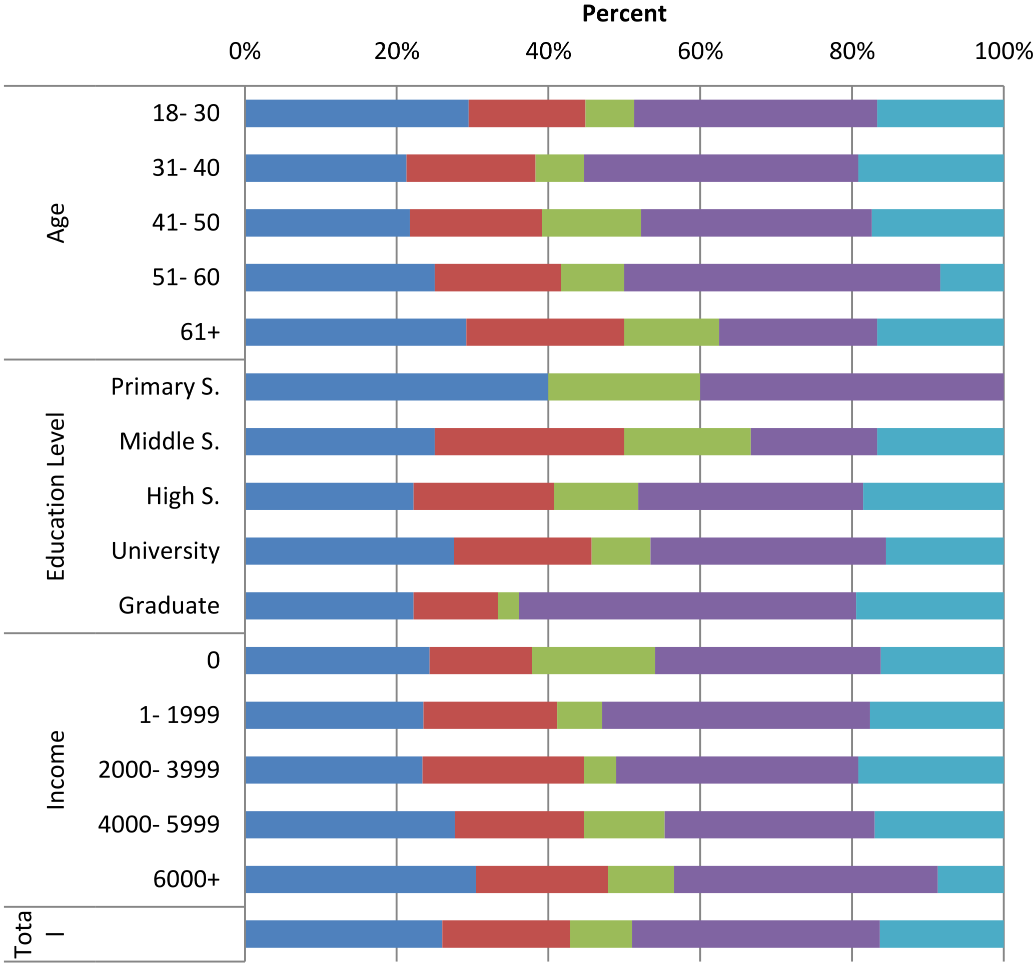
Tourism employees denote ecologic reasons as the most important reason with 88% rating (n=22) and economic reasons as the second important with 68% rating (n=17) for the reasons behind their preference of wind energy systems (see Figure 36). Answers to both reasons seem to get lower as the respondents' level of education increase. Ecologic reasons also get lower as the age of the respondents increases, while health and security reasons get higher. Health and security reasons are very close to each other with 44% (n=11) and 40% (n=10). Visual reasons are the least important with 28% rating (n=7).



	Total	Income					Education Level					Age				
		6000+	4000-5999	2000-3999	1-1999	0	Graduate	University	High S.	Middle S.	Primary S.	61+	51-60	41-50	31-40	18-30
Economic	17	0	7	8	0	0	0	5	7	4	1	0	1	4	10	2
Health	11	0	6	5	0	0	0	5	6	0	0	0	2	4	4	1
Security	10	0	6	4	0	0	1	3	5	1	0	0	2	4	3	1
Ecologic	22	0	9	11	0	0	1	8	9	3	1	0	1	7	10	4
Visual	7	0	3	3	0	0	1	3	3	0	0	0	1	2	3	1

Figure 36: Tourism employee results of Question 13.1: What are the reasons behind your choice?

The results of tourists group show that the ecologic and the economic reasons are still the top two reasons but with less rating, 75% (n=64) and 60% (n=51) respectively (see Figure 37). This time, the visual reasons (38%, n=32) are selected more frequently compared to security reasons (19%, n=16), but health reasons are still underlined to be more important by a small margin (39%, n=33). Similar to the results from tourism employees, economic reasons lose their importance as the tourists' level of education increase. However, the ecologic reasons remain as the most important within most sub-groups.



	Total	Income					Education Level					Age				
		6000 +	4000 - 5999	2000 - 3999	1- 1999	0	Graduate	University	High S.	Middle S.	Primary S.	61+	51- 60	41- 50	31- 40	18- 30
Economic	51	7	13	11	4	9	8	32	6	3	2	7	6	5	10	23
Health	33	4	8	10	3	5	4	21	5	3	0	5	4	4	8	12
Security	16	2	5	2	1	6	1	9	3	2	1	3	2	3	3	5
Ecologic	64	8	13	15	6	11	16	36	8	2	2	5	10	7	17	25
Visual	32	2	8	9	3	6	7	18	5	2	0	4	2	4	9	13

Figure 37: Tourist results of Question 13.1: What are the reasons behind your choice?

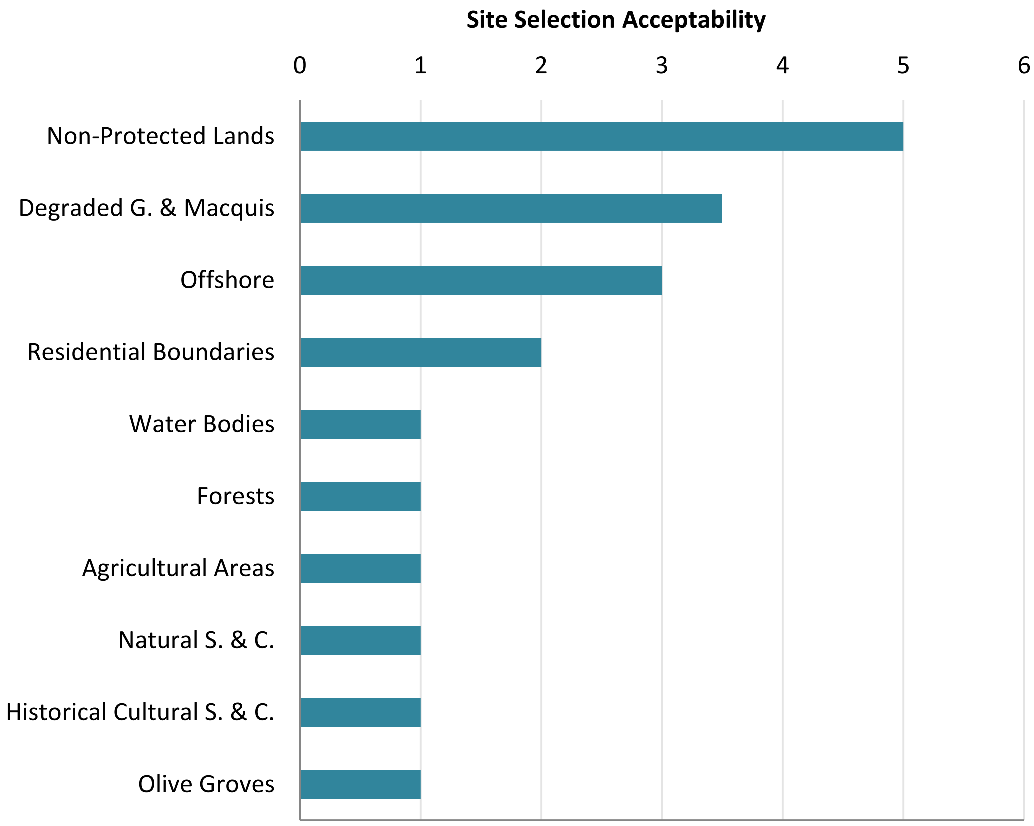
5.2.1. Site Selection for Wind Farms

For the final analysis, the respondents are asked to evaluate suitability of different land use classes for wind farms (see Chapter 4.1.1 for details) in a 5-point Likert-type question. In the evaluation part, 1 is denoting unacceptability of a wind farm development for a questioned land use class, and 5 is full support for a wind farm on that land use class. A catalog including the manipulated pictures of shores with different land use classes was shown to the respondents during Question 14 (see Figure 38 for a sample photo) and their level of acceptability/confirmation is asked. All manipulated images can be seen in Appendix C.

Figure 38: A manipulated picture representing degraded green lands and macquis groves, May 2017

When evaluating these pictures, the respondents were guided to think in terms of both visuality/aesthetic and land use aspects of the questioned land use classes. Some areas with a line or point data, such as power lines, are excluded in this study because their setback distances are changing according to legislation and recommendations. Concerns regarding laws are excluded from this study.

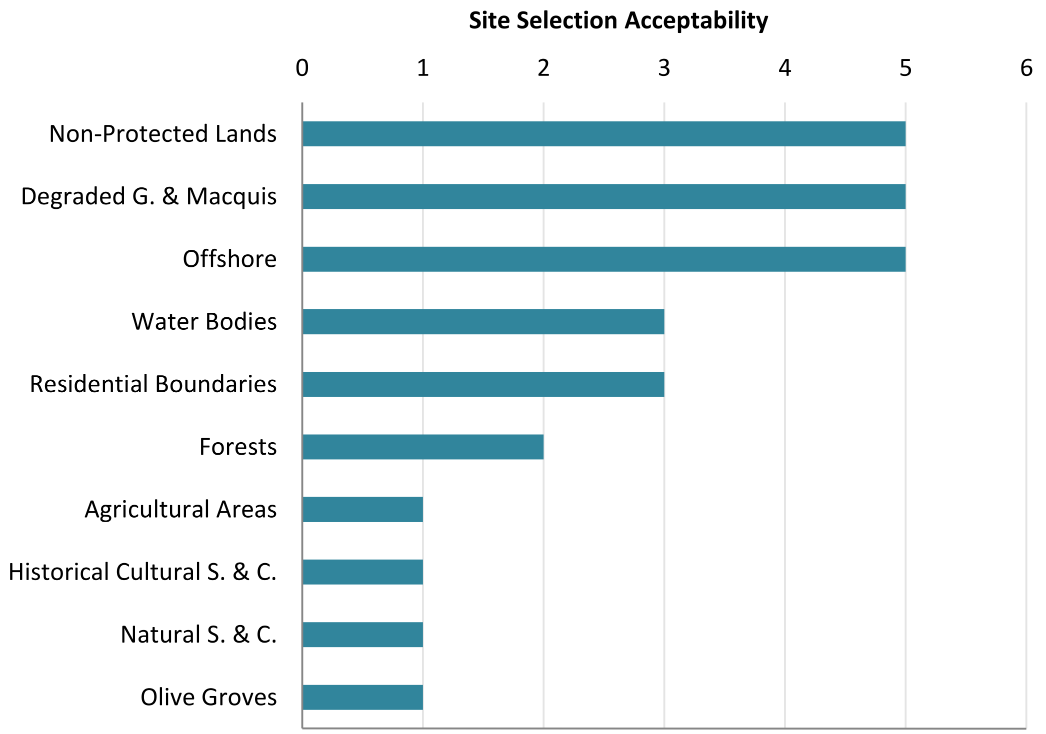
Unsurprisingly, the acceptability results show that the areas with no protection obligation (median=5.00) are the most favored land for the wind energy system developments. These areas do not possess ecologic value, important habitat or any historical, cultural, archeological sites; so they are named as “Vacancy areas” or “Non-protected lands” for the rest of the study. “Degraded green lands and macquis groves” are in the second place (median=3.50), and “offshore” construction comes in third (median=3.00). Next land use classes are the “residential areas” (median=2.00). Results on this choice are showing the acceptability ratings of the respondents to see wind farms close to the cities rather than on natural areas or agricultural areas. With the lowest median values, “water bodies”, “forests” and “agricultural areas” are following the residential areas respectively. Same with these classes, median values of “olive groves”, “natural sites and conservation areas” and another type of sites including historical, cultural and archeological, are at the bottom of the list as their median values are equal to 1.00, denoting total unwillingness. This result definitely shows the sensibility of people to the protection of environmental values. Figure 39 shows the medians of tourists and tourism employees’ preferences for having wind energy systems on different land use classes.



	Olive Groves	Historical Cultural S. & C.	Natural S. & C.	Agricultural Areas	Forests	Water Bodies	Residential Boundaries	Offshore	Degraded G. & Macquis	Non-Protected Lands
Median	1	1	1	1	1	1	2	3	3.5	5

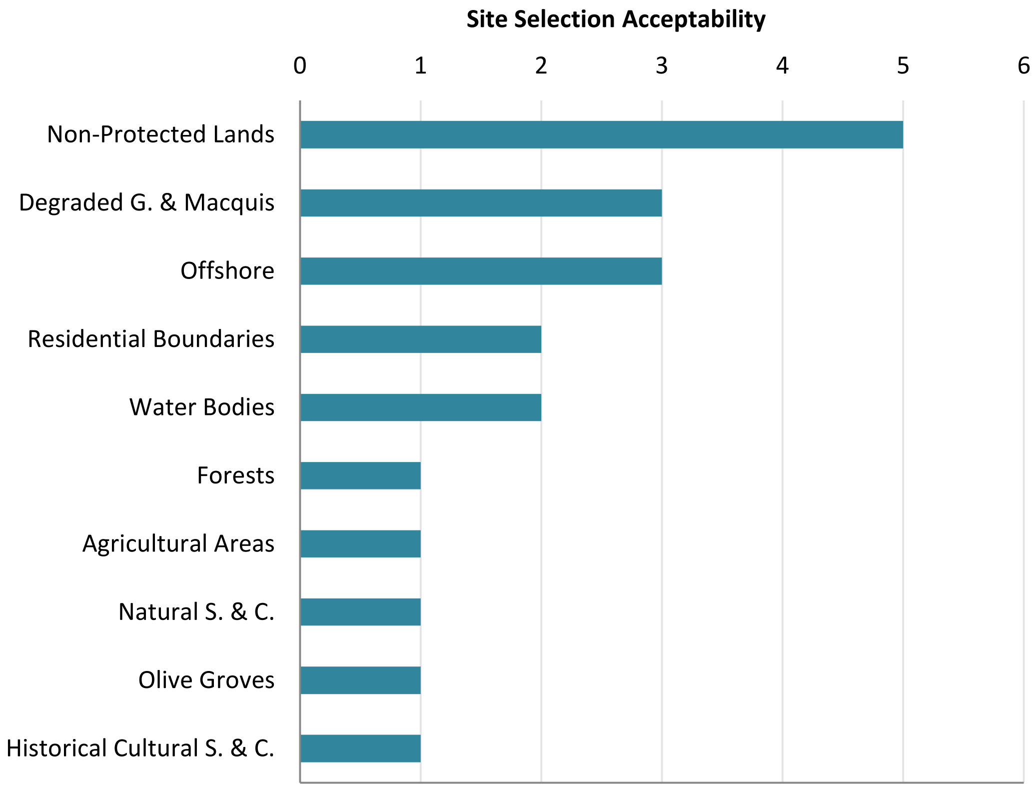
Figure 39: Overall results of Question 14: Please rate your preference for having wind energy systems on each type of land use on a scale from 1 (should not be built) to 5 (could be built).

When tourism employees and tourists' preferences are comparatively examined, acceptability results show that non-protected lands are equally supported by each group. Non-protected areas have the highest support with the highest median value; 5.00 (see Figure 40 and Figure 41). Following non-protected areas, tourism employees have higher acceptability rating towards degraded green lands, macquis groves and offshores as potential sites than the tourists do. This group has median value of 5.00 for the degraded green lands and macquis groves while the tourists have 3.00. Their median value for offshore establishment is also 5.00 but the median of the same area for the tourists is 3.00. Another difference between acceptability rates is for water bodies. The value is 3.00 for the tourism employees but 2.00 for the tourists. This means that the tourism employees are more inclined to accept the establishment of wind turbines close to inland water bodies of the province. There is also a similar difference for residential area boundaries. Forests also have different medians for each respondent group. Tourism employees rate the forests' acceptability higher (2.00) for wind turbine establishments than tourists do (1.00). However, it is still at lower acceptability levels. Other most unacceptable land use classes are the same for each group.



	Olive Groves	Natural S. & C.	Historical Cultural S. & C.	Agricultural Areas	Forests	Residential Boundaries	Water Bodies	Offshore	Degraded G. & Macquis	Non-Protected Lands
Median	1	1	1	1	2	3	3	5	5	5

Figure 40: Tourism employee results of Question 14: Please rate your preference for having wind energy systems on each type of land use on a scale from 1 (should not be built) to 5 (could be built).



	Historical Cultural S. & C.	Olive Groves	Natural S. & C.	Agricultural Areas	Forests	Water Bodies	Residential Boundaries	Offshore	Degraded G. & Macquis	Non-Protected Lands
Median	1	1	1	1	1	2	2	3	3	5

Figure 41: Tourist results of Question 14: Please rate your preference for having wind energy systems on each type of land use on a scale from 1 (should not be built) to 5 (could be built).

Results for the 14th question provide important inputs for the site selection analysis of the study. Survey results reveal the respondents' choices for wind power establishments in different types of land use classes. These acceptability ratings are used to visualize how their choices govern site selection of wind farms at Muğla Province. Because of the geographic focus of the thesis, the main objective of this visualization is to show respondents' preference for the location of the wind turbines on the visible areas from the sea. Steps to obtain visible areas on the land from the sea is given in Figure 42. Visualization of the results performed through ESRI ArcMap, an extensive GIS software. All used tools are provided by the software. In Figure 42, the tools used for conducting the related step are given in box with the dashed-boundary.

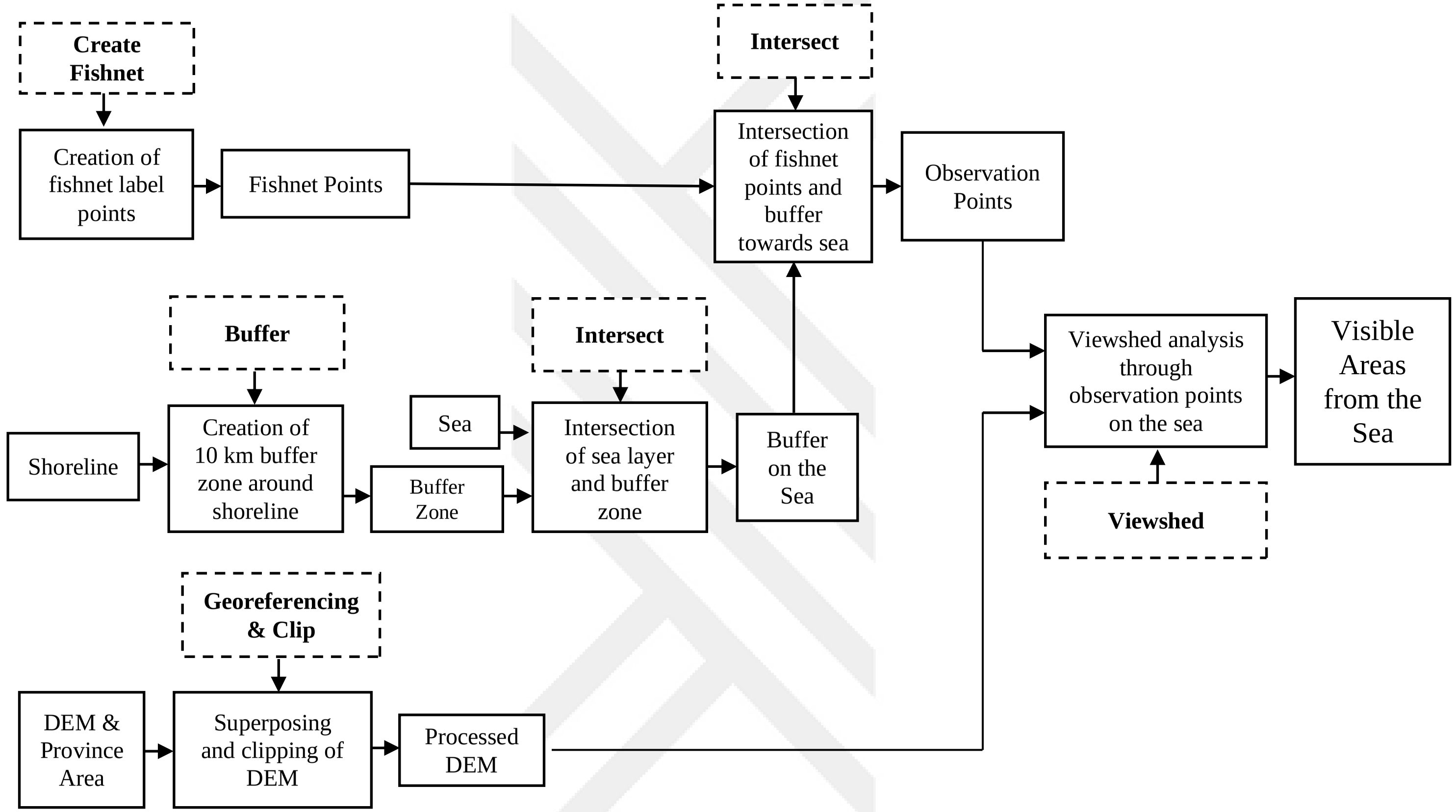


Figure 42: Flowchart of obtaining the visible areas from the sea

After obtaining the spatial data, the first step was preprocessing of the data. Because custom spatial reference of the DEM obtained from Copernicus website was discordant with the projection of all polygon and point data, a superposing was performed via Georeferencing tool of the software. After this step, the DEM was clipped through province area polygon by using Clip tool to get rid of unnecessary data and to prevent unwanted long processing times (see Figure 43). Surrounding lands and islands were excluded in this way.

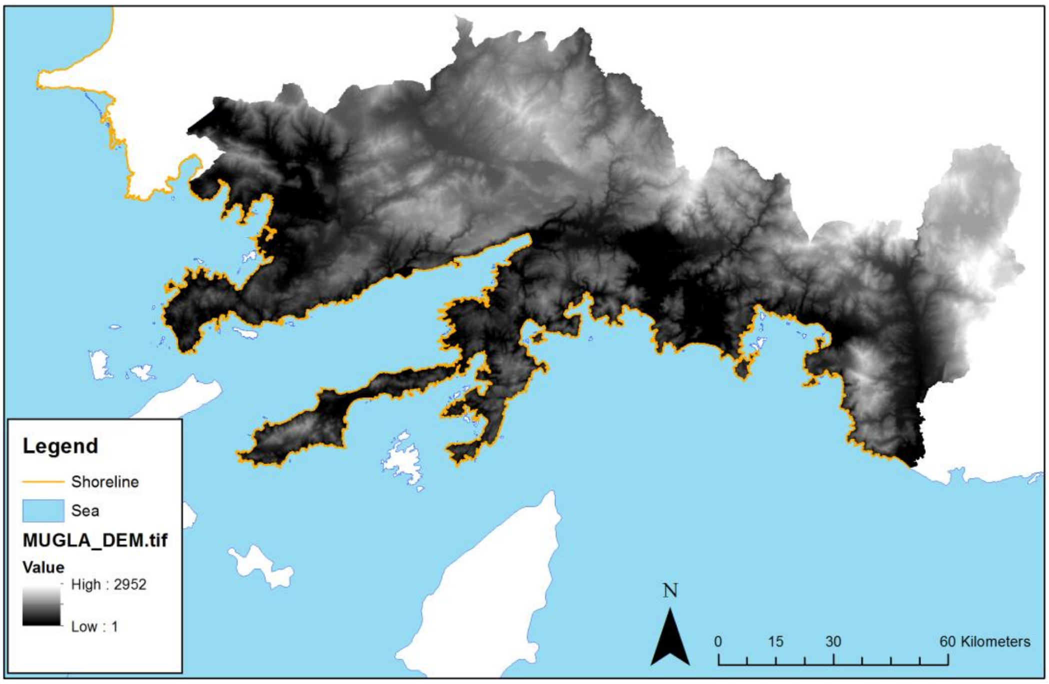


Figure 43: Digital Elevation Model of Muğla Province

To obtain the visible areas from the sea, the author required two inputs: raster of the study area, which is DEM, and observation point(s). Hence, over the sea and the land, points at 100-meter intervals were created using the Create Fishnet tool. Create Fishnet tool enables the user to create rectangular cells and label points (which represent possible observation/station/vista points) at the center of these cells in defined dimensions. An example can be seen in Figure 44.

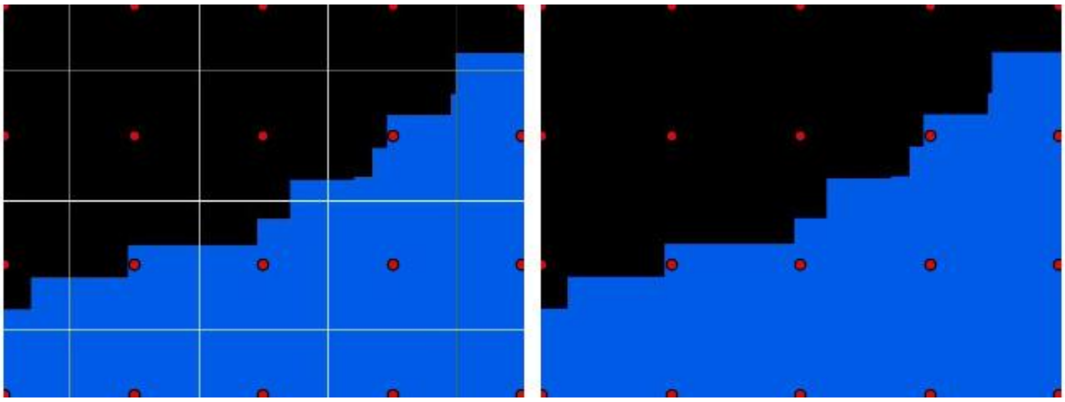


Figure 44: Label points with fishnet cells (on the left) and without fishnet cells (on the right)

To obtain the observation points on the sea, the following sub-steps were carried out: First, a buffer zone was created from the shoreline of the province, with the Buffer tool. 10000 m. was chosen as the maximum distance from the sea because Katsaprakakis (2012) states that a 50 meters long wind turbine is visible at 20000 m. but highly absorbed by landscape at 5000 m. based on weather and landscape conditions. Assuming the tower length of the turbines is 100 m., the maximum distance of viewpoint is doubled in this study (see Figure 45). Second, the buffer zone was intersected with the sea layer to get 10 km. wide zone for the observation points on the sea (see Figure 46). Later, the zone on the sea and fishnet label points were intersected to obtain desired observation points (see Figure 47). Each point on the sea represented the location of a possible observer person (vista point).

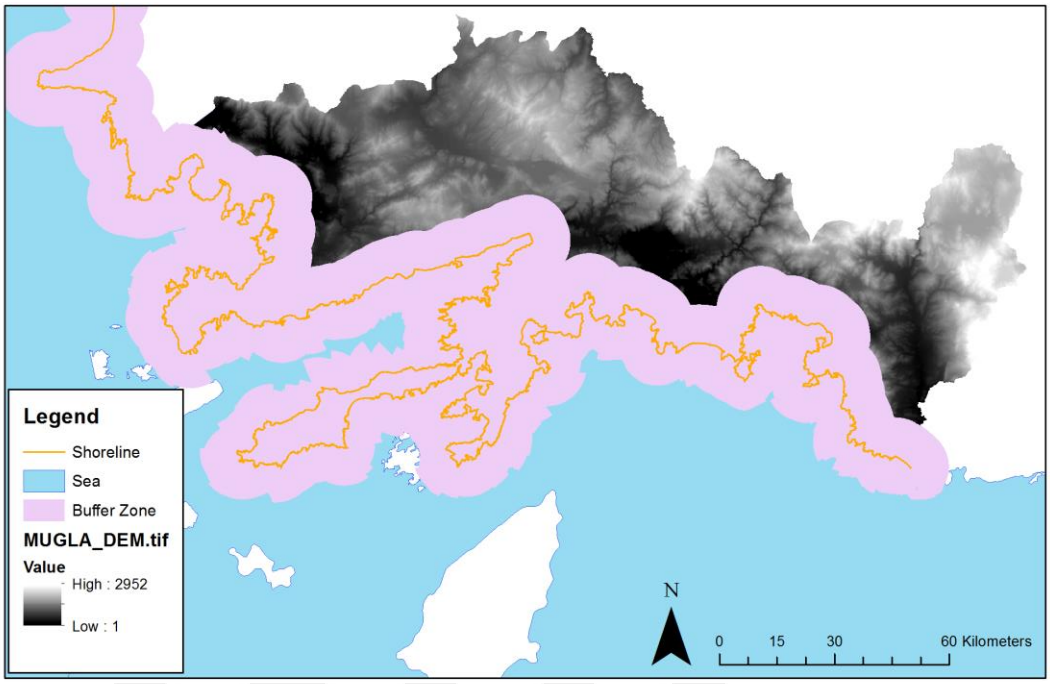


Figure 45: The buffer zone around shoreline

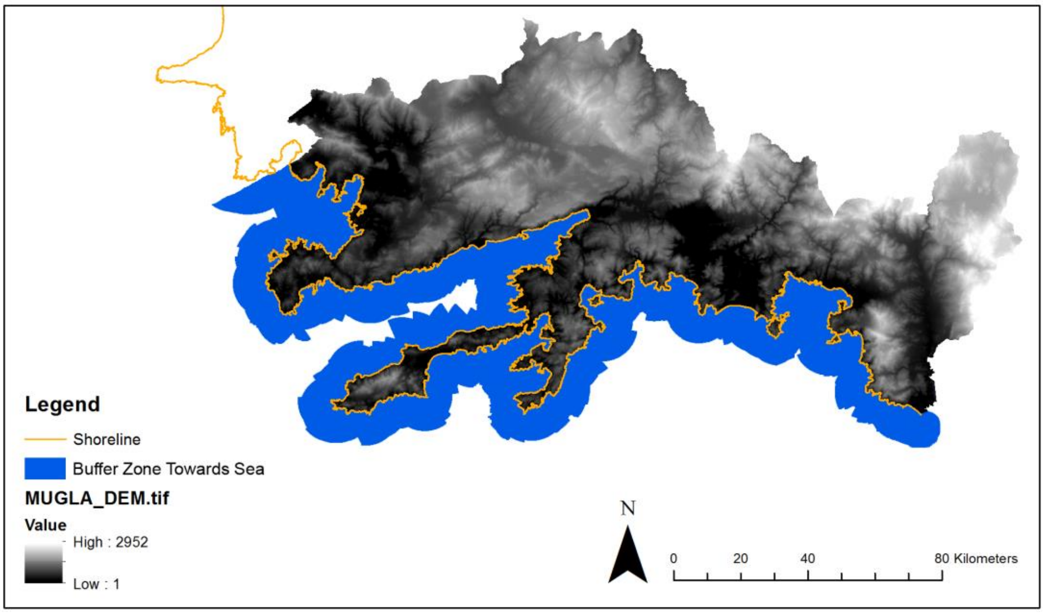


Figure 46: 10 km wide buffer zone towards sea

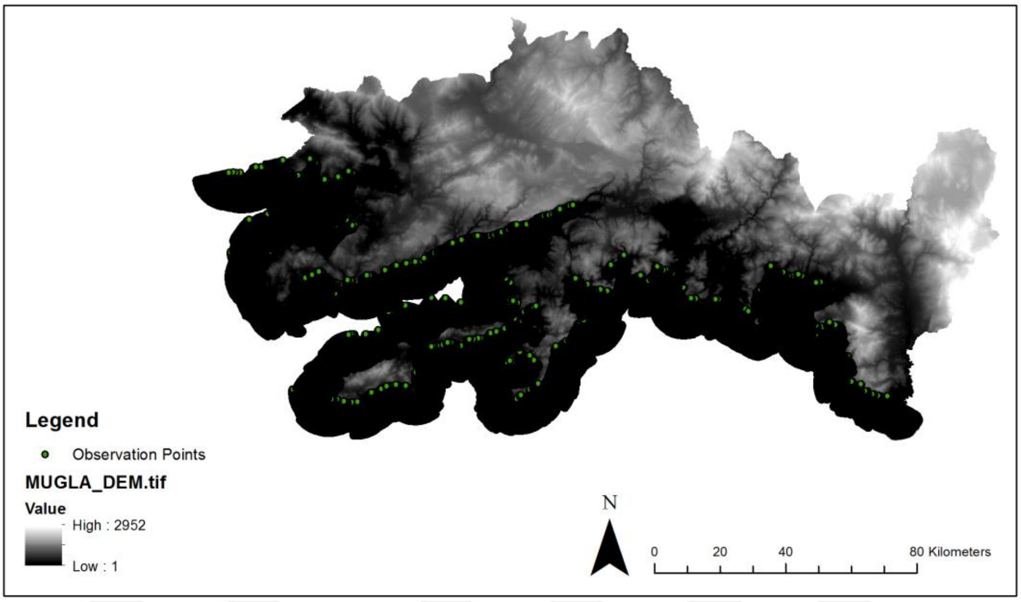


Figure 47: DEM of the province and observation points within 10 km

Visible areas from the sea were computed by using Viewshed tool (see Figure 48). For this purpose, the DEM and viewpoints were used. Also the visible areas are verified by example images taken from Google Earth (see Figure 49, 50, 51 and 52) (as it was stated before, a 50 meters long wind turbine is visible at 20000 m. but highly absorbed by landscape at 5000 m. Assuming the tower length of the turbines is 100 m, the maximum distance of viewpoint is doubled in this study.). Outputs of this analysis were projected on a raster composed of visible and non-visible area grids. Each point on the map represents the location of a possible wind turbine. It was calculated that 2639 km^2 of surface area, covering approximately 20% of all province, is visible from the sea. For the further steps, raster visible areas map has to be converted to a polygon. The conversion was executed by Raster to Polygon tool.

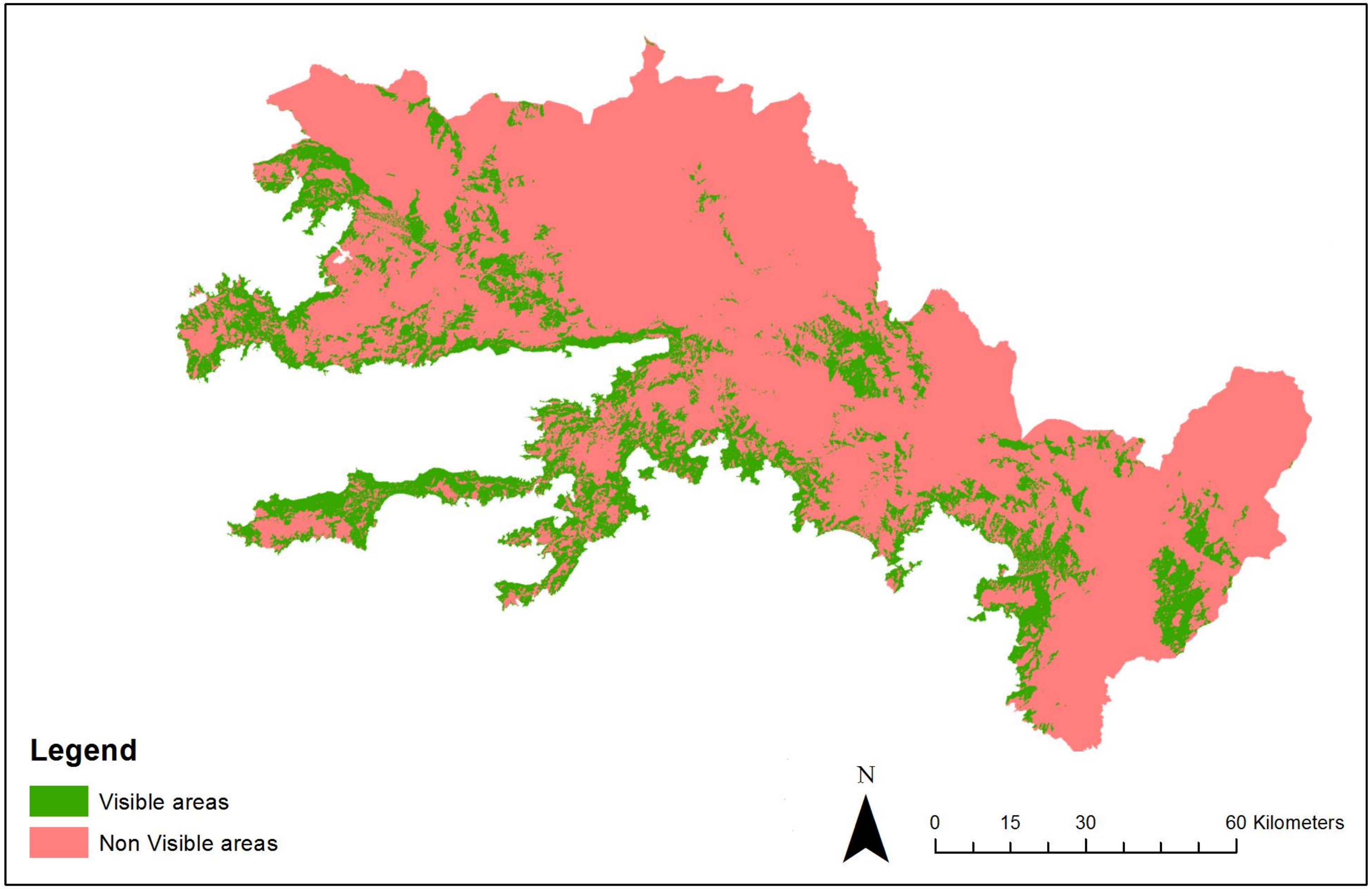


Figure 48: Visible areas and non visible areas from the sea

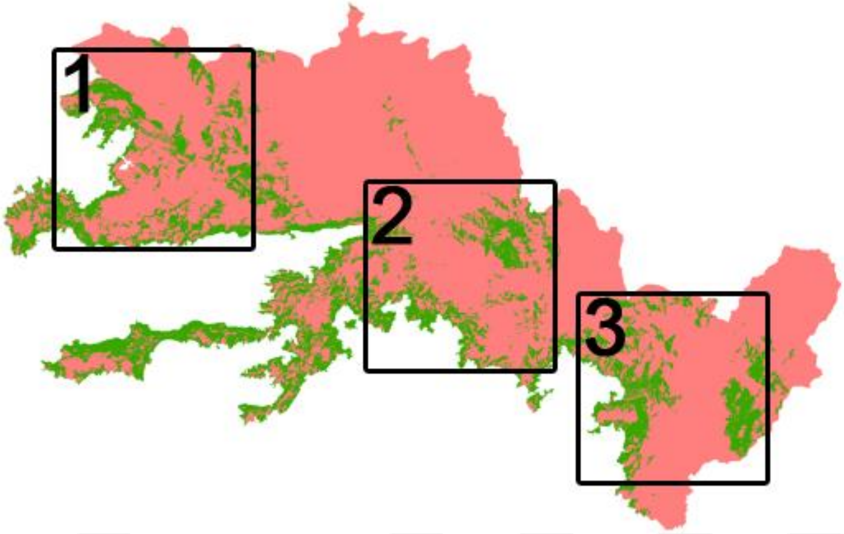


Figure 49: Chosen areas for example 3D images

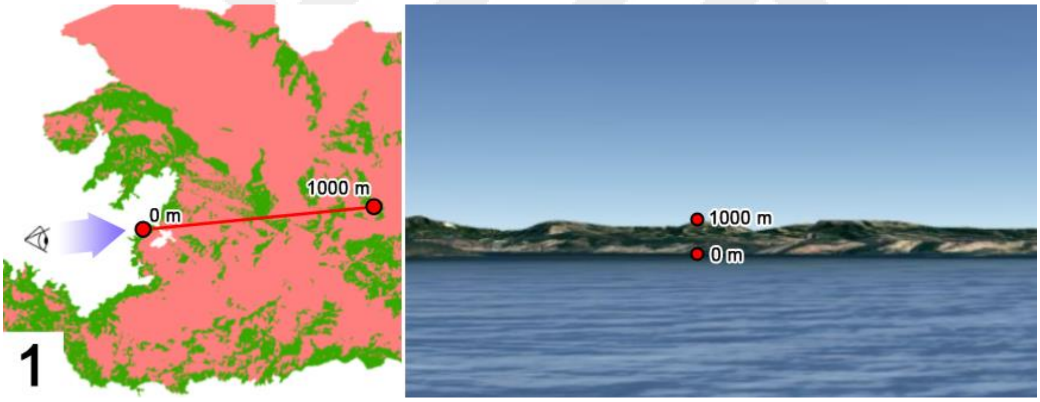


Figure 50: A 3D image of Area 1

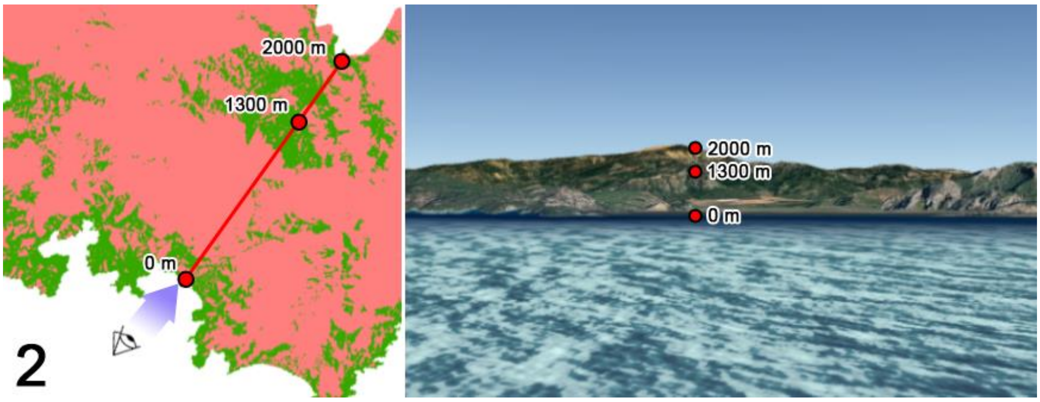


Figure 51: A 3D image of Area 2

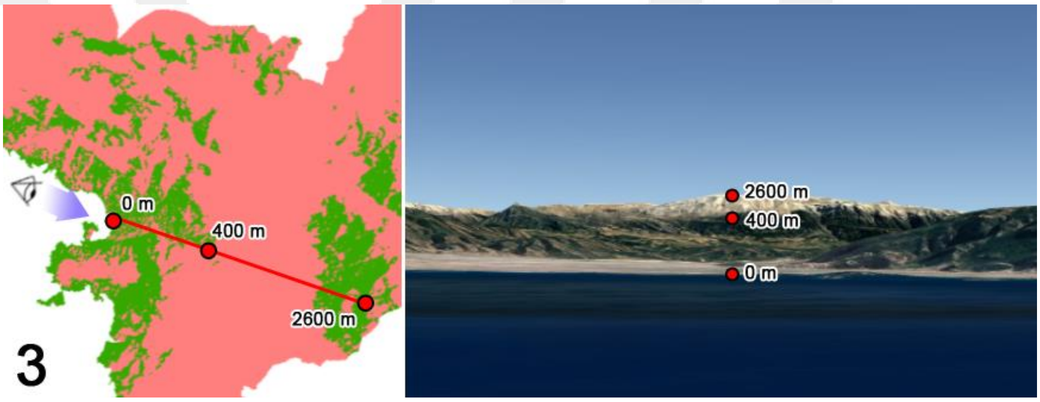


Figure 52: A 3D image of Area 3

Later, all land use class polygons were cropped one by one with Clip tool to obtain new feature classes which represent the corresponding land use on the visible land (see Figure 53). Table 10 lists approximate surface areas for different land use classes that are on visible lands. It should be noted that only lakes, ponds and dam reservoirs were taken into account for representing the water bodies. Also, natural sites, archeological sites, historical sites, cultural sites, and specially protected environmental areas cover some other land use classes so they are not counted while computing the total surface area. Line features like rivers are not proper for producing polygon results which represent an area rather than a linear network. To create polygons surrounding them, buffer zones would be useful. However, creating buffer zones just for one feature would be meaningless as long as setback distances are not taken into account. Similarly, the sea is also excluded from this process. Lastly, the final maps were prepared for median values.

Table 10: Surface areas of different land use classes on visible land

Land Use Class	Area in km^2	Area in percentage
Forests	529.54	20.07%
Degraded lands and Macquis groves	1295.49	49.09%
Vacancy areas	113.63	4.31%
Residential areas	317.13	12.02%
Olive groves	191.10	7.24%
Agricultural areas	188.43	7.14%
Water bodies	3.68	0.14%
Natural Sites	1543.87	58.50%
Specially Protected Environment Areas	936.10	35.47%
Hist., Cult., Arch. Sites	0.36	0.01%
Total	2639	100%

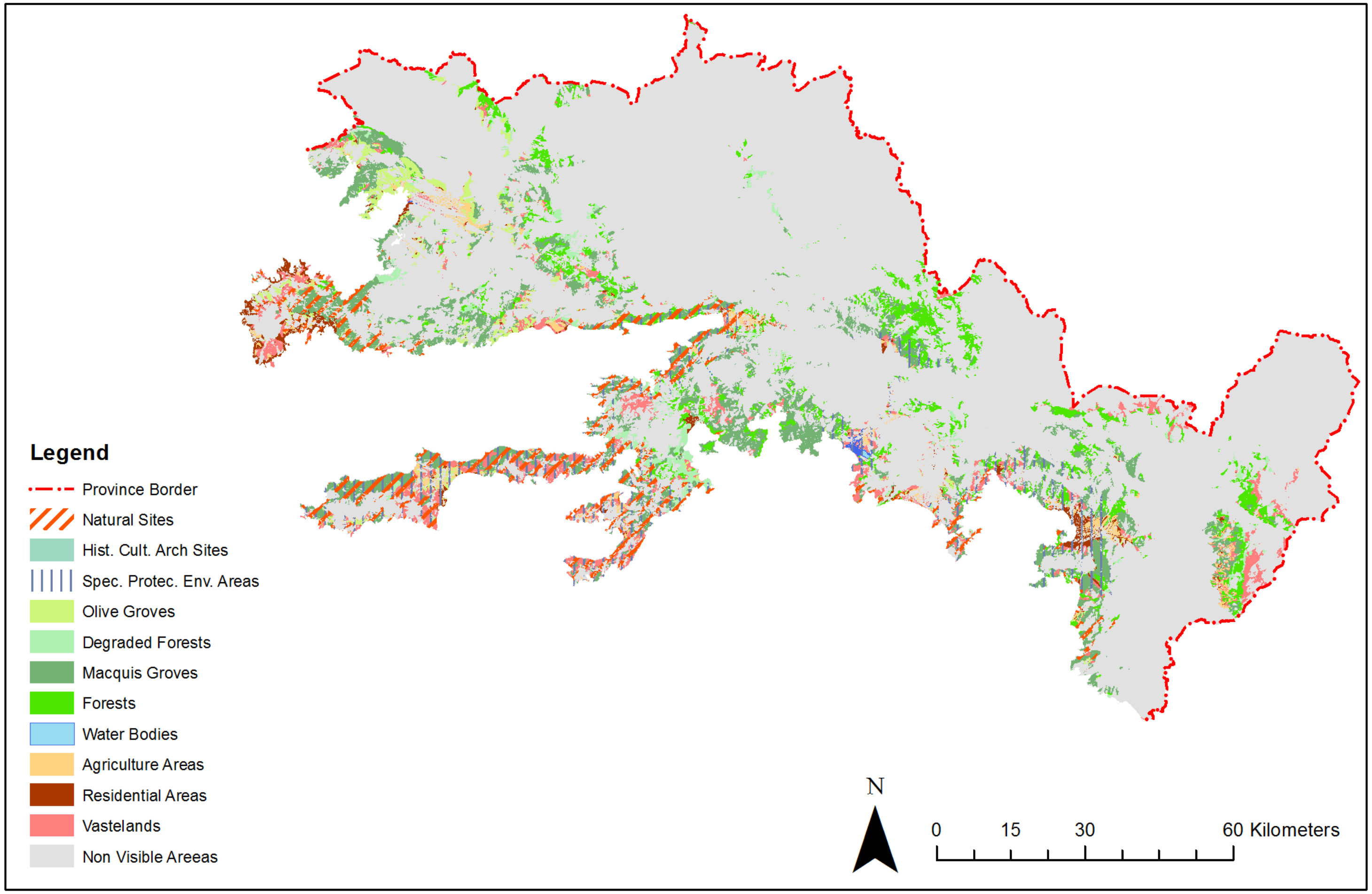


Figure 53: Land use classes on the visible land map

The aim of the final analysis was to assess respondents' preferences for wind turbine locations along the coast of Muğla. The final maps were generated regarding median values of the answers. The acceptability results were overlapped on the land use map of the visible lands (see Figure 55) and wind capacity factor map of the province (see Figure 56). To be able to show all acceptability results, the results were symbolized by the hatching method. A region can be both forest and natural site thus it may have two different acceptability ranking. For example, the southern parts of Fethiye (see the circled area in Figure 54) are both macquis groves and specially protected environmental area. Overall survey results (see Figure 39) show that acceptability for macquis groves is 3.50 (symbolized by vertical black lines in the maps) and specially protected environmental area is 1.00 (symbolized by horizontal black lines in the maps). Thus, the circled area has both vertical and horizontal lines.

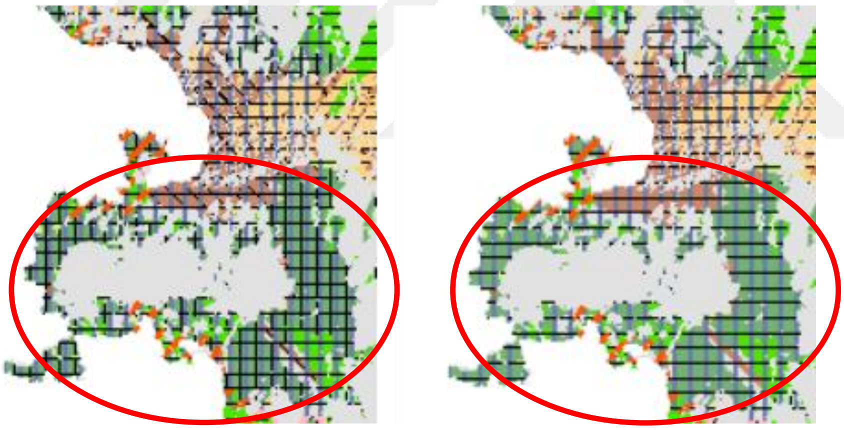


Figure 54: The difference between showing all results (on the left) and showing the lowest acceptable results only (on the right) for the shores of Fethiye.

Overall site selection results show that olive groves, historical and cultural sites, archeological sites, natural sites, specially protected environmental areas, agricultural areas and forests are considered as totally unacceptable lands for wind farm developments. In the maps of the visible areas from the sea, these areas are mostly gathered at certain segments of shores of Milas district, almost half of Bodrum peninsula, shores around Gulf of Gökova and Menteşe districts, northern shores of Marmaris district, almost all Datça peninsula, certain segments of the shore of Köyceğiz district, and almost whole shore line of Dalaman and Fethiye districts. Figure 55 shows a map of these overall site selection results and Table 11 shows the overall preferences for the location of wind farm developments. In further tables such as Table 11, the areas covered by natural sites, archeological sites, historical sites, cultural sites, and specially protected environmental areas are counted as part of these land use classes while computing the total surface area. Hence, surface area values are different than those values of Table 10. As can be seen in Figure 55, most parts of the shoreline are not acceptable for wind energy system developments. Especially, areas along Bodrum Peninsula, Gulf of Gökova, Datça Peninsula, Gulf of Göcek and Gulf of Fethiye are natural sites and/or specially protected environmental areas, and the respondents do not want the wind turbines on these sensitive areas. That means, almost all touristic destinations at the shores of Muğla Province are evaluated to be unacceptable lands. However, these unaccepted lands have high wind energy capacity factors. Especially, northwestern parts of the province are favorites for the ongoing wind farm investments. 8 out of 9 wind farms are located at these areas such as Bodrum, Milas and Datça. The site selection of the current wind farms is problematic because they are constructed on or very close to the unaccepted lands such as natural sites and specially protected environmental areas (see Figure 56).

Northern parts of Milas district, eastern shores of Marmaris district, shores of Köyceğiz and very small part of shores above Mount Akdağ are few of the areas where acceptability for wind farm development is displayed to be at moderate levels. Only, some parts of northern and southern shores of Milas district, southwestern shores of Bodrum peninsula, some areas close to the center and shores of Marmaris district, shores of Köyceğiz to some extent and eastern areas of Mount Akdağ are acceptable for wind energy system developments (in the map, the most acceptable land use classes for wind farm systems are shown with black diagonal lines, 45 degrees inclination - from bottom left to top right). However, the wind energy potential at the eastern parts of the province is not high. Enlarged versions of all site selection maps are represented in the Appendix D.

Table 11: Overall preferences for the location of wind farm developments along the coast of Muğla and the characteristics (types and size) of these sites

Median Value	Land Use Class	Area in km^2	Area in percentage	Total areas in percentage
1.00	Forests	406.95	15.42%	65.51%
	Natural Sites & Specially Protected Environment Areas	1103.68	41.82%	
	Hist., Cult., Arch. Sites	0.36	0.01%	
	Water bodies	3.74	0.14%	
	Olive groves	144.25	5.47%	
	Agricultural areas	69.62	2.64%	
2.00	Residential areas	61.33	2.32%	2.32%
3.50	Degraded lands and Macquis groves	649.25	24.60%	24.60%
5.00	Vacancy areas	199.83	7.57%	7.57%
	Total	**2639**	**100%**	**100%**

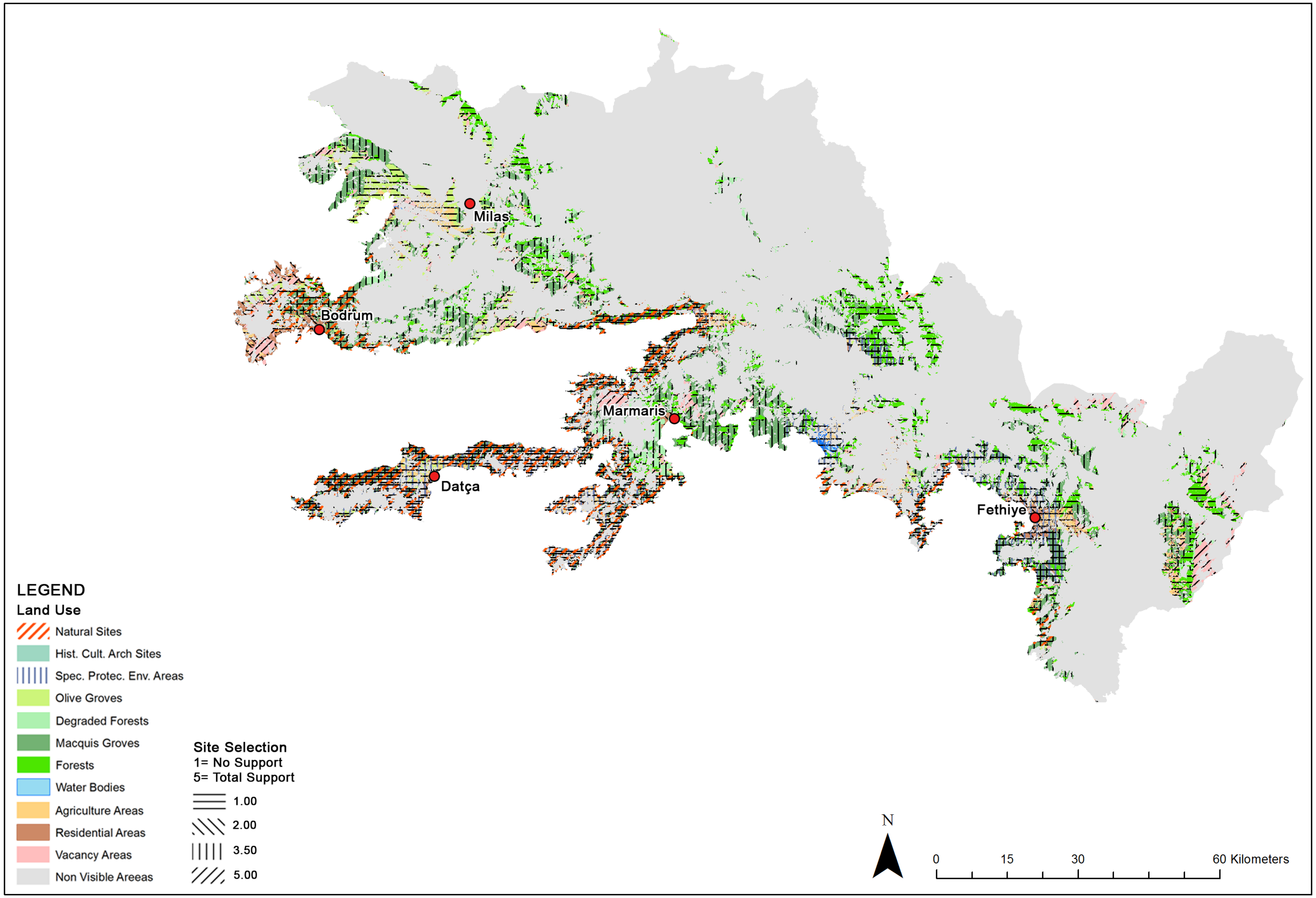


Figure 55: Overall site selection map

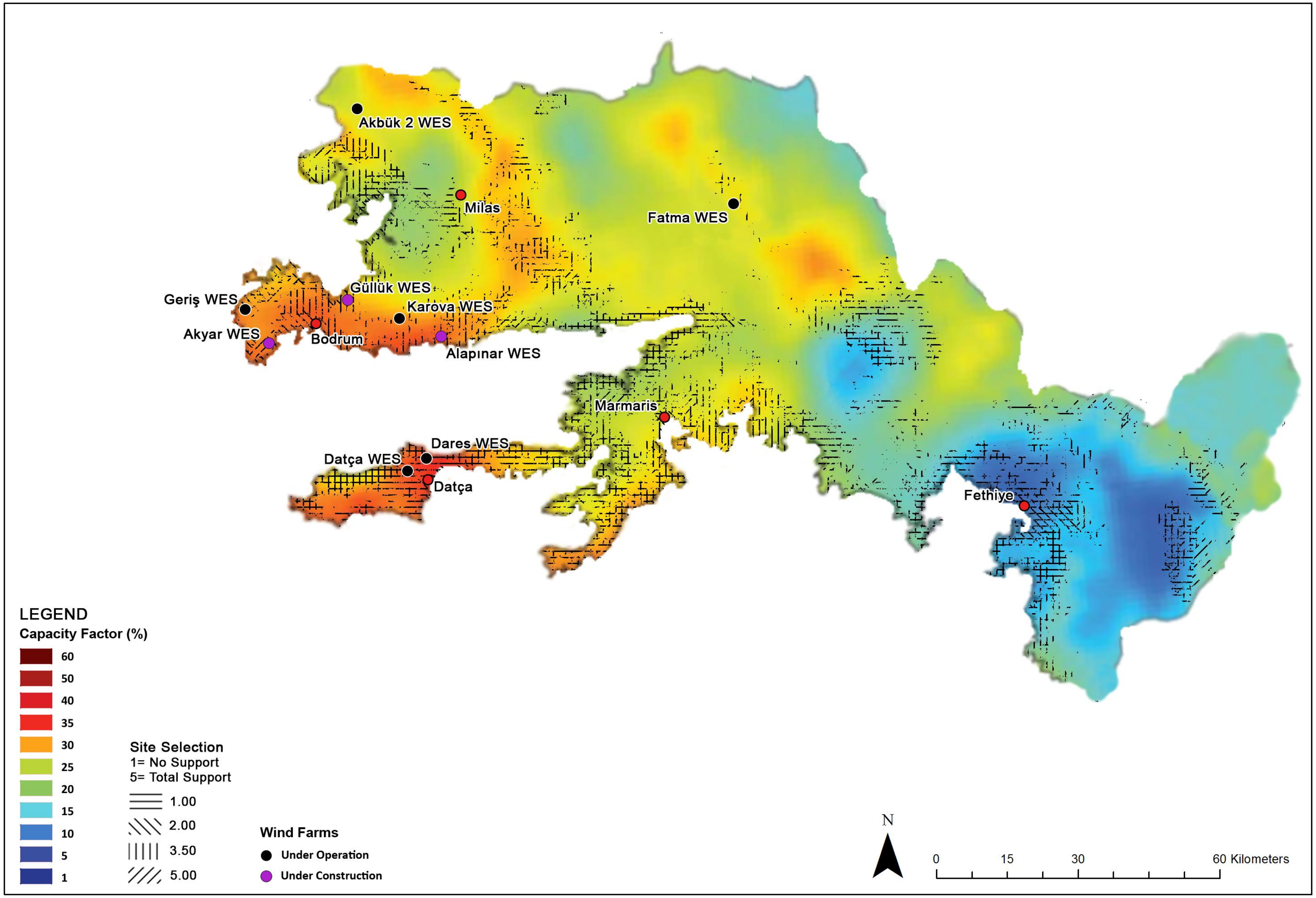


Figure 56: Overall site selection map with the wind energy capacity factor

The responses of tourism employees and tourists are different than each other. The site selection results show that the tourism employees are generally more tolerant to wind farm establishments on specific areas (see Table 12 and Figure 57). According to the tourism employees' site selection maps, degraded green lands and macquis groves are very acceptable for wind farm developments. Also, offshore wind turbines are favorites of the tourism employees group. The forests are slightly acceptable according to them. Additionally, they accept water bodies or residential areas as wind farm establishment areas, at moderate levels. On the other hand, they show almost no support for wind farms on natural sites, specially protected environmental areas, historical and cultural sites, archeological sites, and agricultural areas. Some western and southern shores of Milas, almost all southern shores of Marmaris, the two peninsulas between Marmaris and Köyceğiz are all acceptable for wind farm establishments, according the tourism employees' responds.

Table 12: Tourism employees' preferences for the location of wind farm developments along the coast of Muğla and the characteristics (types and size) of these sites

Median Value	Land Use Class	Area in km^2	Area in percentage	Total areas in percentage
1.00	Olive groves	144.25	5.47%	49.94%
	Natural Sites & Specially Protected Environment Areas	1103.68	41.82%	
	Hist., Cult., Arch. Sites	0.36	0.01%	
	Agricultural areas	69.62	2.64%	
2.00	Forests	406.95	15.42%	15.42%
3.00	Water bodies	3.74	0.14%	2.46%
	Residential areas	61.33	2.32%	
5.00	Degraded lands and Macquis groves	649.25	24.60%	32.17%
	Vacancy areas	199.83	7.57%	
	Total	**2639**	**100%**	**100%**

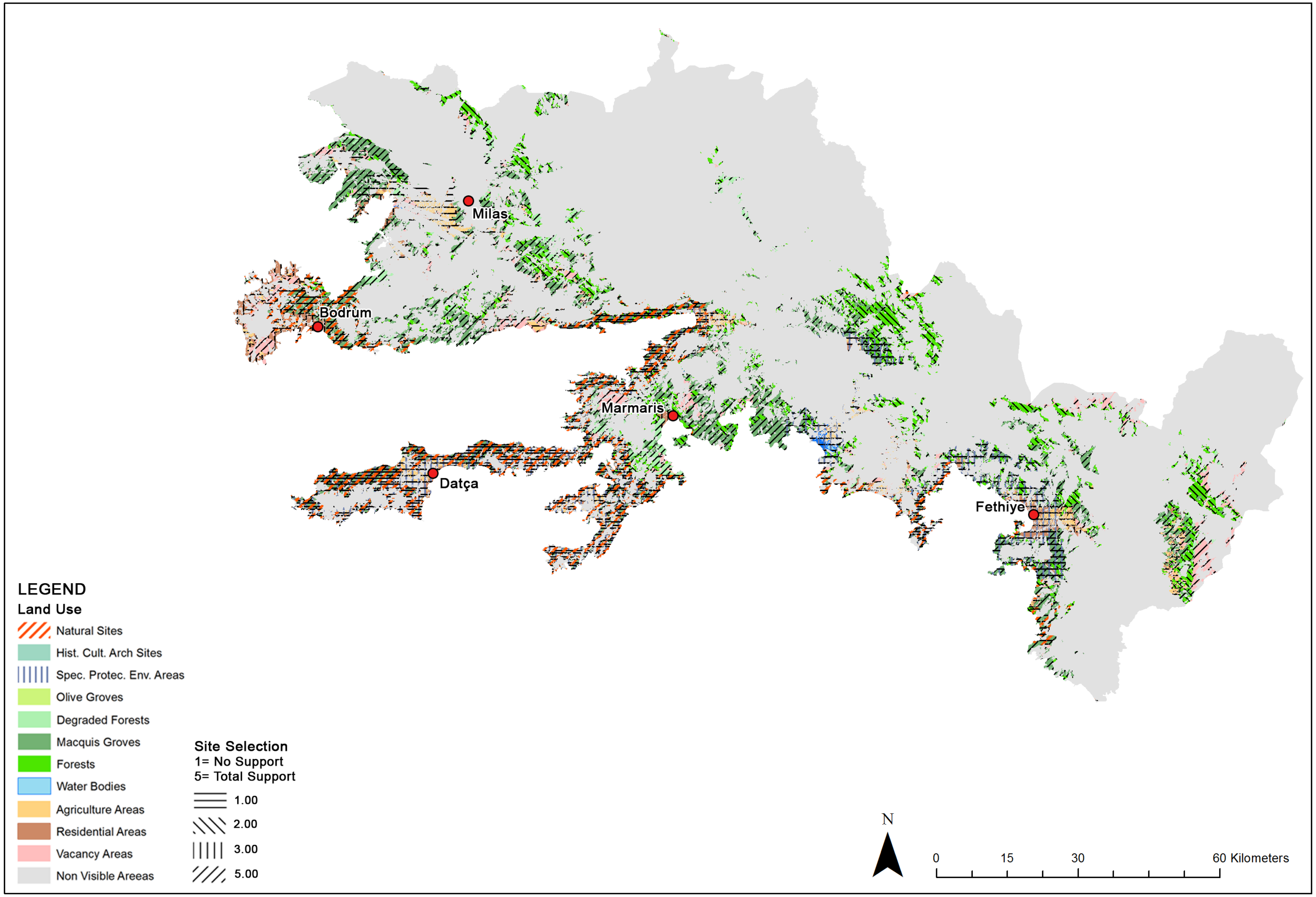


Figure 57: Tourism employees' site selection map

Both respondent groups meet on the common ground in the case of vacancy areas are the most acceptable lands for wind energy system developments. It can be said that the only acceptable areas are vacancy areas for the tourists; even degraded green lands and macquis groves are acceptable at only moderate levels (see Table 13 and Figure 58). On the other hand, the tourists' perspective is more cautious to the developments in forest areas, degraded green lands and macquis groves compared to that of tourism employees. The site selection results of the tourists group points out similar locations with the overall site selection results. Hence, southwestern shores of Bodrum peninsula, northern and southern shores of Milas, some inner areas of Marmaris district, partly shores of Köyceğiz and eastern areas of Mount Akdağ are acceptable for wind energy system developments, according to the answers of this respondent group.

Table 13: Tourists' preferences for the location of wind farm developments along the coast of Muğla and the characteristics (types and size) of these sites

Median Value	Land Use Class	Area in km^2	Area in percentage	Total areas in percentage
1.00	Forests	406.95	15.42%	65.04%
	Natural Sites & Specially Protected Environment Areas	1103.68	41.82%	
	Hist., Cult., Arch. Sites	0.36	0.01%	
	Agricultural areas	61.33	2.32%	
	Olive groves	144.25	5.47%	
2.00	Water bodies	69.62	2.64%	2.78%
	Residential areas	3.74	0.14%	
3.00	Degraded lands and Macquis groves	649.25	24.60%	24.60%
5.00	Vacancy areas	199.83	7.57%	7.57%
	Total	**2639**	**100%**	**100%**

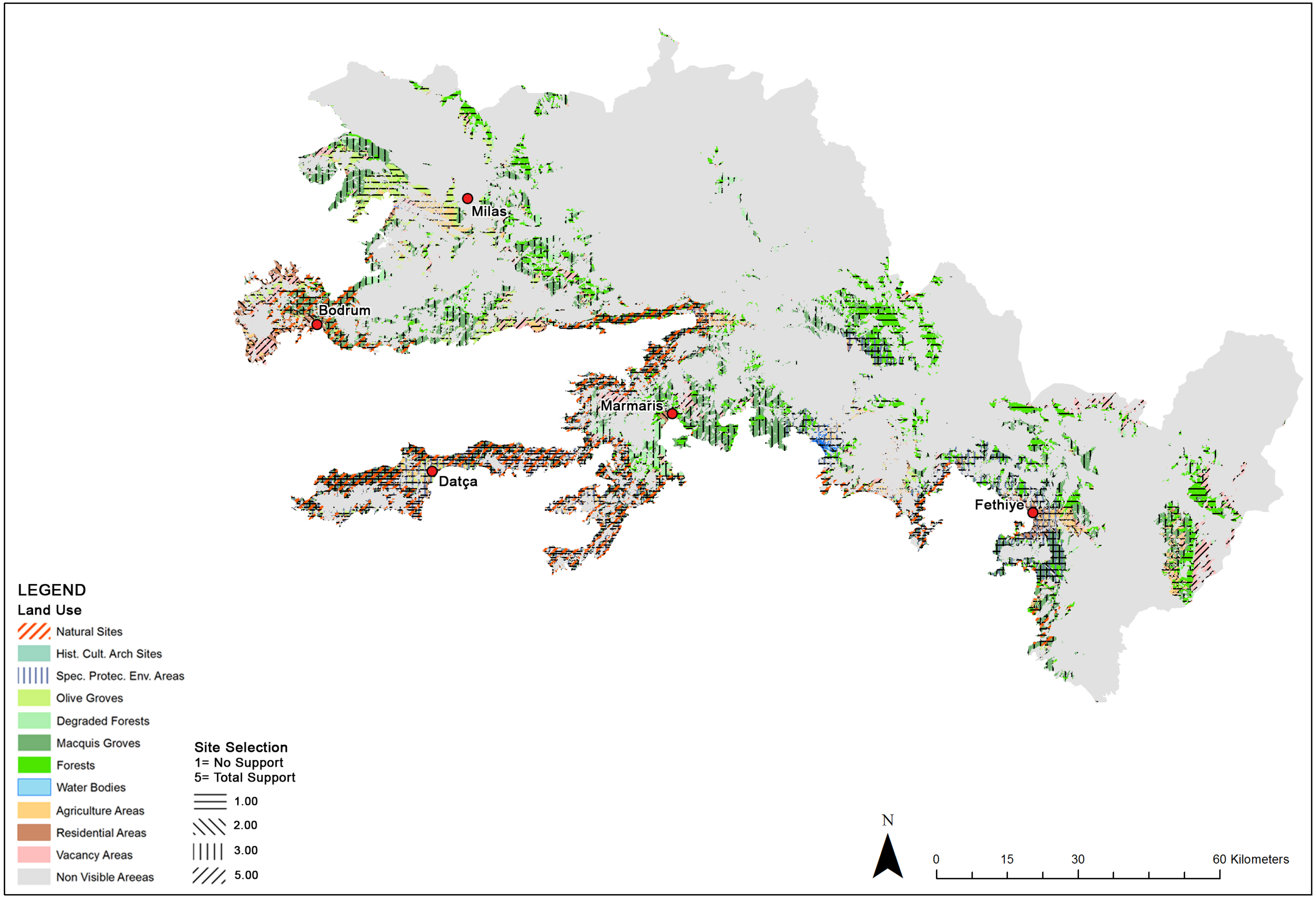


Figure 58: Tourists' site selection map

CHAPTER 6

CONCLUSIONS AND DISCUSSION

Today, environmental problems associated with conventional energy systems are well known and accepted. GHG emissions of these systems are polluting the environment and giving rise to global warming. Also, they are consuming the resources which are finite and expected to finish in the future. These implications show that they are not suitable for a sustainable development. Hence, many countries have started to develop policies regarding implementation of sustainable and renewable energy. Environmental concerns, energy needs, and international agreements led to widespread establishment of renewable energy systems rapidly. Wind energy systems have become one of the most favored among RES because of its environmentally friendly and cost-effective features. However, even these systems have disadvantages. The rapid growth of wind energy developments comes with environmental, social and economic trade-offs. Post-haste site selection efforts may amplify negative environmental impacts. Top-down planning practices may create conflicts. Inadequate preliminary analyses may lead to more loses than gains. To prevent such undesirable scenarios, opinions of all the stakeholders must be evaluated and comprehensive studies regarding environment, economy, and society must be conducted. Unfortunately, Turkey lacks such studies both in academia and in practice. Therefore, this study aims to contribute towards participatory planning processes in wind energy systems' development through the collection and evaluation of two stakeholder groups, namely tourists and tourism employees, opinions on wind farms, their impacts and site selection preferences.

Most parts of Turkey with high wind energy potential already have ongoing wind energy projects and developments. Muğla with its high wind energy potential is among these locations where new wind energy projects are rushed without proper economic and environmental evaluation, and stakeholder opinions are also excluded. Muğla has a strong and popular tourism sector owing to the beautiful and unique environmental features of the area. Its popular tourism destinations attract more than one million foreign and domestic tourists every year (TurkStat, 2018b) and create numerous jobs, which contribute to the provinces local economy. Any big-scale development without proper socio-economic and environmental evaluation can lead to irreversible negative outcomes. Thus, possible side effects of the wind turbines have to be taken into consideration during the planning stages. The objective of this study is to examine impacts of wind turbines on coastal tourism areas through a survey research and GIS-based analysis. It is expected to reveal how two different groups, namely tourists and tourism employees, view wind farms from multiple aspects. Research questions of the study focuses on finding and evaluating the opinions of the respondents regarding the presence of turbines, their negative effects, and their locations. At the same time, the way the choices of the respondents are affected by their age, education level and income is analyzed as well. The main difference of the current study from recent wind farm impact studies provided in the literature is that it is the first Turkish study aiming to evaluate wind farms from the viewpoints of tourists and tourism employees.

This thesis revealed that most of the respondents' outlook (78%) is positive towards wind farms while negative views are only 6%. This shows that not just authorities or decision makers but also tourists and tourism employees in Muğla think that wind energy systems are beneficial. Wind energy is evaluated as a solid alternative to fossil fuels at the highest level among the respondents (i.e. on a 5-point Likert scale, the median of the results for the importance of renewables in comparison to fossil fuels was 5.00 which is the highest rating), without a major variation with respect to age, education level or income group. This result is in accordance with the previous studies where majority of the respondents expressed their positivity for wind energy systems (e.g., MORI Scotland, 2002; University of West England, 2004; Ladenburg, 2010; Lilley et al., 2010; Frantál & Kunc, 2011; Westerberg et al., 2013; Braunova, 2014).

Another finding of this study was that deforestation and replacing agricultural land were identified as the most significant negative impacts of wind turbines according to all respondents. The respondents were cautious about establishment of wind turbines since they may harm the green lands, fertile soils, or olive groves. Even though the wind farms are known as environment-friendly energy systems, they are still seen as a threat to natural features. These two effects seem highly related to the third negative effect identified by the respondents, which is ecosystem threat. Additionally, the flicker effect comes after the noise in the overall results. Changing microclimate follows these two.

Visual effects of wind turbines (their aesthetics and acceptability on various scenes) were discussed by many scholars (MORI Scotland, 2002; Devine-Wright, 2005; Bishop & Miller, 2007; Wolsink, 2007, Riddington et al., 2008; Fáilte Ireland, 2008; Frantál & Kunc, 2011; Molnarova et al., 2012; Karydis, 2013; Braunova, 2014; Mason & Milbourne, 2014). However, in this study, among all the pre-defined possible negative effects of wind turbines, their visual impact is chosen as the least important negative effect. The respondents does not seem to pay too much attention to visual impact. The reason may be the difficulty of imagining a 100-meter tall structure with whirling blades replacing green areas or causing noise and vibration.

Another aim of this study was to find out which land use classes are more (or less) acceptable for wind farm developments from tourists and tourism employees' point of view. This is done by showing pictures that are manipulated digitally by placing wind turbines on different land use classes such as degraded green lands, macquis groves, forests; and asking tourists and tourism employees to rank their support or acceptability for these scenarios. Firstly, it was observed that, generally, people do not want to see wind farms at shores of Muğla. Especially people from 18-30 and 51-60 age groups, or who received higher education, or who are in the income interval from 1-1999 TL are cautious about seeing wind farms at the coasts of Muğla. This is an interesting result that, in a way, conflicts with the high positive attitude of the respondents towards wind farms in general. Specifically, the difference between the willingness levels of the tourism employees and tourists are also remarkable. It clearly shows that compared to the tourists, the tourism workers are more willing to see the wind turbines at the shores of Muğla. That result is definitely related with giving medium level of importance at most to any negative effect. The reason for this may be the fact that they consider the local benefits of wind energy systems in terms of cheaper energy, while the tourists are more concerned about the potential negative impacts on the nature. The tourists might be concerned about wind farms deteriorating the beauty and cultural richness of the province. Hence, they are not fully embracing the idea of wind turbines at the shores of the province.

In terms of the density of wind turbines, respondents stated that they prefer wind farms to be planned in medium densities (i.e. not too close to each other). This is an indicator of the fact that tourist and tourism employees are willing to accept wind farms if they are placed at acceptable locations with medium densities. These results are consistent with those of previous studies where turbines are identified as threats to human health (e.g., Fáilte Ireland, 2008) and ecology (e.g., Saidur et al., 2011; van Haaren & Fthenakis, 2011; Dai et al., 2015).

Survey respondents associated their willingness to see wind farms in specific densities primarily to ecologic reasons. Economic reasons are identified as the second most important reason for medium density preferring. Big wind farms would affect tourism sector implicitly by its negative impacts and, therefore, subsequently damage the economy of the province. Health issues are the third reason and that may imply the side effects of the turbines such as noise and flicker effect. Visual aesthetic is not given considerable importance again compared to other factors. Security is the least important reason according to the results. It seems the respondents would not feel uncomfortable with the besetting presence of the turbines. Rating distributions for the reasons is consistent with almost all sub-groups based on age, education level, and income levels.

According to the site selection acceptability results, areas with no protection obligation are the most acceptable land use class for the wind energy system developments. Water bodies, forests and agricultural areas are following the residential areas respectively with the lowest acceptability levels. Same with these classes, acceptability ratings of olive groves, natural sites and conservation areas and another type of sites including historical, cultural and archeological, are at the bottom of the list of site selection acceptability. These results show that like the previous studies have found (e.g., NFO WorldGroup, 2003; Riddington et al., 2008; Westerberg et al., 2013), both tourists and tourism employees care about the protection of environmental values and coasts. Furthermore, tourists and tourism employees mentioned that they prefer offshore wind farms to onshore farms, probably because of the negative effects of the turbines such as noise or flicker effect.

These unaccepted land use classes are mostly gathered at certain segments of shores of Milas district, almost half of Bodrum peninsula, shores around Gulf of Gökova and Menteşe districts, northern shores of Marmaris district, almost all Datça peninsula, certain segments of the shore of Köyceğiz district, and almost whole shore line of Dalaman and Fethiye districts (see Figure 55). Hence, it seems that most parts of the shoreline are not acceptable for wind energy system developments. The site selection results of the tourists group also point out similar locations with the overall site selection results (see Figure 58). However, the responses of tourism employees are different from the tourists' responses. According to them, some western and southern shores of Milas, almost all southern shores of Marmaris, the two peninsulas between Marmaris and Köyceğiz are all acceptable for wind farm establishments because these areas are mostly covered by macquies groves (see Figure 57).

Findings of the current study are parallel to those provided in the literature in terms of positive attitude towards wind farms, support for this renewable energy source, and the opinions' independence from social profiles of the respondents. People are willing to see the turbines at the shores as long as they are established at the right locations. Final remarks are listed below:

- Tourists and tourism employees rank negative impacts of wind turbines slightly differently but deforestation and replacing agricultural areas are generally identified as the most critical negative impacts. Visual effects are ranked as the least important one according to both groups.

- Whether tourist or tourism employee, the respondents become more cautious about the establishment of wind turbines as their level of education increases. Awareness of people towards the negative effects of these systems increases in parallel with education levels. There is no significant relation with age or income.

- In terms of site selection, the tourists strongly reject untouched natural, historical, cultural, archeological sites and conservation zones of the province for wind farm establishments. The tourism employees are also concerned about the environment but they are slightly more tolerant to wind turbines, most probably due to economical motivation.

Combination of three maps (visible areas from the sea, land use and site selection results) made the author able to visualize these site selection results with land use classes on the visible lands. Thus, GIS definitely created an advantage not just for spatial analysis but also for visual presentation. Its tools assist users to implement their methods easily.

6.1. Implications for Planning and Research

There is a growing body of literature discussing the negative impacts of wind turbines on different groups of people but most of these studies have focused on local people. Furthermore, most of these studies were conducted in western countries such as the U.S.A., Sweden or Scotland. This study has focused on one of the important tourism destinations in Turkey to understand tourists and tourism employees' ideas about wind energy systems and their preference for the location of wind farm developments. The author argues that the results presented here can be generalized to other contexts that share similar characteristics with Muğla.

The rush in wind energy development projects would eventually affect Muğla Province. With its big wind energy potential, Muğla catches the investors' attention for new wind energy system developments. However, there is not any direct legislation on the site selection criteria of wind turbines. Current legislation, such as the noise regulation, only indirectly concern wind turbines and this gap makes situation open to abuse. Furthermore, the possible effects of wind farm developments on the tourism sector of the province, which is one of the critical stakeholders, are not taken into account by the authorities.

The sustainable natural balance and unspoiled environment determine motives of both sample groups of the study. For this reason, negative effects which are not directly linked to natural features have dropped in rankings at some point. Frantál and Kunc (2011) discuss that even though the natural features are an important factor for touristic attraction, tourism potential of one place cannot be identified only with its natural potential; cultural subsystem is also indispensable for the area. The cultural subsystem includes scenery of nature, sights of historical artifacts, archaeological remains, architecture and other cultural activities (Frantál & Kunc, 2011). Thus, it is suggested that the natural environment and cultural subsystem should be considered as integral parts of a whole, and be treated in a sensitive and complementary manner. Studies looking at different aspects such as this one should be taken into consideration, and more comprehensive researches should be carried out for the site selection of turbines.

Because precious lands like natural sites, specially protected environmental areas, forests and olive groves cover a significant part of the Muğla coast, the preservation of such areas should be the priority of the municipality. With an increase in the number wind farms, there would be a threat to tourism in Muğla unless the conservation of these precious lands is ensured. In this context, the government should pursue more strict environmental conservation policies. According to the results of the study, placing the turbines in the fields of degraded green lands, macquis groves and the vacancy areas, which do not possess ecological, historical, cultural, archeological values, would protect Muğla's tourism values. In addition, the planning of wind farms at moderate (rather than high) density would not only provide a more aesthetic image for tourists, but also help government to generate substantial amount of electricity.

6.2. Limitations of the Study

Main limitation of this study was lack of data and inconsistency of existing data. First of all, Metropolitan Municipality of Muğla could not provide a digital topographic map of the province. Buying the maps from private companies is too expensive and there was not enough budget for such expenses in this study Hence, the DEM is gathered from a free international source which has its own custom spatial reference and it was discordant with the other geographic data which gathered from the municipality. Secondly, the data of wind turbines are inconsistent among Metropolitan Municipality of Muğla, General Directorate of Renewable Energy and Turkish Wind Energy Association. General Directorate of Renewable Energy gives information about existing wind farms but do not share the information of their exact locations. Turkish Wind Energy Association also does not share the geographic coordinates of the existing wind turbines, and some of the wind farm information they share are different from those of General Directorate of Renewable Energy’s information. The data gathered from

Metropolitan Municipality of Muğla consist exact locations of only some of the existing wind farms. Hence, the approximate location information of wind farms provided by TWEA is used while generating the maps of currently existing wind farms according to data gathered from General Directorate of Renewable Energy.

In this study, the sample size was not large because of budget and time limitations. Thus, some social groups such as people at 50 or older ages or having an income in between 1-1999 TL are not well represented in the survey. The sample size of the tourism employees remained at 25 for this study. The results and conclusions will become more representative of the population and may change if larger sample sizes are used. More importantly, the survey groups may be diversified. In addition to tourists and tourism employees other groups such as residents, government personnel, policy makers, and various other individuals can be included in the analysis and more comparative results can be obtained. Such studies will broaden the horizon of the authorities and the researchers.

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APPENDIX A

TOURISM EMPLOYEE QUESTIONNAIRE

- Do you own an estate in Muğla province (summerhouse/timeshare property etc.)? ☐ Yes ☐ No
- How many days per week do you work in Muğla?
- How long have you been in this business in Muğla?
- Have you noticed the wind turbines along the coasts of Muğla province?

  ☐ Yes ☐ No
- If your answer is Yes, does the existence of wind turbines annoy you?

  ☐ Yes ☐ No
- If it annoys you, what are the reasons?
- What is your opinion on wind energy systems?

  ☐ Positive ☐ Neutral ☐ Negative
- What are your ideas about the positive impacts of wind turbines?
- What are your ideas about the negative impacts of wind turbines?
- If you compare fossil fuels (coal, petrol, natural gas etc.) with renewable energy resources (wind, sun etc.) for energy generation, how would you rate the importance of the use of renewable energy resources?

  (1: Not Important; 5: Very Important)

1	2	3	4	5

- Below, the most known negative impacts of wind energy systems are listed. Please rate the importance of these effects for you.
  (1: Not Important; 5: Very Important)

	1	2	3	4	5
Noise					
The threat for the ecosystem (death of flying livings like birds, bats etc.)					
Disturbing visual integrity					
Jamming of TV and radio signals through creating a magnetic field					
Flicker effect and vibration (constantly moving shadows and/or vibrations in homes)					
Changing microclimate (such as drying air)					
Replacing forest areas					
Replacing agricultural areas					

- What do you think about the impacts of existence of wind turbines on tourists?

  ☐ Positive ☐ Neutral ☐ Negative

- Do you think that the existence of wind farms affect your business negatively?

  ☐ Yes ☐ No

- What are the reasons behind your answer?

- How would you rate your preference for having wind energy systems along the coasts of Muğla province?
(1: Definitely I do NOT; 5: Definitely I DO)

1	2	3	4	5

- Regardless of legal constraints / regulations, if placing wind turbines on various lands is on the agenda, how dense should the wind farms be?
(0: None, 1: Sparse; 5: Very Dense)

0	1	2	3	4	5

- What are the reasons behind your choice?

☐ Economic ☐ Health ☐ Security
☐ Ecologic ☐ Visual

- **Personal Information**

Gender: ☐ Female ☐ Male ☐ Other

Age: ....

Country: .... City: ....

Job: ....

Level of Education: ☐ Primary S. ☐ Middle S.
☐ High S. ☐ University ☐ Graduate

Marital Status: ☐ Married ☐ Single ☐ Other

Monthly Income: ....

- Below, there are several areas where wind turbines can be built on. Please rate your preference for having wind energy systems on each type of area on a scale from 1 (should not be built) to 5 (could be built).

	1	**2**	**3**	**4**	**5**
Forest areas					
Degraded forest lands and macquis groves					
Areas that do not have any protective status and, without tree or housing					
Residential areas					
Olive groves					
Agricultural areas					
Wetlands and surrounding protection areas					
Natural sites and conservation zones					
Historical, cultural, archeological sites and conservation zones					
On the sea (Offshore)					

APPENDIX B

TOURIST QUESTIONNAIRE

- Are you a permanent resident in Muğla province? (Marmaris, Datça, Bodrum etc.)? ☐ Yes ☐ No
- Do you own an estate in Muğla province (summerhouse/timeshare property etc.)? ☐ Yes ☐ No
- Have you been in Muğla province for touristic or business purposes before? ☐ Yes ☐ No
- If your answer is yes, where have you been or visit?
- Annually, how often do you visit Muğla province?
- How long have you stayed in Muğla?
- Have you gone on a cruise along the coast of Muğla before?

  ☐ Yes ☐ No
- Have you noticed the wind turbines along the coasts of Muğla province?

  ☐ Yes ☐ No
- If your answer is Yes, does the existence of wind turbines annoy you?

  ☐ Yes ☐ No
- If it annoys you, what are the reasons?
- What is your opinion on wind energy systems?

  ☐ Positive ☐ Neutral ☐ Negative
- What are your ideas about positive impacts of wind turbines?
- What are your ideas about negative impacts of wind turbines?

- If you compare fossil fuels (coal, petrol, natural gas etc.) with renewable energy resources (wind, sun etc.) for energy generation, how would you rate the importance of the use of renewable energy resources?
  (1: Not Important; 5: Very Important)

1	2	3	4	5

- Below, the most known negative impacts of wind energy systems are listed. Please rate the importance of these effects for you.
  (1: Not Important; 5: Very Important)

	1	2	3	4	5
Noise					
The threat for the ecosystem (death of flying livings like birds, bats etc.)					
Disturbing visual integrity					
Jamming of TV and radio signals through creating magnetic field					
Flicker effect and vibration (constantly moving shadows and vibrations in homes)					
Changing micro climate (such as drying air)					
Replacing forest areas					
Replacing agricultural areas					

- How would you rate your preference for having wind energy systems along the coasts of Muğla province?
  (1: Definitely I do NOT; 5: Definitely I DO)

1	2	3	4	5

- Regardless of legal constraints / regulations, if placing wind turbines on various lands is on the agenda, how dense should the wind farms be?
  (0: None, 1: Sparse; 5: Very Dense)

0	1	2	3	4	5

- What are the reasons behind your choice?

  ☐ Economic ☐ Health ☐ Security
  ☐ Ecologic ☐ Visual

- **Personal Information**

  Gender: ☐ Female ☐ Male ☐ Other

  Age: ....

  Country: .... City: ....

  Job: ....

  Level of Education: ☐ Primary S. ☐ Middle S.
  ☐ High S. ☐ University ☐ Graduate

  Marital Status: ☐ Married ☐ Single ☐ Other

  Monthly Income: ....

- Below, there are several areas where wind turbines can be built on. Please rate your preference for having wind energy systems on each type of area on a scale from 1 (should not be built) to 5 (could be built).

	1	**2**	**3**	**4**	**5**
Forest areas					
Degraded forest lands and macquis groves					
Areas that do not have any protective status and, without tree or housing					
Residential areas					
Olive groves					
Agricultural areas					
Wetlands and surrounding protection areas					
Natural sites and conservation zones					
Historical, cultural, archeological sites and conservation zones					
On the sea (Offshore)					

APPENDIX C

PHOTOS OF THE QUESTIONNAIRES

Figure 59: A manipulated picture representing vacancy lands, May 2017

Figure 60: A manipulated picture representing residential areas, May 2017

Figure 61: A manipulated picture representing olive groves ("Olive Groves", n.d.)

Figure 62: A picture representing agricultural areas ("Wind Turbines on Agricultural Areas", n.d.)

Figure 63: A manipulated picture representing water bodies, May 2017

Figure 64: A manipulated picture representing forests, May 2017

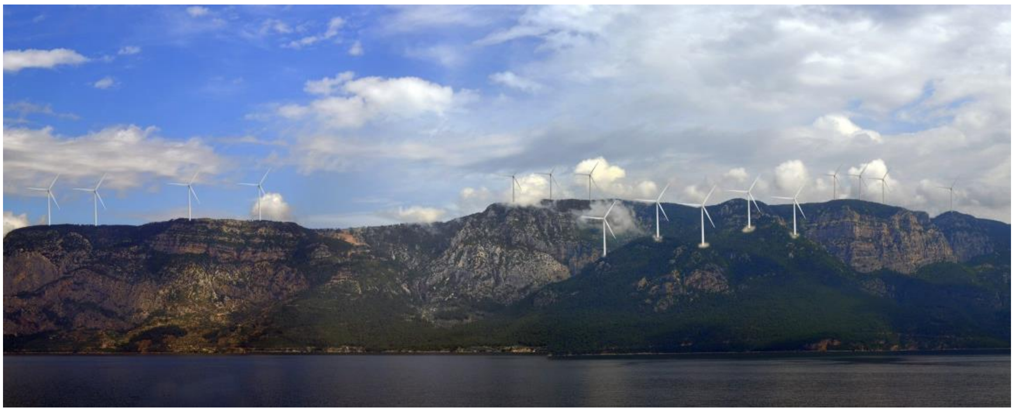

Figure 65: A manipulated picture representing natural sites and other natural conservative areas, May 2017

Figure 66: A manipulated picture representing historical, cultural and archeological sites (İpek, 2017)

Figure 67: A picture representing offshore wind farms (Thayer, 2016)

APPENDIX D

ENLARGED OVERALL SITE SELECTION MAPS

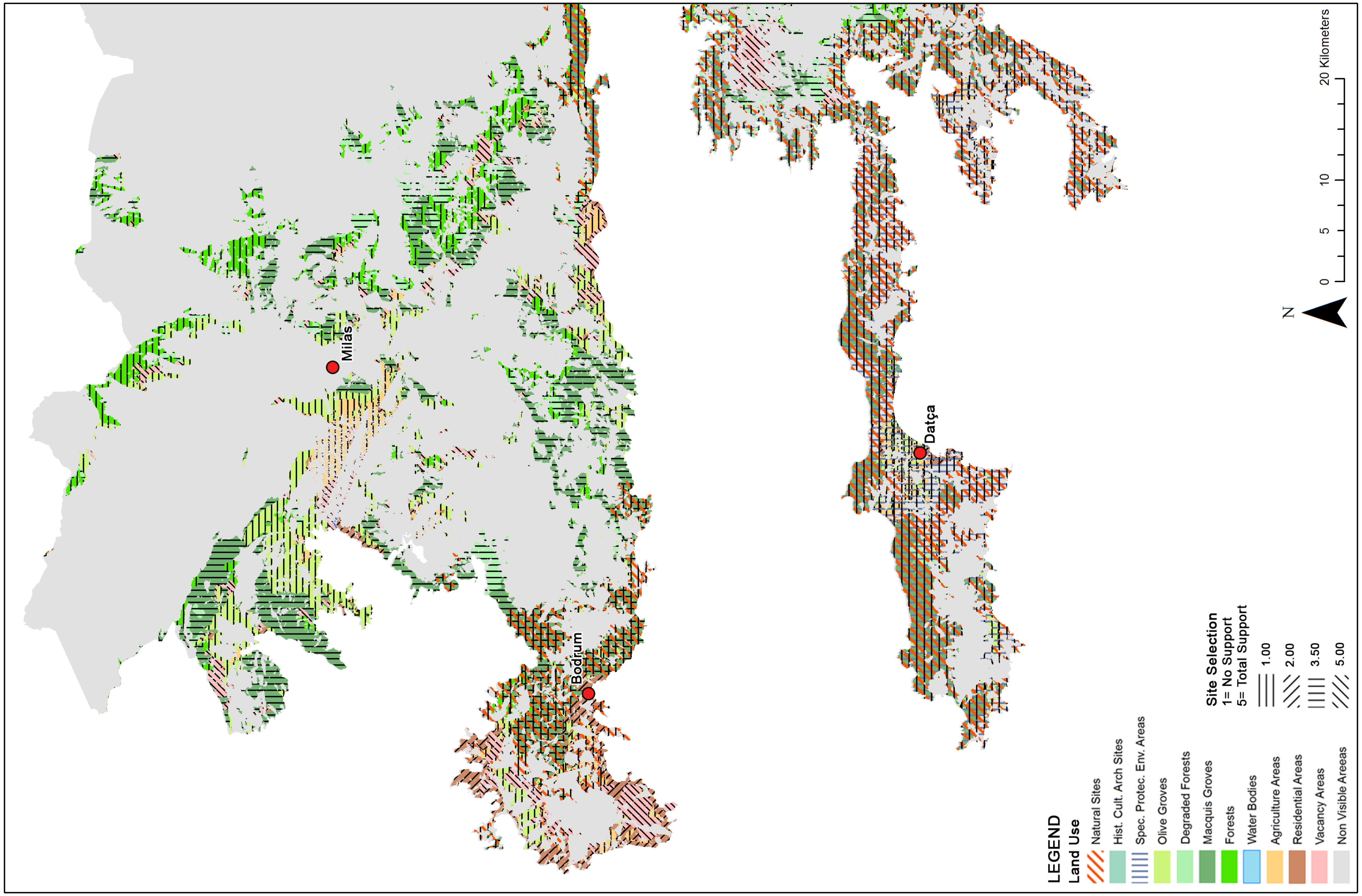

Figure 68: Overall site selection map, western part

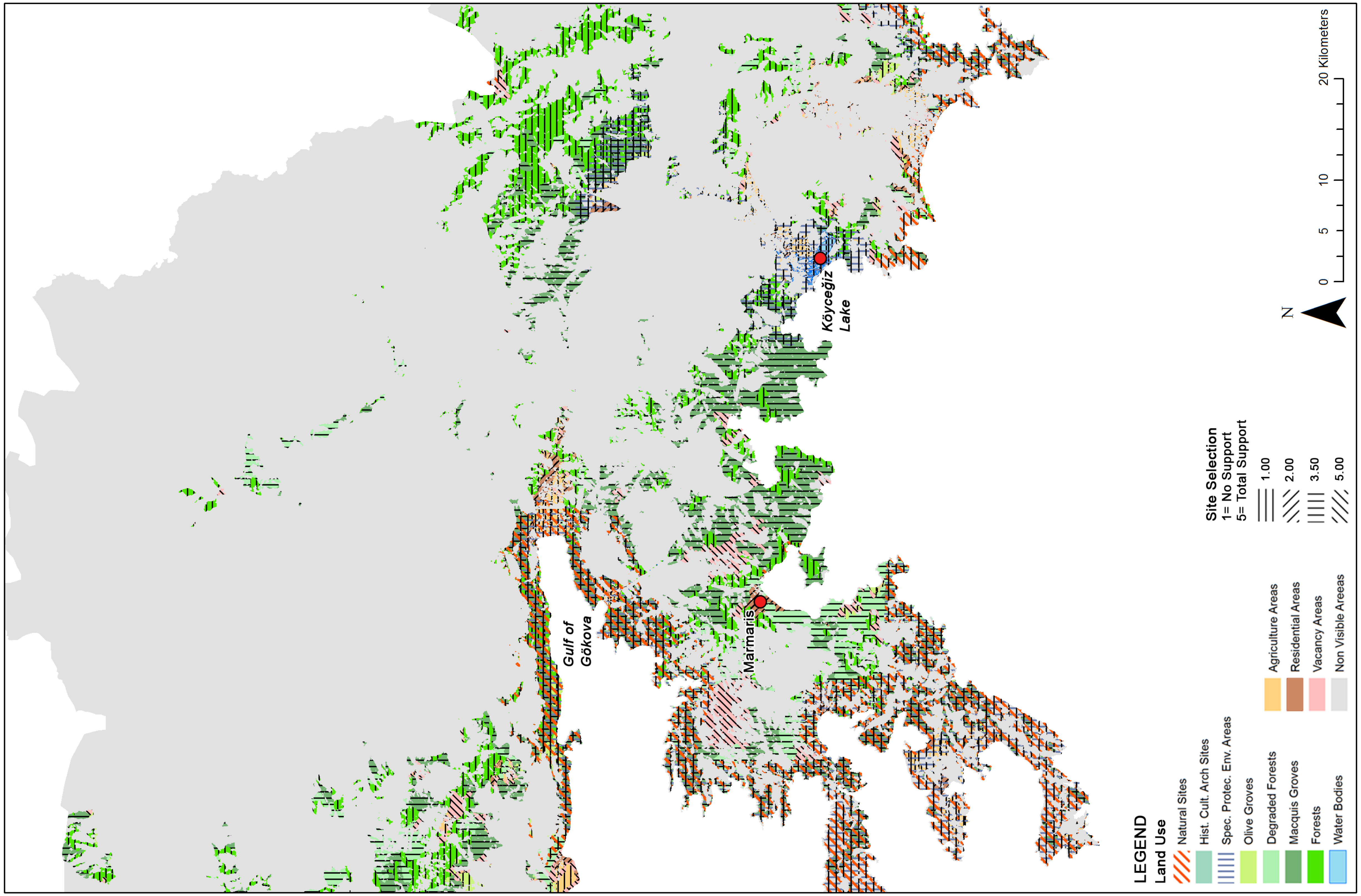

Figure 69: Overall site selection map, middle part

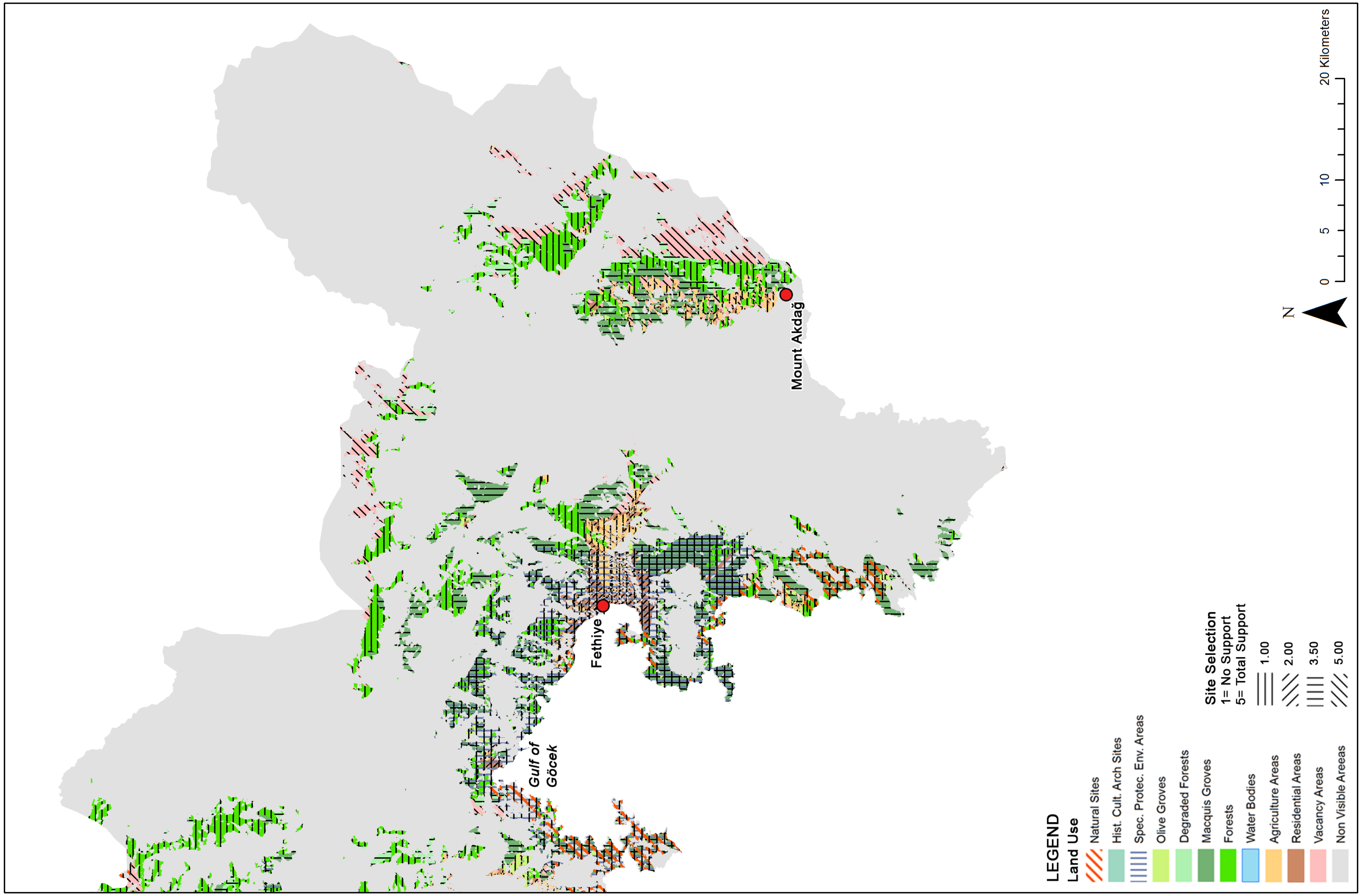

Figure 70: Overall site selection map, eastern part

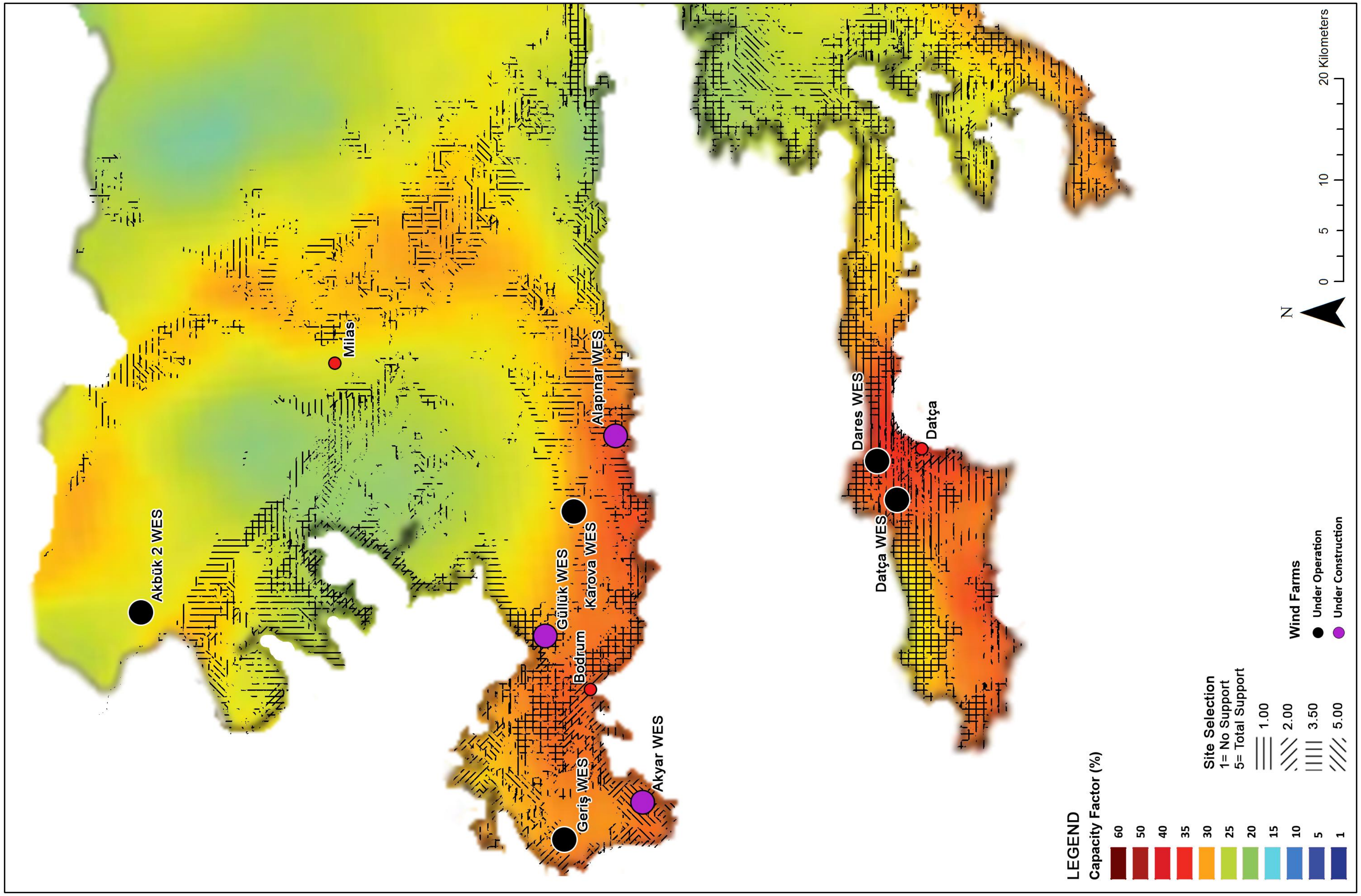

Figure 71: Overall site selection map with the wind energy capacity factor, western part

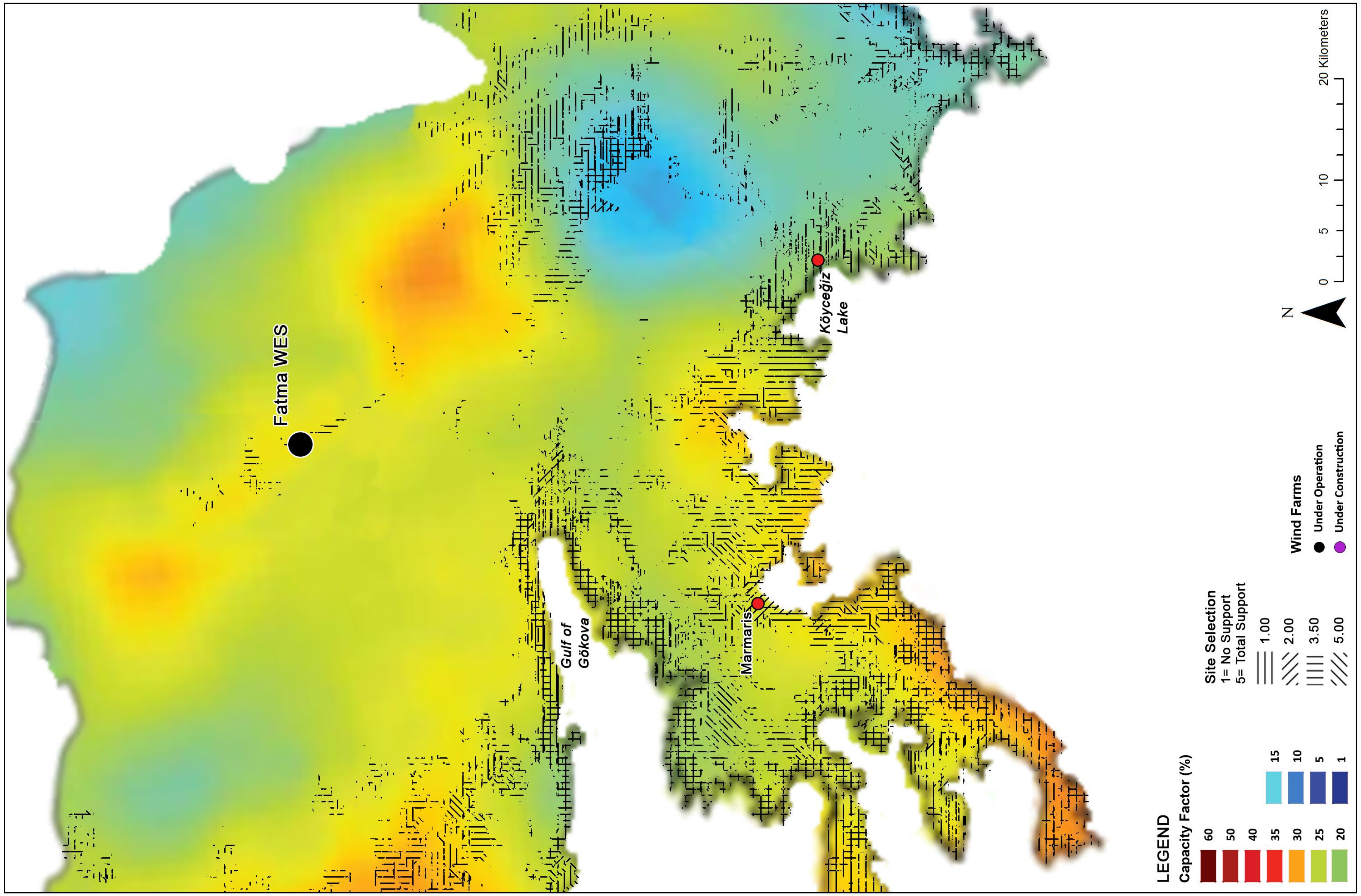

Figure 72: Overall site selection map with the wind energy capacity factor, middle part

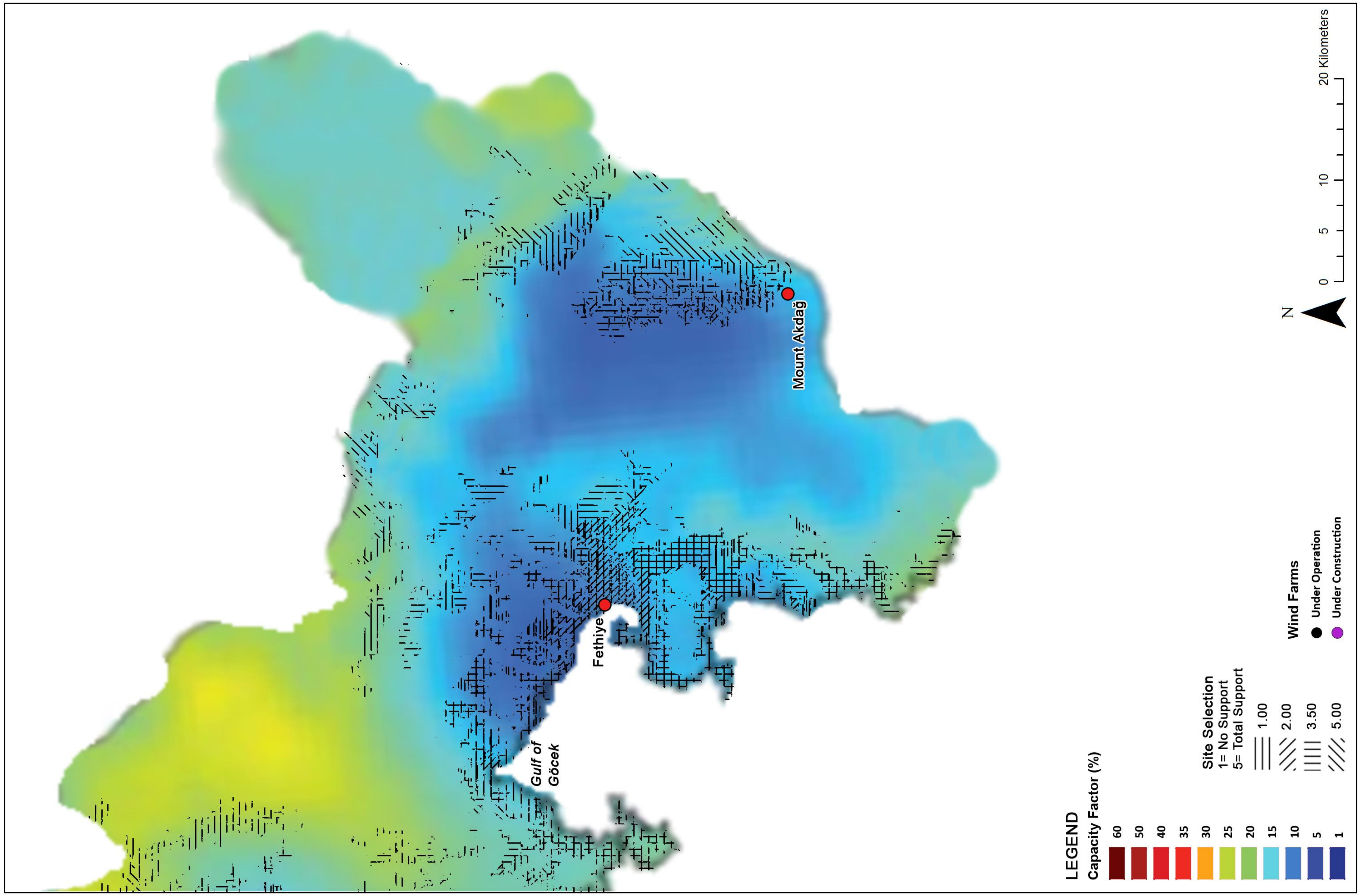

Figure 73: Overall site selection map with the wind energy capacity factor, eastern part

APPENDIX E

TOURISM EMPLOYEES' ENLARGED SITE SELECTION MAPS

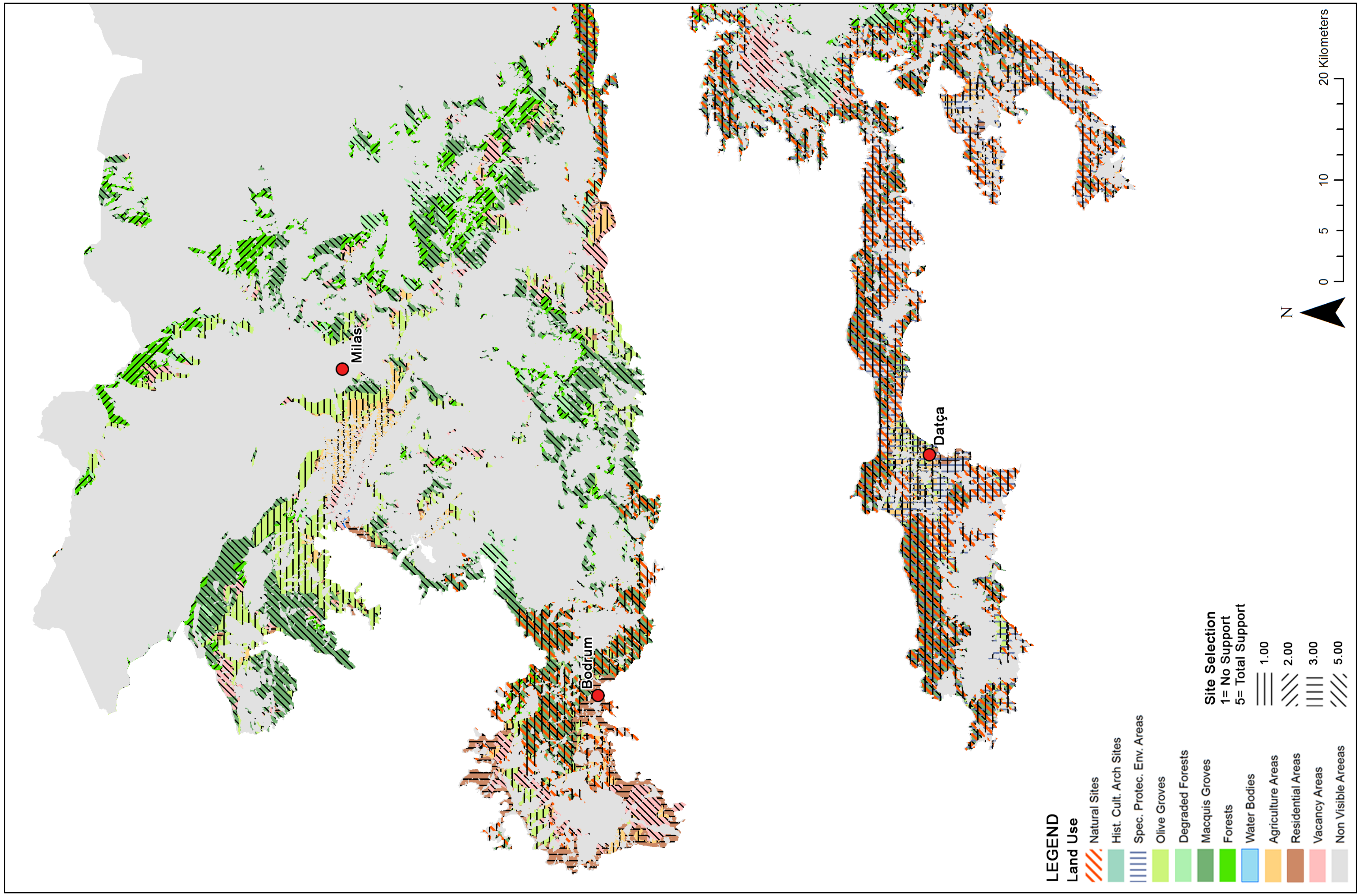

Figure 74: Tourism employees' site selection map, western part

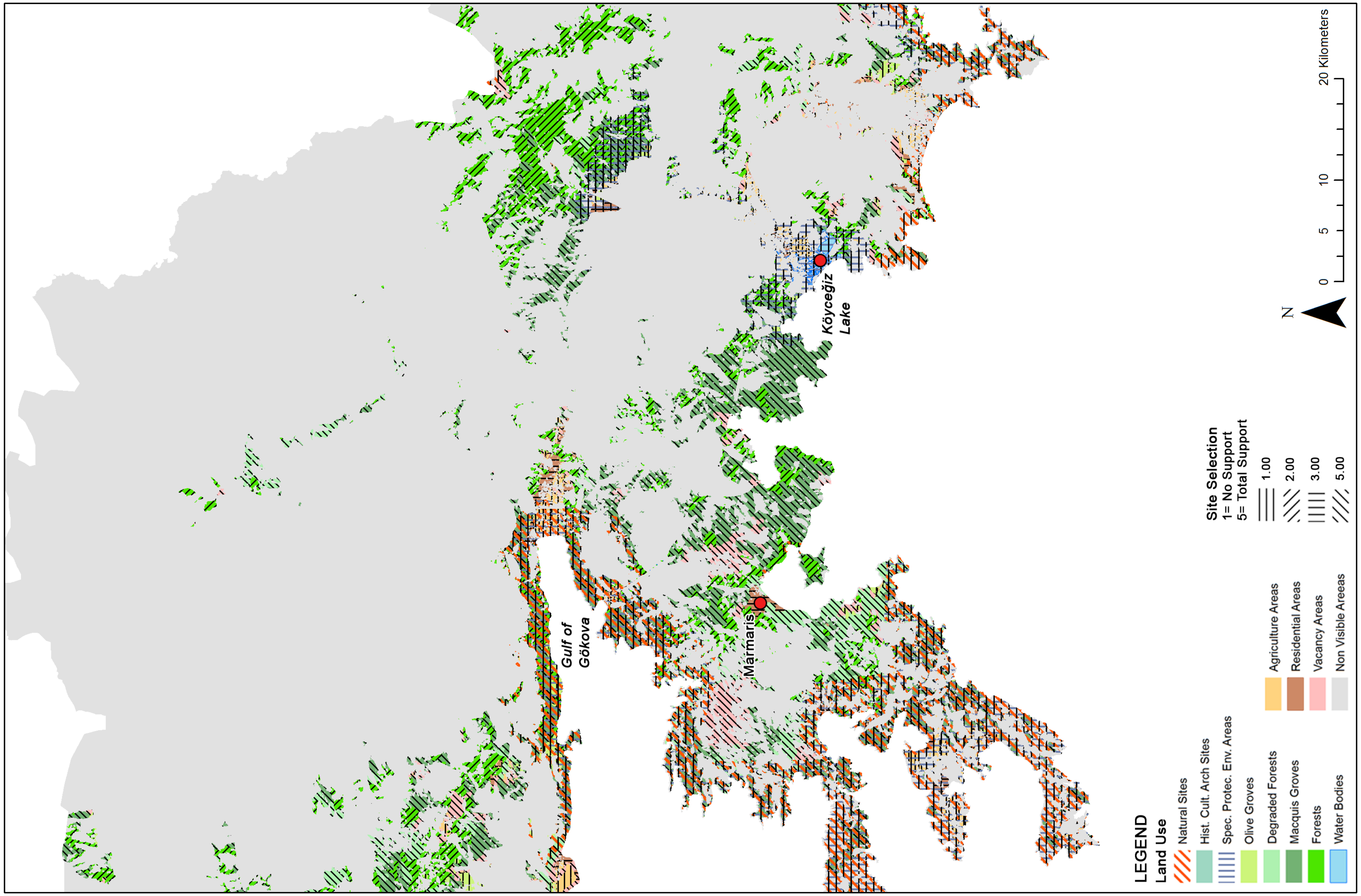

Figure 75: Tourism employees' site selection map, middle part

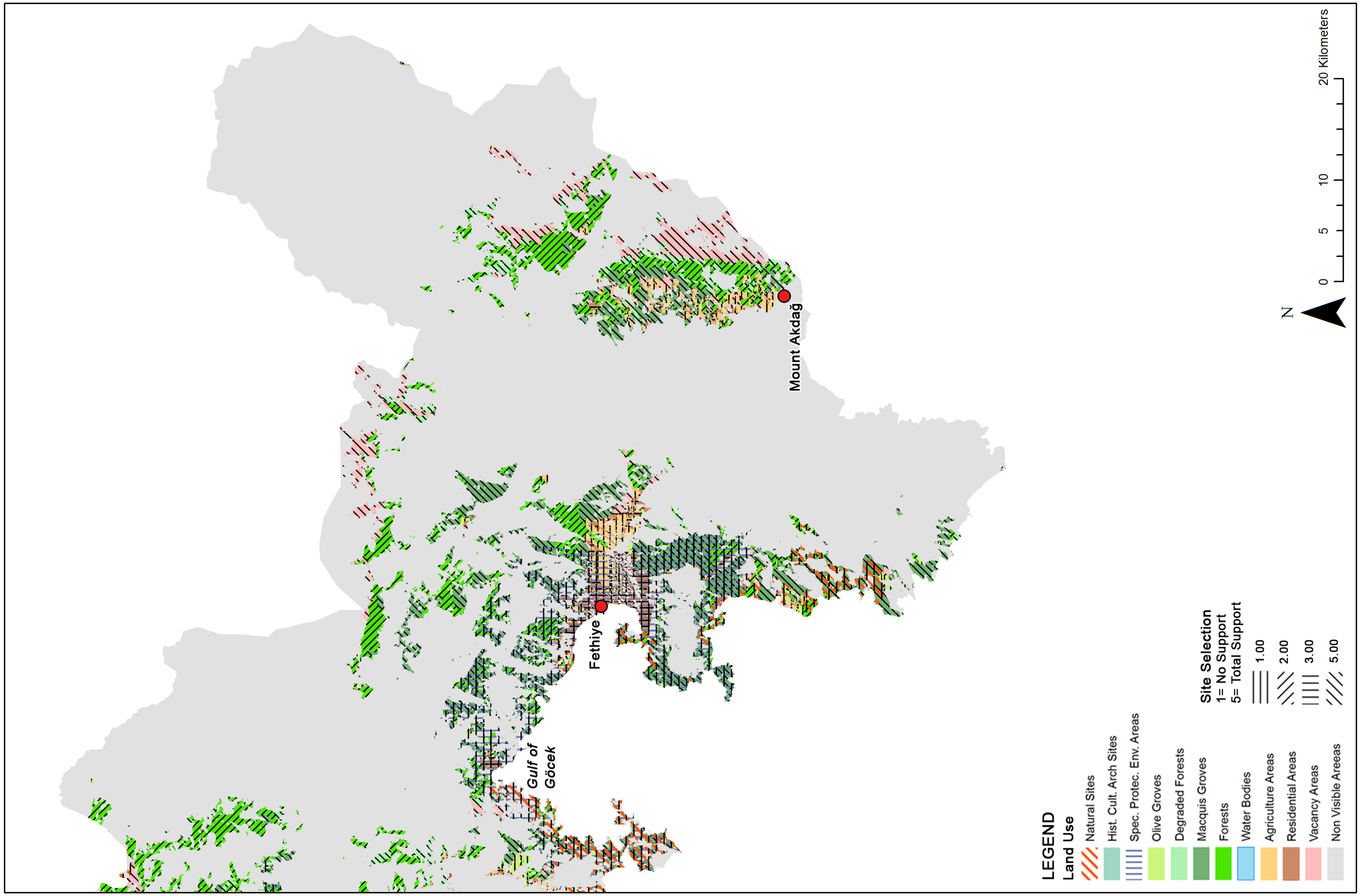

Figure 76: Tourism employees' site selection map, eastern part

APPENDIX F

TOURISTS’ ENLARGED SITE SELECTION MAPS

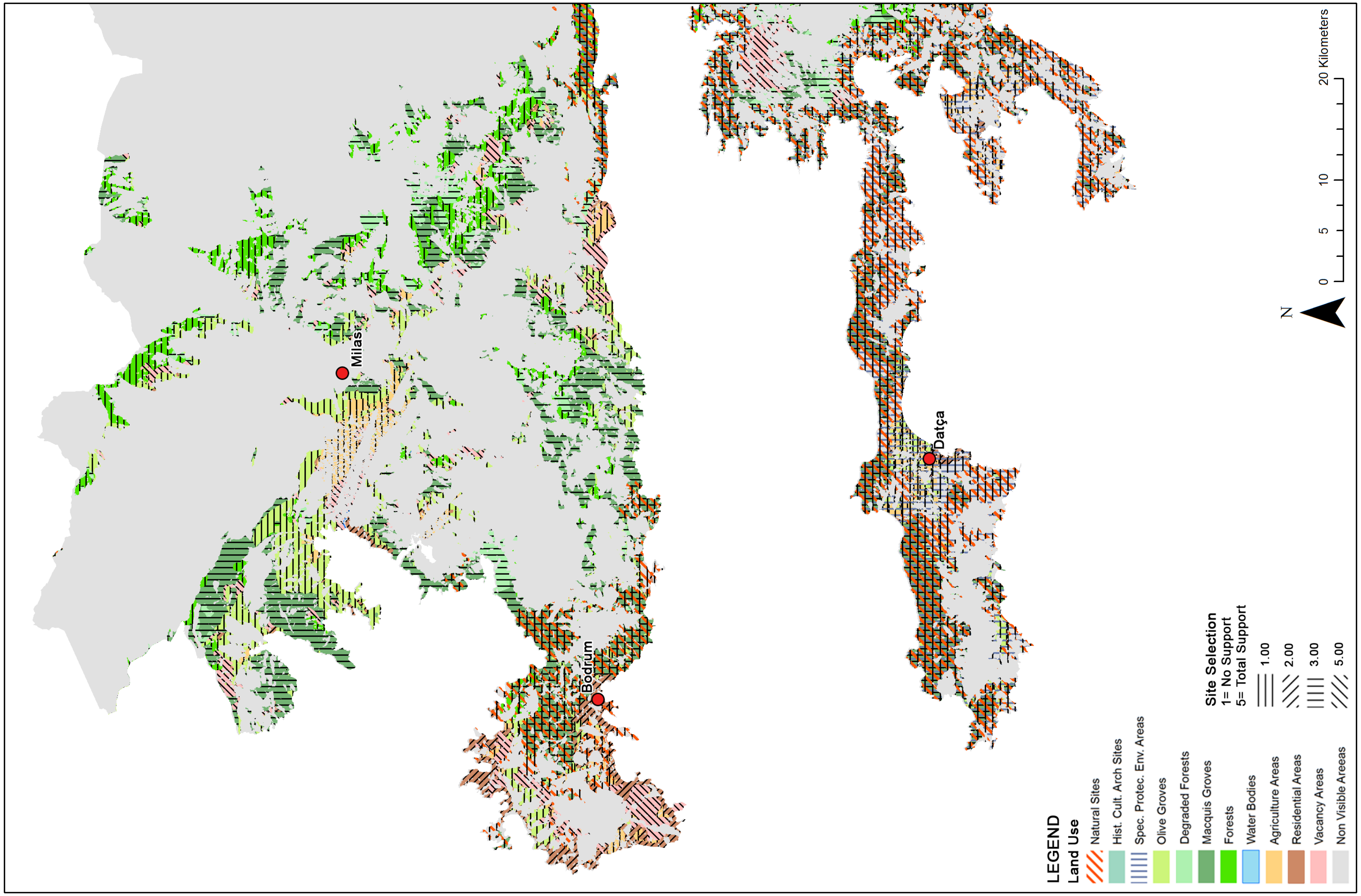

Figure 77: Tourists' site selection map, western part

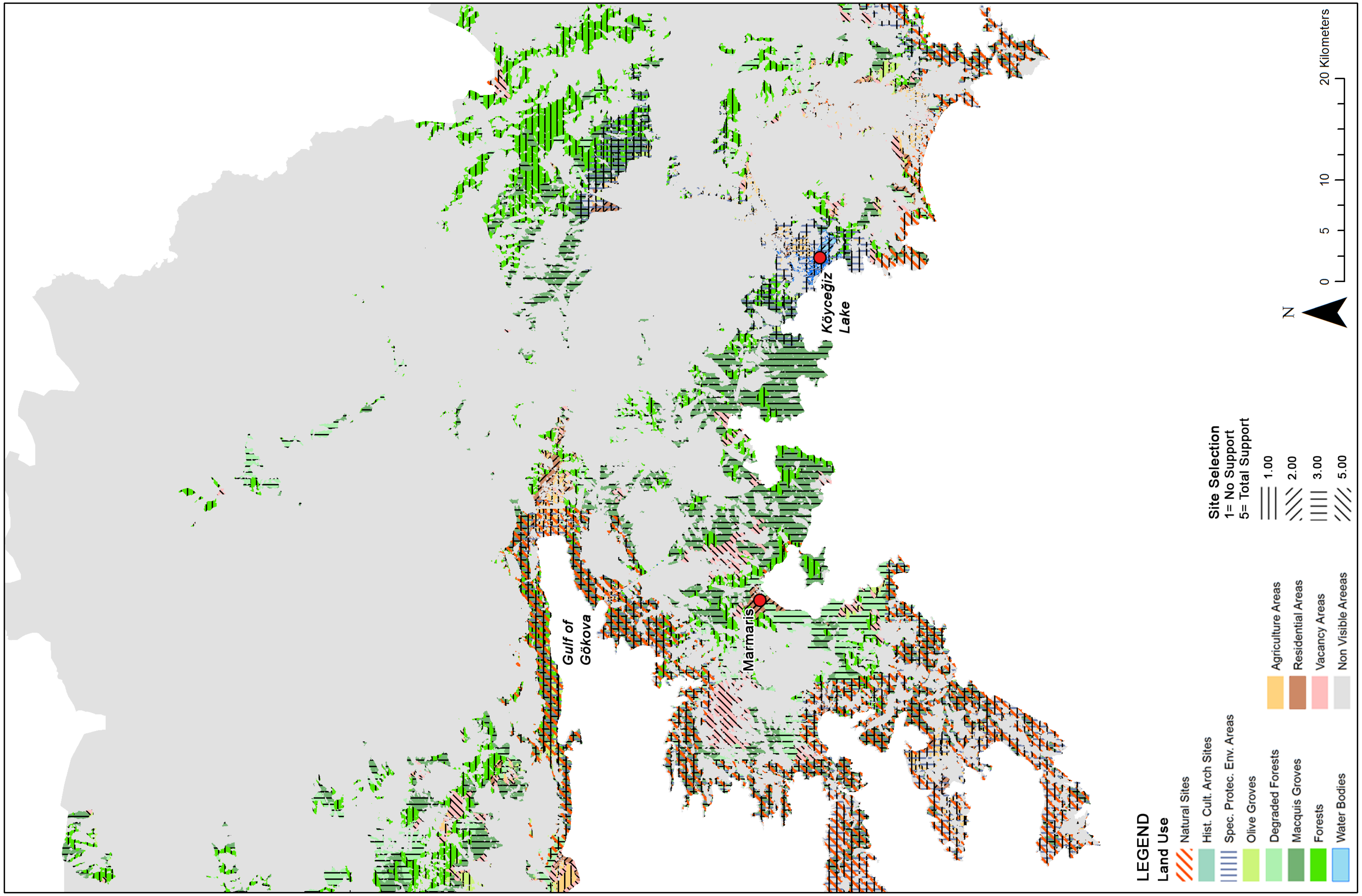

Figure 78: Tourists' site selection map, middle part

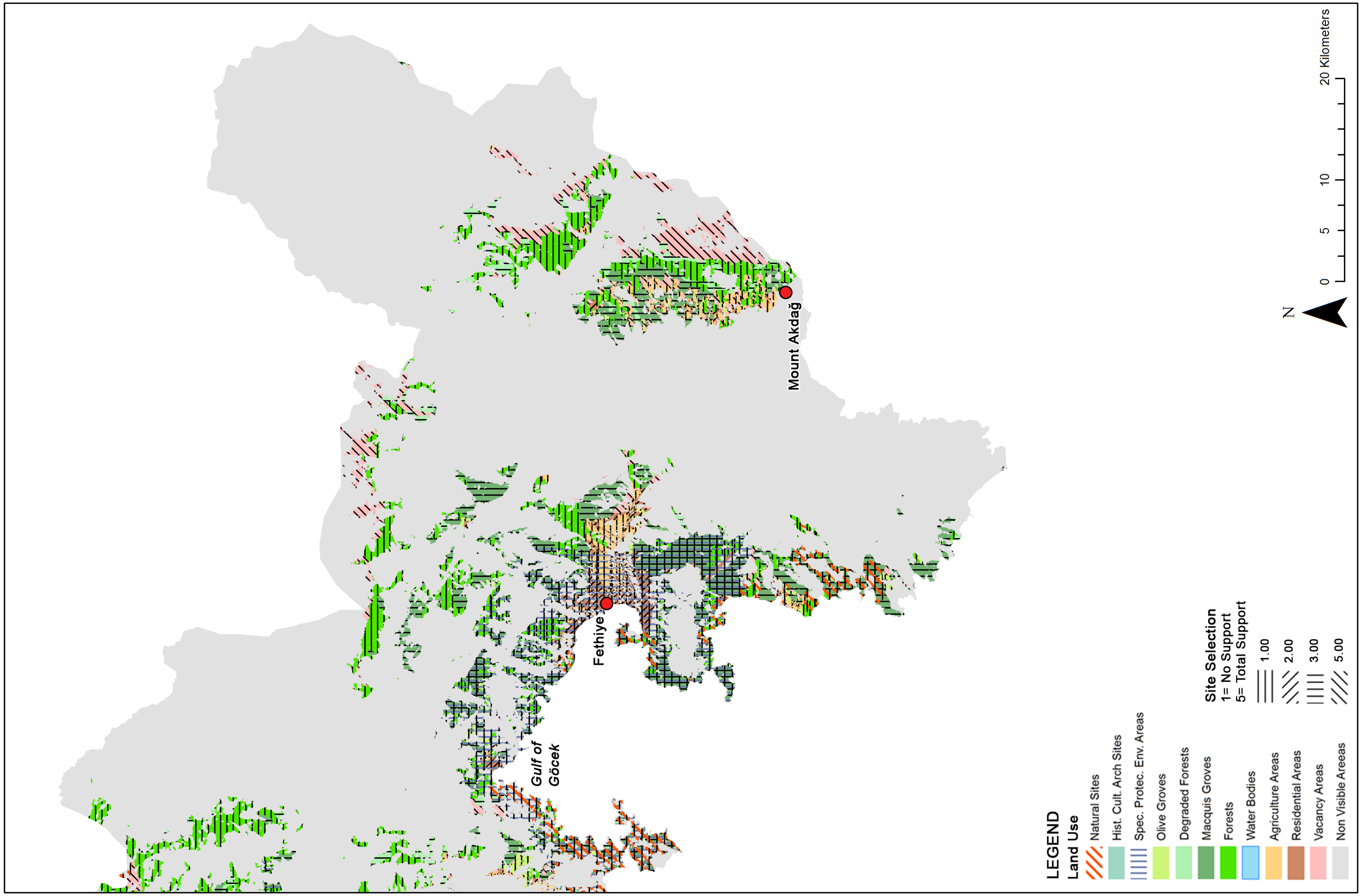

Figure 79: Tourists' site selection map, eastern part