

Economic Analysis of Gökova Special Environmental Protection Area

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Strengthening the System of
Marine and Coastal Protected Areas of Turkey Project

2011

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Foreword

Turkey is a country surrounded by the sea on three sides. Turkey's nature and climatic conditions adorn it with a significant biodiversity in its coastal areas. However, there are also problems that touch these regions and that become more imminent everyday. Urbanization, industrialization, tourism, other residential areas and activities alike that leads to irregular and unplanned development that have severe impacts on coastal and marine areas.

Developments, especially in the economy also increase marine transportation and dependency on the use of marine and coastal areas for development, housing, commerce, recreational activities and basic needs. Furthermore, the pressure of fast urbanization and settlement activities on coastal areas leads to many problems including loss of dunes, salt beds and marshes; marine and coastal pollution, deterioration and loss of coastal ecosystems. Biodiversity and fertility of coastal and marine areas are faced with this increasing pressure, leading to damages that cannot be undone.

These coastal and marine areas are one of the most precious assets we have and we must protect them. In order to alleviate these pressures and overcome these challenges, relevant structures and infrastructures for effective implementation and surveillance to ensure that these areas are sustainably managed, preserved and protected without being deteriorated and with a balanced approach between use and protection. In this regard, all related agencies and institutions have to go under a capacity building process to meet the demands of the required structures and infrastructures; cooperation and coordination between all parties have to be improved and an effective and efficiently operating work program and a model for financial resources have to be developed.

In its responsibility area covering a coastline that extends over some 8,592 km, General Directorate for the Natural Assets Protection carries out research activities for the protection and study of threatened and endangered species and habitats that are duly specified in the national legislation as well as in international conventions that Turkey is a party; carries out research activities on the biodiversity of marine and coastal environments; determines the marine surface vessel capacity of important bays and harbors; establishes

procedures and principles for use of protection and use of such areas; carries out other integral coastal management activities and strives to minimize risks that threaten such assets.

Protection of marine and coastal resources being a global priority, Marine Protected Areas are fast developing and expanding as a concept. Turkey is no exception to this rule where considerable awareness raising efforts are being carried out.

Through the large scale GEF Project entitled 'Strengthening Turkey's Marine and Coastal Protected Areas' covering the term between 2009-2013 and with the UNDP as the implementing partner, the General Directorate has taken a very first step for devising a long term solution for the protection of marine biodiversity in Turkish coastal waters; for the restructuring of marine and coastal protected areas database and to guarantee effectiveness and sustainability of ecological service functions.

A series of technical reports that are prepared as a part of the project on economic analysis, socio-economy of fisheries in coastal areas, together with other efforts on the identification of marine sensitive areas, integration of economic principles to planning processes, ensuring financial sustainability, mitigation of pollutants from marine vessels and determination of alternative livelihood resources are expected to yield the following project outcomes:

- Responsible institutions have the capacities and internal structure needed for prioritizing the establishment of new MCPAs and for more effectively managing existing MCPAs.
- MCPA financial planning and management systems are facilitating effective business planning, adequate levels of revenue generation and cost-effective management.
- Inter-agency coordination mechanisms in place to regulate and manage economic activities within multiple use areas of the MCPAs.

Documents covering the three main outcomes of the Project so far mentioned are submitted to your perusal.

Osman İYİMAYA
Dep. Gen. Dir.

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Acronyms

ESA	Ecosystem Service Approach
EU	The European Union
GEF	Global Environment Facility
GDNAP	General Directorate of Natural Assets Protection
IKO	International Kite Boarding Organization
MARA	Ministry of Agriculture and Rural Affairs
MCPA	Marine and Coastal Protected Area
REDD	Reduced Emissions from Deforestation and Degradation
SEPA	Special Environmental Protection Area
SMAP	Short and Medium Term Priority Environmental Action Program
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme

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Exchange rates

1 TL = US\$ 0.6235

1 TL= € 0.4

1€ = US\$1.40

Yönetici Özeti

Çalışmanın Amacı ve Yaklaşım

Gökova Özel Çevre Koruma Bölgesi (ÖÇKB) doğal, tarihi ve kültürel önemi nedeniyle 1988 yılında deniz ve kıyı koruma alanı ilan edilmiştir.

Bu çalışmanın amacı Gökova ÖÇKB'sinin ekonomik analizini gerçekleştirerek:

- Alanın temin ettiği denizel hizmet ve ürünler yelpazesi hakkında farkındalık yaratmak;
- Kilit ekosistem hizmetlerinin devamını tehdit eden baskılara ve bunların ekonomik sonuçlarına işaret ederek alanın sürdürülebilir yönetimine katkıda bulunmak;
- Denizel hizmetlerin ekonomik değerini ortaya koyarak ve potansiyel gelir getirici faaliyet ve mekanizmaların altını çizerek alan için hazırlanacak olan İş Planına bilgi tabanı sağlamaktır.

Bu çalışmanın da bir parçasını oluşturduğu GEF-UNDP projesi kapsamında, Gökova ÖÇKB'si için alternatif gelir kaynakları seçenekleri ve masraf azaltıcı mekanizmaların tespit edilmesi ve bir iş planının geliştirilmesi öngörülmüştür. Dolayısıyla bu rapor alandaki ekosistem hizmetlerinin ve değerlerinin tespit edilmesine odaklanmış, potansiyel finansal mekanizmalar hakkında sadece üst düzeyde bir tartışma dahil edilmiştir.

Gökova ÖÇKB'sinin ekonomik analizi alan hakkında mevcut veri ve literatür taramasına, Eylül 2010 ve Mart 2011'de kilit paydaşlarla yapılan görüşmelerden elde edilen verilere ve Haziran 2011'de alanda yürütülen turizm anketlerine dayanmaktadır. Turizm anketleri, Gökova ÖÇKB'sine gelen turist sayıları, kalış süreleri, harcamaların nitelik ve yapısı, otel doluluk oranları gibi resmi veya basılı istatistiklerde bulunmayan bilgilerin derlenmesini sağlamıştır. Anketler 155 ziyaretçi, 7 turizm operatörü, 28 otel ve 23 lokanta ile gerçekleştirilmiştir. Ayrıca muhtemel yarar transfer değerlerini temin edebilmek, alan için belirlenen değerleri karşılaştırmak ve değerlendirme yaklaşımlarına dair farklı anlayışları görebilmek için, başta Akdeniz havzası olmak üzere, deniz ve kıyı alanlarında yürütülmüş ekonomik değerlendirme çalışmalarına dair bir literatür taraması da yürütülmüştür.

Bu çalışma için, Ekosistem Hizmetleri Yaklaşımı (Ecosystem Service Approach – ESA) ve Milenyum Ekosistem Değerlendirmesi'nin tedarik, düzenleme, kültürel ve destek hizmetleri sınıflandırmasına (2005) dayanarak, deniz ve kıyı ekosistemleri hizmetlerine yönelik bir tipoloji geliştirilmiştir. Ekosistem Hizmetleri Yaklaşımı denizel ortamlardaki ekosistemlerin ve bunların barındırdığı biyolojik çeşitliliğin bireysel ve sosyal refaha katkıda bulunduğunu açıkça onaylamaktadır. Yaklaşım, bu katkının balık gibi doğrudan tüketilen ürünlerin temininin çok daha ötesine gittiğini, denizel ekosistemlerin karbon tutma gibi kritik düzenleme fonksiyonları olduğunu takdir etmektedir. Dolayısıyla, Ekosistem Hizmetleri Yaklaşımı karar alma süreçlerinde ekosistemlerin bir bütün olarak ele alınmasını ve sağladıkları hizmetlere değer biçilmesini sağlayan bir çerçeve sunmaktadır.

Temel Bulgular

Çalışmada Gökova ÖÇKB'sinin bir yıllık ekonomik değeri 31.2 milyon ABD doları olarak hesaplanmıştır. Bu, alanın başlangıç aşamasındaki değerini yansıtmaktadır ve daha detaylı çalışmalarla geliştirilebilir. Ortaya çıkarılan değer tedarik hizmetleri (balık), düzenleme hizmetleri (karbon tutma, erozyon kontrolü ve su arıtımı), ve kültürel hizmetleri (turizm ve rekreasyon) kapsamaktadır. Ancak, turizm için kullanılan muhafazakar tahminler ve kaile alınamayan diğer ekosistem hizmetlerinden ötürü tespit edilen bu değer alanın gerçek ekonomik değerinin altında olduğu tahmin edilmektedir. Alanda

potansiyel olarak varolduğu düşünülen fakat bilimsel bilgi ve/veya veri noksanlığından incelenemeyen ekosistem hizmetleri arasında doğal ilaçlar gibi hammaddeler, genetik kaynaklar ve dekoratif ürünler; denizel ortamın mikro-iklim düzenlemesinde ve sel, fırtınadan korumadaki rolü; alanın eğitim, peyzaj ve miras değerleri gibi henüz üzerinde çalışılmamış hizmetler bulunmaktadır. Aşağıdaki tablo Gökova ÖÇKB'si değerlendirme çalışmasını özetlemektedir.

Tablo. Gökova ÖÇKB'si değerlendirme sonuçları özeti

Hizmet	Değer/ yıl ABD\$	Değerleme yöntemi	Not
Balık	332,854	Piyasa değerleri	Bu değer sürdürülebilir av oranına göre hesaplanmamıştır (alan için bilinmiyor). Rekreatif balıkçılığı kapsamamaktadır ve balık avı miktarlarının kayıt dışı olmasından ötürü gerçek değerine göre muhtemelen düşüktür. Brüt değerlerdir – masraflar düşülmemiştir.
Deniz börülcesi	62,350	Piyasa değerleri	5TL/kg piyasa değeri ve bölgedeki lokantalarının %50'sinin sezon başı birer ton talebi olduğu varsayılmıştır. Brüt değerlerdir – masraflar düşülmemiştir.
Karbon tutma	792,064	Piyasa değerleri (kaçınılan harcama yaklaşımı)	Orman karbon piyasasına benzer şekilde Mavi Karbon Kredi piyasasının gelişeceği varsayılmıştır. Dolayısıyla bu değer henüz "yakalanmamaktadır". Karbon piyasa değeri 11.2 \$/ tCO ₂ eşdeğeri olarak alınmıştır.
Erozyon kontrolü	2,844,800	Yarar transferi	Mangos ve arkadaşları (2010). Her kıyı metresi için 160,000 avro, Gökova ÖÇKB'sindeki 159 km'lik Posidonia çayırlarına ve alanın %8'nin risk altında olduğuna dayanarak.
Atıksu arıtımı	10,148,400	Yarar transferi	Mangos ve arkadaşları'na (2010) dayanarak, Türkiye kıyıları için hesaplanan 229 milyon €'luk arıtım hizmeti Gökova ÖÇKB'sindeki kıyasal alana taksim edilmiştir.
Turizm / Rekreatif	17,051,104	Piyasa değerleri	Çalışma kapsamında yürütülen turizm harcamaları anketine ve bölgeye gelen ziyaretçi sayılarına dair muhafazakar kestirime (yılıda 30,000 geceleleyen ve 100,000 günübirlik ziyaretçi) dayanarak.
TOPLAM	31,231,572		

Alanın değerlerinin yaklaşık %55'i turizm ve rekreasyona dayanmaktadır ve bölgede turizm sektörünü sürdürülebilir bir şekilde yönetmenin önemine işaret etmektedir. Gökova ÖÇKB'si için hesaplanan atıksu arıtma hizmeti de önemli bir boyuttadır (toplam değer %32,5'i). Ancak bu değer yarar transferi metoduyla ölçülmüştür ve bölgeye spesifik araştırmalarla iyileştirilmelidir. Bunun için öncelikle koruma bölgesindeki denizel arıtım hizmetinin bilimsel çalışmalarla tanımlanması gerekmektedir.

Değerleme sonuçları alandaki Posidonia çayırlarının karbon tutma ve erozyon kontrolü hizmetlerine dayanan ekonomik önemini vurgulamaktadır. Karbon tutma değeri alana özel çalışmalar yürütülerek, Gökova'daki Posidonia çayırlarının karbon depolama ve tutma kapasiteleri incelenerek rafine edilmelidir. Mavi Karbon piyasasının gelişiminde gözlemlenen ilgi göz önünde tutulduğunda bu araştırmaları yürütmek için çok uygun bir zamandır.

Alandaki balıkçılığın değeri 332,854\$ olarak hesaplanmıştır. Bu değer rekreatif balıkçılığı kapsamamasından ve genelde balık avı miktarlarının kayıt dışı olmasından ötürü gerçek değerine göre muhtemelen düşüktür, fakat bu tahmin sürdürülebilir av miktarını daha iyi yansıtabilir. Balıkçılık için ekonomik değer sürdürülebilir av oranına göre hesaplanmalıdır ve bu oran Gökova için bilinmemektedir. Bölgede

özellikle yoğun yasa dışı balık avı faaliyetlerinden ötürü (zıpkınla avcılık) balıkçılığın geleceği kaygı uyandırmaktadır. Dolayısıyla balıkçılığın sürdürülebilirliği açısından balık stokları analiz edilmelidir.

Alandaki ekosistem hizmetleri yerel ekonomi ve kalkınma açısından da önemlidir. Akyaka Belediye Başkanına göre, Akyaka ekonomisinin %60-80'i kıyıya dayanmaktadır; böylece denizel koruma önemlidir. Turizm ve rekreasyon ilçenin GSMH'sının %60'ını oluşturmakta ve 500 kişiye sağlanan işgücü ile Akyaka ekonomisi için elzemdir. İlçede 170 küçük işletme (lokanta, kafe ve oteller) turizme bağlıdır. Ayrıca Bördübet bölgesinde yaklaşık 50 kişi daha turizmden geçinmektedir. Hane geçimi ayrıca balıkçılığa da dayanmaktadır. Örneğin Akyaka'da yaklaşık 60 hane balıkçılık yapmakta ve Akçapınar nüfusunun %70'i balıkçılıkla uğraşmaktadır. Ancak son araştırmalar bölgedeki küçük ölçekli balıkçılık sektörünün düzensiz ve düşük gelir seviyeleri nedeniyle tehdit altında olduğunu ortaya koymaktadır. Bunun ana nedeni bölgede yoğun olarak yürütülen yasa dışı avcılık faaliyetleridir.

Bu iş imkanları işsizlik oranlarının yüksek ve alternatif gelir kaynaklarının sınırlı olduğu bu bölgede önemlidir. Akyaka'da işsizlik oranı %8 civarında, bölge genelinde %3'tür ve Gökova Körfezi içerisinde nüfusun yaklaşık %40'ının gelirleri asgari ücretin altındadır.

Ekonomik ve kültürel önemlerine rağmen, Gökova ÖÇKB'sindeki ekosistem hizmetleri hem nicelik hem de nitelik olarak ciddi baskıların altındadır. Bunların başında aşırı ve yasa dışı balık avı, turizmden kaynaklı baskılar ve kıyasal yapılaşma gelmektedir.

Öneriler

Çalışma sonucunda, değerlendirme yöntemlerinin iyileştirilmesine ve denizel ekosistem hizmetlerinin daha etkin ve sürdürülebilir yönetilmesine yönelik bazı öneriler geliştirilmiştir. Örneğin;

- Balıkçılık için yapılan değerlendirme ve **balıkçılık yönetimi**, sürdürülebilir av oranının (miktar) net faydaya (gelirler eksi masraflar) çarpılmasına dayandırılmalıdır. Sürdürülebilir av oranlarının tespit edilebilmesi için alandaki balık stoklarının düzenli bilimsel araştırmalarla incelenmesi gerekmektedir.
- Alana özel **düzenleme hizmetlerine** odaklı bilimsel çalışmalar bu hizmetleri daha iyi anlamak ve değerlendirmeye ışık tutmak açısından gerekmektedir. Bu sırasıyla şu hizmetleri kapsamaktadır: karbon tutma, erozyon kontrolü, sel ve fırtınadan korunma ve atıkların özümsemesi.
- Öncelikli araştırma alanı olarak alandaki Posidonia **çayırlarının** sağladığı hizmetler incelenmelidir. Gökova ÖÇKB'sine özel olarak yürütülecek çalışmalarla çayırların sağladığı karbon tutma ve depolama oranları Türkiye'yi yeni gelişen Mavi Karbon piyasasında avantajlı bir konuma taşıyabilir.
- Turizm bölgenin deniz koruma alanı statüsünü bütünlüleyici bir şekilde gelişmeli ve yönetilmelidir. Bölgenin turizm taşıma kapasitesini ortaya koyan bir çalışma ile turizm gelişiminin sınırları belirlenmeli ve buna bağlı olarak turizm master planı veya stratejisinin oluşturulması ve uygulanması önerilmektedir. Bu, turizmi sayısal olarak artırmak yerine alanın taşıma kapasitesine uygun yüksek kalitede bir turizm deneyimine odaklanmalıdır. Master plan alanın denizel koruma statüsünü tamamlayıcı olmalı ve bölgedeki "Yavaş Şehir" kriterlerine uyumu gözetmelidir. Master plan Gökova ÖÇKB üzerindeki turizm baskılarını (katı ve sıvı atıklardan kaynaklı denizel ve kıyasal kirlilik gibi) azaltmaya yönelik ve turizme bağlı altyapıyı kuvvetlendirmeye yönelik mekanizmaları araştırmalıdır.

Executive summary

Objectives of study & approach

Gökova was declared a Special Environmental Protection Area (SEPA) in 1988 on account of its natural, historical and cultural significance. The objective of this study was to undertake an economic analysis of Gökova Special Environmental Protection Area (SEPA) in order to:

- Raise awareness of the range of marine goods and services provided by the site
- Contribute to the sustainable management of the site by highlighting pressures threatening the viability of key ecosystem services and the economic implications of this
- Inform the business plan to be developed for the site by demonstrating the economic value of marine services and highlighting potential revenue generating activities and mechanisms.

It should be noted that other components of the GEF-UNDP project under which this study sits are focused on the identification of feasible income generating options, the determination of cost-offsetting mechanisms and the development of a business plan for Gökova SEPA. Therefore this report is focused on the identification and valuation of ecosystem services and only provides a high level discussion of potential financing mechanisms

The economic assessment of Gökova SEPA is based on a review of the available data and literature on the site, interviews with key stakeholders and data gathered through a site visit in March 2011 and a tourism survey undertaken in June 2011. The tourism survey was able to provide information on the tourist numbers, duration of their stay, composition and expenditure patterns, and hotel occupancy rates within Gökova SEPA, which is not available from official or published statistics. The survey covered 155 visitors, 7 tour operators, 28 hotels and 23 restaurants. A literature review of economic valuation studies of marine and coastal areas from the region was also undertaken to provide potential transfer values, benchmarks against which to assess values derived for the site and insights on valuation approaches.

A typology of marine and coastal ecosystem services has been developed for this study following the ecosystem service approach (ESA), which is based on the Millennium Ecosystem Assessment (2005) classification of ecosystem services into provisioning, regulating, cultural and supporting services. The ESA explicitly recognizes that ecosystems such as marine environments and the biological diversity contained within them contribute to individual and social wellbeing. Importantly it recognizes that this contribution extends beyond the provision of goods such as fish to the natural regulating functions of marine ecosystems such as carbon sequestration. The ESA therefore provides a framework for considering whole ecosystems in decision making and for valuing the services they provide.

Key Findings

This study estimates the economic value of Gökova SEPA at around US\$31.2 million per year. This provides an initial value of the site, which needs to be refined through further study. This value incorporates provisioning services - fish and salicornia, regulating services - carbon sequestration, erosion protection and waste treatment, and cultural services - tourism and recreation. It is considered to be an underestimate in that conservative estimates have been used for example for tourism and a number of potentially important services are not included in this total. Ecosystems services thought to be present (or potentially present) at the site which cannot be estimated due to a lack of scientific information and/or data are - raw materials such as natural medicines, genetic resources and ornamental resources, which have yet to be studied at the site; the role the marine environment plays in micro-climate regulation, the role of the

marine environment in flood and storm protection, the sites heritage value and educational value and the sites landscape and amenity value.

Table. Summary of Valuation results for Gökova SEPA

Service	Value/ year US\$	Valuation approach	Comment
Fish	332,854	Market prices	This is not based on a sustainable harvest rate, which is unknown. This estimate does not include recreational fishing and may be based on an under-reporting of fish catch. This is a gross value – costs have not been deducted
Salicornia	62,350	Market price	Market price of 5TL/kg and assumption that 50% of restaurants in area demand 1 ton per season This is a gross value – costs have not been deducted
Carbon sequestration	792,064	Market prices (avoided cost approach)	Assumes development of market in blue carbon credits analogous to the forest carbon market. This value is therefore not currently 'captured'. Based on market price of carbon of US\$11.2 / tCO ₂ eq
Erosion protection	2,844,800	Benefits transfer	Mangos <i>et al</i> (2010). Based on 160,000 Euro per meter of coastline, 159km of <i>Posidonia</i> beds in Gökova SEPA and 8% of the area at risk.
Waste treatment	10,148,400	Benefits transfer	Based on Mangos <i>et al</i> (2010) estimate for Turkey of 229 million Euros apportioned to the study site based on length of its coastline.
Tourism / Recreation	17,051,104	Market prices	Based on a conservative estimate of tourist numbers (30,000 overnight visitors and 100,000 day visitors per year) and a survey of tourist expenditure
TOTAL	31,231,572		

Around 55% of the value is attributable to tourism and recreation in the area highlighting the importance of sustainably managing the tourism industry. The estimate of waste treatment function of Gökova SEPA is also significant (around 32,5% of the total). However this value is based on a value transfer approach and needs to be refined through site specific studies. This first requires scientific studies to define the provision of this service at the site.

The valuation results highlight the economic importance of the site's *Posidonia* meadows, which result in the estimated benefits of carbon sequestration and erosion protection. The carbon sequestration value could be refined through site specific studies of the storage and sequestration functions performed by Gökova's *Posidonia* meadows. Such studies would be timely given the current interest in developing a market in Blue Carbon.

The value of fish is estimated at US\$332,854. This may be an underestimate as it does not include the value of recreational fishing and may be based on under reporting of actual catch, however it may better reflect a sustainable fishery resource value. The economic value should be based on a sustainable harvest level, which is not specified for the area, and there are concerns that the fishery is currently on an unsustainable path – due largely to illegal fishing. Fish stocks therefore need to be analyzed to assess the sustainability of the fishery.

The site's ecosystem services are also important to local livelihoods and economies. According to the major of Akyaka, between 60-80% of Akyaka's economy is dependent on the coast, therefore marine protection is important. Tourism and recreation are vital to the Akyaka's economy representing 60% of

the district's GDP and employing around 500 people. There are around 170 small businesses – restaurants, cafes, hotels engaged in tourism. In addition around 50 people are employed in the two hotels operating in Bördübet. There are also a number of households dependent on fishing. For example, in Akyaka there are around 60 households involved in fishing while in Akçapınar around 70% of the population is engaged in fishing. Recent studies however indicate that the livelihoods of the small scale fishing sector is threatened by irregular and relatively low income levels. A key reason for this is considered to be the high level of illegal fishing activity.

These jobs are important within an area where unemployment rates are high and alternative job opportunities are limited. The unemployment rate at Akyaka is 8%, compared to 3% for the region and in Inner Gökova bay around 40% of the population have incomes below the minimum wage.

Despite their economic and cultural importance the quality and quantity of Gökova's ecosystem services are threatened by a range of pressures including over fishing and illegal fishing activities, tourism pressures and coastal developments.

Recommendations

The study has identified a range of recommendations aimed at the refinement of the valuation estimates and improved sustainable management of the marine ecosystem services. For example:

- In terms of **fishery valuation and management** the valuation should be based on a sustainable harvest rate (quantity) multiplied by revenues - costs. Scientific studies of fish stocks are therefore required to determine sustainable harvesting rates.
- Site specific scientific studies of the **regulating services** are required to better understand these services and inform the valuation. This includes the following regulating services – carbon sequestration, erosion control, flood and storm protection and waste assimilation.
- A priority area of research is considered to be studies of the services offered by the site's posidonia meadows. In particular, site specific studies of the carbon sequestration and storage rates of Gökova's posidonia meadows would position Turkey to potentially benefit from the emerging market in Blue Carbon.
- Tourism needs to be developed and managed in a way that complements the area's status as a marine protected area. A study of the area's tourism carrying capacity is needed to understand the limits to tourism development in the area and the development and implementation of a tourism master plan / strategy is recommended. This should focus on offering a high quality tourism experience in line with the site's carrying capacity rather than increasing tourism numbers. The master plan should be aligned with the area's marine protection status and build on its proposed accreditation as a 'Slow City'. The master plan would explore mechanisms for minimizing tourism pressures on Gökova's SEPA (such as marine and coastal pollution from solid and liquid waste), and for improving tourism related infrastructure.

INTRODUCTION



2

This study is an activity under the Global Environment Facility - United Nations Development Programme (GEF-UNDP) project 'Strengthening the Protected Area Network of Turkey: Catalyzing Sustainability of Marine and Coastal Protected Areas'.

The proposed long-term solution for marine biodiversity conservation in Turkey's territorial sea is a reconfigured Marine and Coastal Protected Area (MCPA) network designed to protect biodiversity while optimizing its ecological service functions. The success of this long-term solution is seen to rest on three main pillars: (i) the existence of key agencies capable of identifying and managing sensitive and biologically significant MCPAs; (ii) *the application of economic analysis to inform the planning and management of MCPAs and the integration of sustainable financing mechanisms;* and (iii) inter-sectoral co-operation that builds on the relevant strengths of various management agencies and branches of Government and civil society to solve marine biodiversity conservation challenges. This study relates to the development of the second pillar.

1.1. Objective

The objective of this study was to undertake an economic analysis of Gökova Special Environmental Protection Area (SEPA) in order to:

- Raise awareness of the range of marine goods and services provided by the site
- Contribute to the sustainable management of the site by highlighting pressures threatening the viability of key ecosystem services and the economic implications of this
- Inform the business plan to be developed for the site by demonstrating the economic value of marine services and highlighting potential revenue generating activities and mechanisms.

It should be noted that other components of the GEF-UNDP project under which this study sits are focused on the identification of feasible income generating options, the determination of cost-offsetting mechanisms and the development of a business plan for Gökova MCPA. Therefore

this report is focused on the identification and evaluation of ecosystem services and only provides a high level discussion of potential financing mechanisms.

1.2. Approach

The economic assessment of Gökova SEPA is based on a review of the available data and literature on the site, interviews with key stakeholders and data gathered through a site visit in March 2011 and a tourism survey undertaken in June 2011. A list of people consulted is provided in Appendix 1, while the tourism survey instrument is provided in Appendix 2. A literature review of economic valuation studies of marine and coastal areas from the region was also undertaken to provide potential transfer values, benchmarks against which to assess values derived for the site and insights on valuation approaches.

This assessment draws heavily on two recent studies of the area:

- SAD-AFAG¹ led a 22 month project to design a draft Integrated Coastal and Marine Management Plan for Gökova SEPA (Kıraç and Veryeri, 2010). The project partners were The Rubicon Foundation of the Netherlands, GDNAP formerly known as the Environmental Protection Agency for Special Areas (EPASA), and the Ministry of Agriculture and Rural Affairs (MARA). The study undertook scientific and socio-economic surveys and analysis and covered the whole of Gökova SEPA.
- The European Union (EU) Short and Medium Term Priority Environmental Action Program (SMAP) III Gökova project² - Preparation of Integrated Coastal Zone management for the Inner Gökova Bay and Sedir Island (2006-2009), was co-ordinated by Muğla University and the project partners were the Governance of Muğla province, the Municipality of Akyaka and GDNAP (former EPASA). This study

evaluated the current economic activities in the area such as tourism, fishing and agriculture, and considered ways of enhancing the income of local communities. A review of the literature was combined with field surveys to provide an up to date overview of the scientific evidence for the site. This study covers 80% of the Gökova SEPA.

An Ecosystem Service Valuation Framework was developed for the assessment, which provides a comprehensive list of marine and coastal services provided at the site (see Section 3). This framework provides the basis for understanding the range of benefits provided by the marine ecosystem and the pressures that they face.

While it is clear that the marine, coastal and terrestrial ecosystems are interrelated in the area, this assessment is focused on the ecosystem services provided by the marine environment. They include coastal services, such as tourism and recreation to the extent that these are clearly dependent on the marine environment. However, given the importance of wetlands in the area, a high level qualitative assessment of Kadın Azmak (wetland) has also been undertaken (see Appendix 3).

1.3. Layout of report

The rest of this report is set out as follows: Section 2 provides an overview of the site and the pressures that it faces plus available information on the socio-economic characteristics of the area; Section 3 presents the marine ecosystem services typology and a qualitative assessment of the services provided by the site; Section 4 presents the valuation of individual ecosystem services where the required bio-physical and monetary data is available; Section 5 discusses potential financing mechanisms: and, section 6 concludes. Appendix 1 lists the people interviewed during field visits in March 2001, Appendix 2 presents the tourism survey instrument and Appendix 3 presents a qualitative analysis of Kadın Azmak.

¹ SAD-AFAG is a Turkish NGO, which specialises in the research and protection of marine and coastal habitats.

² SMAP III is the third stage of the European Union Short and Medium-term Priority Environmental Action Programme (SMAP)

BACKGROUND ON SITE



3

Gökova was declared a Special Environmental Protection Area (SEPA) in 1988 on account of its natural, historical and cultural significance. It covers an area of 307 km². Figure 1 presents a map of Gökova SEPA, indicating the location of wetlands (Kadın Azmağı, Akbük, Çınar and Akçapınar), vegetation and built up areas.

Gökova SEPA includes the following districts - Akyaka, Gökova, Akçapınar, Gökçe, Çamlı, Karacaköy and Çetibeli. Akyaka District, an important settlement in the northeast of the Gökova Gulf, is located 28 km away from Muğla, the Provincial capital. Akyaka is backed by abruptly rising pine covered mountains and features a number of beaches and the Kadın wetland, which meets the sea at Akyaka. Another significant area in the region is Sedir Island³ situated in the south of Gökova Gulf. The island is uninhabited and a popular tourist destination due to its rare ooid sands and tablets belonging to Hellenistic and Roman periods.

2.1. Biodiversity Overview

The area resembles typical Mediterranean coastline vegetation, flora and fauna (SMAP, 2010) and is mainly composed of untouched areas. *Erygium thorifolium*, an endemic flora species for Gökova, Datça and Sandras Mountains region has been identified at the site. High maquis strands composed of, for example, sandlewoods, gum tress and *Quercus caccifera* are also important.

Kıraç and Veryeri's (2010) literature review revealed 905 **Macrozoobenthic** species inhabiting the region, including 23 threatened species. Field work undertaken in 2010 identified 6 threatened species - *A.aerophoba* (Porifera), *L.lithophaga*, *P.nobilis* (Mollusca), *P. lividu* (Echinodermata), *S.latus* (Crustacea) and *T.galea* (Mollusca). With the exception of the sea urchin *P.lividus* and gold sponge *A.aerophoba*, all these species were only represented by a few individuals. Alien species such as echinoderm *Synaptula recipocans* are present at the site, but due to the lack of data, the impact of alien invertebrates is unknown. In terms of species richness Boncuk bay and Bördübet ranked first and last respectively.

³ Also known as Ketra, Setra, Sedir or Schirlioglu island

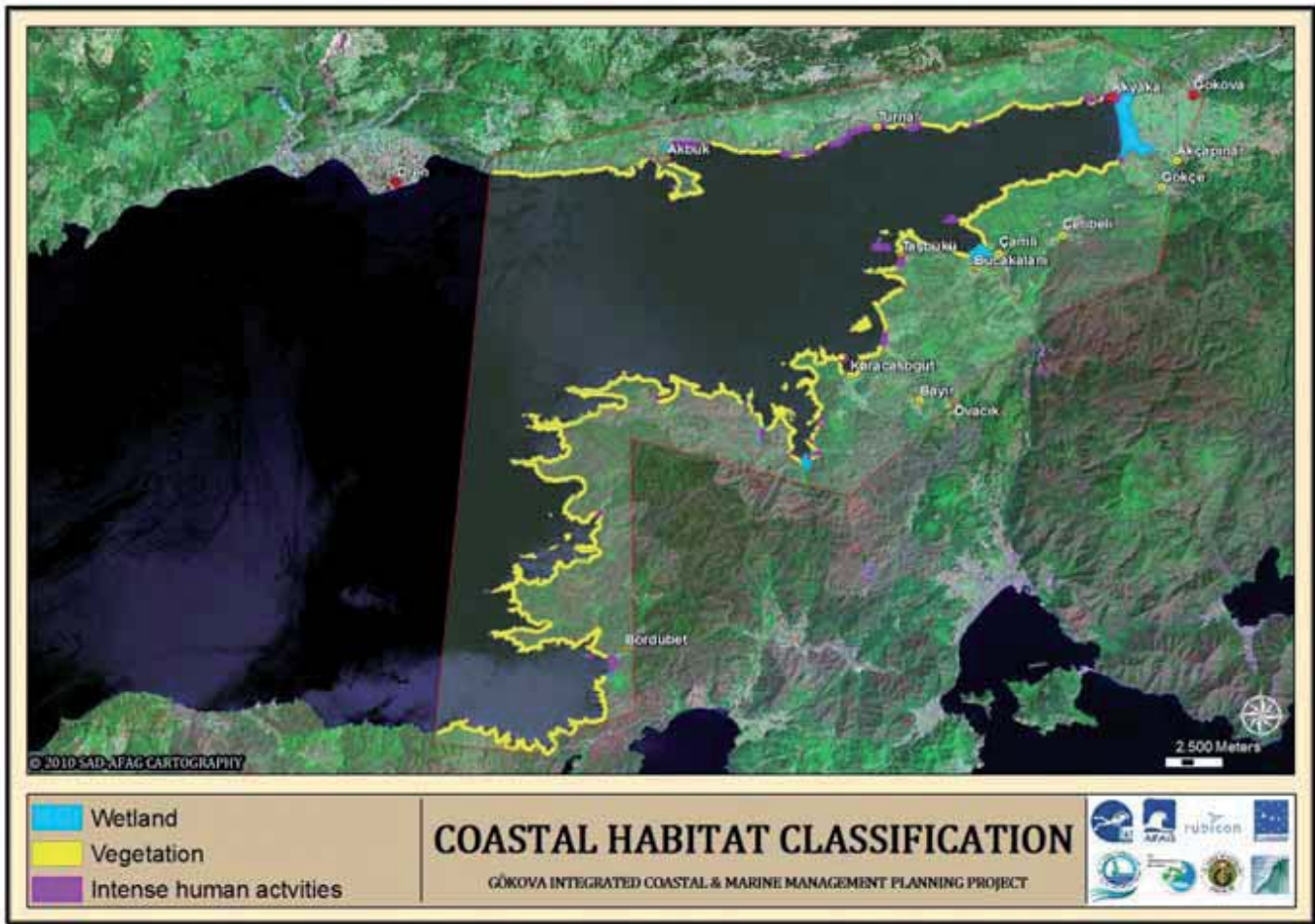


Figure 1. Map of Gökova SEPA (Source: Kiraç and Veryeri, 2010).

A literature survey by Kiraç and Veryeri (2010) revealed the presence of 352 **fish species** in the area, comprising almost 73% of all fish species in Turkey, including 24 threatened species. Surveys revealed 71 fish species belonging to 31 families in Gökova Bay. Boncuk Cove has the highest number of fish species (52) followed by Karaca (38 species). The lowest number of species was recorded at Bordubet. Six species, known to have a common distribution along the entire Aegean Sea coasts were present at all localities: damselfish (*Chromis chromis*), Mediterranean rainbow wrasses (*Coris julis*), two banded sea bream (*Diplodus vulgaris*), gray mullet (*Lioza sp.*), painted comber (*Serranus scriba*), and silver cheeked toadfish (*Lagocephalus sceleratus*).

An analysis of fish resilience revealed that the majority of species (91%) fall into the category of high and medium resilience. These species are

characterized by their fast (or moderately fast) growth, with relatively short life spans.

Alien puffer fish (*Lagocephalus sceleratus*), is regarded as one of the 'worst alien fish' of the entire Mediterranean Sea. Several local fishermen have reported its harmful effects to fishing gear, but many are unaware of its toxic features (Kiraç and Veryeri 2010).

The site is one of the world's well known nursery grounds for the endangered **sandbar sharks** (*Carcharhinus plumbeus*). At certain periods of the year, sandbar sharks come to breed at Boncuk, but are threatened by fishing activities and waste waters discharged by boats.

Kiraç and Veryeri (2010) identified 142 **bird species** within Gökova SEPA. The most important bird areas include: Gökova wetland and plain

(including the dunes along the coast), Çamlı wetland and delta and Karaca. The southern part of Gökova wetland is the richest and at the same time the most sensitive part of the SEPA. Important bird species include - Osprey (*Pandion haliaetus*), Eleonora's Falcon (*Falco eleonora*), Bonelli's Eagle (*Hieraaetus fasciatus*), Shag (*Phalacrocorax aristotelis desmatestii*), Audouin's gull (*Larus audouinii*), Caspian tern (*Sterna caspia*), Kruppers' Nuthatch (*Sitta kreuepen*) and Rueppel's warbler (*Sylvia rueppeli*). Bird populations are threatened by coastal and wetland habitat destruction, hunting pressures and poaching.

There are estimated to be 5 to 9 **monk seals** occupying Gökova SEPA, which are thought to interact with the monk seals occupying Datça SEPA. The most important monk seal habitats exist along the northern coast of Gökova SEPA between the north border (just next to Ören town) known as Focinier and Çınar beach in the east, where there are 9 caves suitable for breeding and at least 30 caves and caverns suitable for resting. The western part of the north coast of Gökova SEPA is considered particularly important for monk seals as adult females have been observed.

2.2. Pressures

The main pressures facing the site are summarised in Table 1 and include illegal fishing, tourism pressures and pollution caused by the use of agro-chemicals. An estimated 8% of the coastal areas are under direct influence of human activities in terms of man-made structures - human settlements, hotels, coastal facilities such as piers, docks and roads (Kıraç and Veryeri (2010).

Pressures on the site are both caused by and impact the viability of a range of sectors highlighting the need for different Government Ministries to co-ordinate their management of the area. An analysis of the pressures facing Gökova SEPA is also presented in Kıraç and Veryeri (2010) and SMAP (2010).

Table 1. Overview of Pressures

Pressure	Description	Policy Driver / Context	Sector Responsible
Over fishing / Illegal fishing	Fishing cooperatives in the area estimate that approximately 2.5 tons of groupers, 1 ton of dentex and 1.5 - 2 tons of seabass are illegally caught in one season (Unal & Erdem 2009a). Illegal spear-fishing is of particular concern. The illegal catch of white grouper is thought to be higher than the legal catch by the cooperatives. Illegal fishing by outsiders negatively impacts the livelihoods of local fishing communities.	6 No-take zones were introduced in 2010 in an effort to regenerate fish stocks in the area. However, ineffective monitoring and control means that illegal activities, especially the use of spear gun fishing, continue. Without proper monitoring and control the no-take zones will be ineffective.	Fishery
Boat anchors	Fishing by big boats (e.g., purse seiners and trawlers) is prohibited in the Inner Gökova Bay, but does occur resulting in serious damage to the fish nursery and the stocks in the region. Mediterranean endemic species <i>Posidonia oceanica</i> (seagrasses) have decreased significantly or become extinct in the beds of the inner bay, mainly due to the damage caused by anchoring of tour boats and fishing boats (SMAP III). Posidonia beds on some spots such as the south coast of Tuzla Bay may be affected by boat anchors.	A scheme to mitigate the impact of anchoring on the marine environment in another SEPA, site - Göcek-Dalaman coves, commenced in 2009 with the creation of 50 mooring sites. Each mooring site is estimated to reduce/stop the degradation of at least 30 m ² of posidonia beds. A similar mitigation scheme is foreseen for Gökova SEPA as part of the management plan.	Fishing, Tourism

Table 1. Overview of Pressures

Pressure	Description	Policy Driver / Context	Sector Responsible
Tour boats	Tour boats discharge their bilge water to the sea and consequently at the start of the tourism season nitrate and phosphate concentrations increase (SMAP III). Çamlı, Akbük and Tuzla Bays face pollution from oily discharges from tour boats and private and charter yachts The solid and liquid wastes of bigger boats arranging 'blue tours' in Gökova Bay also contribute to marine pollution. There are an estimated 10,000 Blue Voyage boats in one season, half of which are illegal. They travel from Bodrum to Gökova peninsula and result in 500 tons of organic water, 50 tons of septic waste and 850 kg of boat oil.	Generally tighter regulation of soil and liquid waste by tour boats is required. (limitations of the boat numbers, especially unlicensed Blue Voyage boats)	Tourism
Solid waste	Solid waste and litter is a problem within the SEPA. For example, soil waste is dumped in the Gökova and Cıtlık riverbeds and Akbük bay has problems with solid waste during the summer months. Litter is a particular problem at semi-enclosed inlets preferred by daily tour boats Long Delta Beach between Akyaka and Gökçe are not well maintained and suffer from the dumping of rubbish which is no longer collected	Under staffed local municipalities and low budgets. Poor prioritisation of infrastructure needs.	Tourism Households
Waste water sewage	There is no sewage system in Akçapınar, Gökçe, Çetibeli, Çamlık, Taşbükü, Bucakalını, Akbük and Turnalı villages. In Akyaka and Gökova a partially functioning sewage system is in place Several coastal establishments (hotels, restaurants, camping facilities) lack essential wastewater treatment facilities, which can easily impact food web dynamics (due to a rapid change in nitrogen and phosphorous values) and lead to eutrophication.	Lack of sewage treatment systems. Lack of municipal funding and corruption	Tourism Households
Pesticides / chemicals	Agricultural chemicals and run-off is evident in Turnalı bay and vicinity and in the delta plain between Akyaka and Gökçe. Agro-chemicals seriously affect marine species, especially fish, water birds, marine reptiles and marine mammals. Agricultural pollution has been cited among the reasons for the decline in the fish productivity in recent years.	The use of agro-chemicals requires regulation. GDNAP's promotion of organic agriculture within SEPAs remains ineffective (due to weak implementation capabilities)	Agriculture
Coastal developments	There is evidence of massive construction activities in Taşbükü bay - a pristine coastal area located between Çamlı and Boncuk Bays in the southern costs of Gökova SEPA. Road construction is occurring between Gökova and Akbük. This is causing coastline erosion. Extracted materials have affected coastline habitats in some cases. One of the most important factors affecting the area is the highways, passing through or by the area and the rehabilitation or expansion of the highways, which can result in disruption and pollution of the natural habitats, disturbance and extinction of species. The jetties at the points where Kadin Creek in Akyaka and Akçapınar Creek join the sea cause coastal erosion.	The road expansion works should be based on careful planning including consideration of the transportation capacity Tourism Incentive Law No 2634 promoted tourism investment by simplifying procedures regarding the allocation of private lands. In 1984 Municipalities were given the authority to approve proposals, previously within the power of the Ministry of Public Works. Between 1980 and 1990 the dynamics of coastal ecosystems were not taken into account when determining the capacity of tourism areas. Lack of enforcement of the existing conservation laws and lack of monitoring.	Tourism Urban development
Illegal hunting	There is evidence of hunting at Akbük wetland, Çamlı (Gelibolu wetland), Gökova plain, Bördübet and Amazon. Hunters shoot song birds, water fowl and wild boat. Wild boats can be sold to restaurants / hotels for 150-250TL	Better enforcement is needed	Illegal hunters

Source: SMAP (2010), Kiraç and Ververi (2010) and information from field visit April 2011.

2.3. Socio-economic characteristics of site⁴

According to the State Planning Agency (2003), the Aegean region is Turkey's second most developed geographic zone and Muğla ranks as the 13th most prosperous province in the country. Employment in the Southern Aegean Region comprises 28% in agriculture, 26.8% in services including tourism, 22% in commerce and 22% in industry (TUIK 2009).

Socio-economic information on Inner Gökova bay is provided in SMAP III⁵. The population of Inner Gökova bay is approximately 8,356 (2007 Address-Based Census). Household income is derived from: agricultural production and stock farming 19%; tourism (salaried) 33%; retired 24%; hotel and hostel operation 7%; small tradesmen 6%; other 8%; and, fishery 3%. While overall agriculture is the main activity, soil quality is declining and farmers are finding it harder to earn enough to survive. Agriculture is also not appealing to the young and the agricultural workforce is ageing. The primary source of income differs from one town or village to another - fishing, boat owning and tourism in Akyaka; fishing in Akçapınar; agriculture and boat owning in Çamlı; and, agricultural production in Çetibeli and Gökçe Villages.

In **Akyaka** around 500 people are employed in tourism. In addition there are 60 households involved in fishing and 15 households in agricultural activities such as growing olive trees and sesame. In general people are moving towards tourism and a dependence on other areas for the provision of agricultural products. Some people are reportedly exploring agri-tourism activities. According to the mayor of Akyaka, between 60-80% of Akyaka's economy is dependent on the coast, therefore marine protection is important for the economy. The unemployment rate at Akyaka is 8%, compared to 3% for the region.

Akçapınar has a population of approximately 516. Around 70% of the population is engaged in fishing, 10% in animal husbandry, 10% in farming and 10% work outside Akçapınar. Due to the shortage of jobs in the village, around 40% of the young are estimated to work in the tourism sector in Marmaris.

Sarnıç is a village located 10 km away from Akbük. There are 12 professional and 5-6 semi professional fishing vessels in Akbük. All the owners of professional fishing vessels are members of Sarnıç-Akbük Fishery Cooperative.

The main source of income in **Çamlı Village** is farming, animal husbandry, beekeeping, fishing and tourism. There are 20 boats used for tours to the Sedir Island. **Turnalı** depend on farming (vegetables and olives), beekeeping and animal husbandry.

Sources of income in the Town of **Gökova** are farming, animal husbandry, service sector (paid work in Marmaris Aksaz), retirement pension (70% of town people are retired) and tourism. The principal source of income in the **Gökçe Village** is farming and animal husbandry. Another source of income is transportation.

Around 40% of the population have incomes below the minimum wage; this ranges from 16% in Akyaka to 64% in Turnalı. Around 7 % of the population moved to the region within the last 5 years, 15% have been living in the area for the last 5-10 years, 15% for 11-15 years, 13% for 16-20 years and 49% for 20 years or more. In terms of educational attainment, 63% are primary school graduates, 22% are elementary school graduates and 11 % are higher education graduates. The socio-economic characteristics of fishermen within Gökova SEPA are discussed in more detail in Section 4.1.1.3.

⁴ This section is largely based on (SMAP III, 2010)

⁵ Socio-economic data specific to Gökova SEPA is not available.

QUALITATIVE ASSESSMENT OF ECOSYSTEM SERVICES



4

3.1. Marine Ecosystem Services Typology

A typology of marine and coastal ecosystem services has been developed for this study following the ecosystem service approach (ESA), which is based on the Millennium Ecosystem Assessment (2005) classification of ecosystem services into the following four categories:

- *Provisioning services* relate to the tangible products, such as fish and pharmaceuticals, provided by marine ecosystems
- *Regulating services* refer to the marine environment's natural processes such as waste assimilation and carbon sequestration that contribute to social wellbeing.
- *Cultural services* may be associated with both use and non-use values and relate to the non-material benefits obtained from ecosystems, for example, through tourism and educational use of the marine environments.
- *Supporting services* are necessary for the production of all other ecosystem services (e.g. soil formation or nutrient cycling). They differ from the other services in that their impacts on people are either indirect (via provisioning, regulating or cultural services) or occur over a very long time.

The ESA explicitly recognizes that ecosystems such as marine environments and the biological diversity contained within them contribute to individual and social wellbeing. Importantly it recognizes that this contribution extends beyond the provision of goods such as fish to the natural regulating functions of marine ecosystems such as carbon sequestration. The ESA therefore provides a framework for considering whole ecosystems in decision making and for valuing the services they provide.

It is important to note that economic valuation is focussed on the 'final benefits' or 'outcomes' realised by society from the services marine ecosystems provide, not the services and functions that contribute to those outcomes. This is to avoid double counting. The benefits generated by supporting services, while fundamental to the provision of final benefits, are not valued independently as they are intermediate benefits which contribute

to the provision of a range of final benefits. Their value is captured in the valuation of the final outcomes associated with the services they support. Supporting services include soil formation and retention, primary production and habitat provision⁶.

Health is also not explicitly listed as an ecosystem service as health benefits are considered to be provided by a range of services such as fish, flood protection benefits and a clean environment for recreation. The health cost associated with a deterioration in these services may be used to measure the benefits provided by the marine ecosystem. Biodiversity is also considered to be cross cutting, the final benefits of which could be associated with a range of services. An exception is biodiversity non-use which is listed a separate service.

Table 2 provides a typology of marine ecosystem services and a qualitative assessment of the marine ecosystem services provided at Gökova SEPA. Each ecosystem services has been rated as follows: ‘**’ means that the service is important, ‘*’ means that the service is provided, ‘-’ means the service is not relevant at the site, and ‘?’ means that there isn’t enough information to determine whether the services is present or not, so its provision is uncertain. Table 2 also identifies the sectors that are supported by (or benefits from) the provision of each ecosystem service and the sectors that can influence the quality and quality of that service.

The typology presented in Table 2 does not include marine sub-habitat types, which can include hard beds; rocks, muds, sands, gravels, sea-grass meadows and caves. The extent of services provided will depend on the specific sub habitat type. The available data at Gökova SEPA did not warrant this level of detail, with the exception of the posidonia meadows (seagrasses) which form a key input into the economic valuation. In support of this approach Austen et al, 2010 states that In the case of the marine environment the spatial

data is less essential, as most marine environments deliver most marine ecosystem services, albeit to differing amounts.

3.2 Provisioning services

3.2.1 Food

The two main food products provided by Gökova SEPA are fish and salaconia.

3.2.2 Raw materials

These products relate to the extraction of marine organisms for all purposes other than human consumption. Marine raw materials include seaweed for industry and fertilizer, fishmeal for aquaculture and farming, pharmaceuticals and ornamental goods such as shells. The provision of genetic resources, natural medicines and ornamental products at the site is unknown.

3.3 Regulating services

3.3.1 Regulation of GHGs

A key service provided by marine ecosystems is their capacity to sequester carbon dioxide. The ocean is estimated to hold about one third of all anthropogenic CO₂ emissions and has two interconnected CO₂ absorption circuits: the biological pump and its physico-chemical counterpart. At the global level, the latter has been responsible for most of the capture of CO₂ of human origin, while the biological pump is consider still be working as it did before the dawn of the industrial age (Nellemann *et al*, 2009). The sequestration of CO₂ emitted by human activities by the physico-chemical pump (through a process of solubility), shows little dependence on ecosystem quality. However, it leads to the gradual acidification of the oceans, which will have a considerable effect on marine ecosystems and the living resources produced, particularly in the Mediterranean (CIESM, 2008;

⁶ Many organisms provide living habitat through their normal growth, for example, reef forming invertebrates and meadow forming sea grass beds. ‘These ‘natural’ marine habitats can provide an essential breeding and nursery space for plants and animals, which can be particularly important for the continued recruitment of commercial and/or subsistence species. Such habitat can provide a refuge for plants and animals including surfaces for feeding and hiding places from predators. Living habitat plays a critical role in species interactions and regulation of population dynamics, and is a pre-requisite for the provision of many goods and services’ (Beaumont et al 2007).

Table 2. Qualitative assessment of marine ecosystem services and benefits at Gökova SEP

ES Type	Service	Benefit / outcome	Marine Area	Sectors supported by ecosystem service	Sectors impacting / influencing the provision of ecosystem service
Provisioning Services	Food	Commercial and subsistence fish and wildlife	**	Households, Fishery, Tourism	Households, Fishery, Agriculture, Industry
	Raw materials	Industrial purposes - seaweed	-	Households, Industry (construction materials)	Households, Industry
		Natural medicines obtained from marine dependent species	?	Household	Households, Fishery, Agriculture, Industry
		Genetic resources - variety in gene pool in marine flora and fauna	?	Agriculture	Fishing, Tourism, agriculture
		Ornamental resources – e.g., shells used as jewellery, handicrafts	?	Industry	Industry, Fishing, Tourism
Source of energy (fuel etc)	Energy provision e.g., tidal power	-	Energy Households		
Transport	Commercial use of waterways	-	Industry		
Regulating Services	Regulation of GHGs	Carbon sequestration	**	Potentially all	Potentially all
	Micro-climate stabilization	Influence on temperature, precipitation, wind, humidity etc	*	Potentially all	Potentially all
	Disturbance regulation	Flood and storm protection	*	Tourism, Industry, Households/ Urban Settlement, agriculture	Potentially all
		Erosion control	*	Tourism	Potentially all
Waste assimilation	Detoxification of pollution Water purification	*	Tourism Industry	Potentially all	
Cultural Services	Spiritual, religious, cultural heritage	Archeological ruins (historical not recreational value). Use of marine environment in books, film, painting, folklore, national symbols, architecture, advertising	?	Tourism, Households	Potentially all
	Educational	A 'natural field laboratory' for understanding marine processes	*	Households	Potentially all
	Recreation and ecotourism	Recreational fishing, birdwatching, hiking, diving, sailing, canoeing, Holiday destination (aesthetic views) , archeological ruins (historical not recreational value)	**	Tourism	Potentially all
	Landscape and amenity	Property price premiums	**	Tourism	Potentially all
	Biodiversity non-use	Enhanced wellbeing associated for example with bequest or altruistic motivations	*	Potentially all	Potentially all

Code: ** service important, * service provided, - service not relevant, ? uncertain of provision



Gambaiani et al, 2009). This issue, about which little is yet known, is the subject of many initiatives currently underway (Orr, 2009) and a European research programme including the socioeconomic consequences is set to be launched in the near future.

At the local level, the flow of carbon from the surface towards the sediment depends on biological processes, which in turn depend on ecosystem quality (and does not lead to the acidification of the environment).

About 35-50% of the carbon production of the coastal ocean is estimated to be a result of the photosynthesis by marine macrophytes including seagrasses (Duarte and Cebrian 1996). These marine plants have a global average biomass of about 180 g C m⁻² and an average net production of about 400 g C m⁻² yr⁻¹, ranking amongst the most productive ecosystems in the biosphere (The Encyclopedia of Earth 2011).

In the Mediterranean the matte (sheaths and rhizomes) produced by the *Posidonia* meadows store a carbon flow, which has been estimated at 1.2 million tonnes of carbon per year (Pergent, 1997). Thus the preservation or restoration of these coastal ecosystems contributes to the sustainability of this ecosystem service. The Mediterranean *Posidonia* accumulates in its subsurface large quantities of organic material derived from its roots, rhizomes and leaf sheaths embedded in often sandy sediments (Lo Iacono et al 2008). These organic deposits can reach up to several meters as they accumulate over thousands of years forming what is known as matte, whose high content in organic carbon plays a crucial role in the global carbon cycle (ibid). *Posidonia oceanica* is considered

to be one of the most extensive coastal reservoirs of CO₂ because of the preservation of this matte along the Mediterranean coasts over time (Duarte et al 2005). This in-situ accumulation of large quantities of biogenic materials over millennia is an important ecological phenomenon and occurs only in few ecosystems such as peats, coral reefs and mangroves besides seagrass meadows (Mateo et al 1997).

Despite their global importance, there is growing evidence that seagrasses are experiencing an unprecedented level of damage and deterioration (Orth et al 2006). It is estimated that seagrass meadows are being lost due to anthropogenic ecosystem impacts at a rate of up to two football fields per hour, roughly similar to tropical rainforest conversion (Unsworth & Unsworth 2010).

Gökova SEPA is rich in seagrasses. *Posidonia* beds which are located at a depth of between 0 and 30m were mapped at the following coasts by Kırac and Veryeri (2010): Northern coasts of the Gökova SEPA, Boncuk bay, Yediadalar; the four southern islands and adjacent coasts of Gökağaç Limanı, Karagac Limanı, Sakli Cove, Kufre Cove; Bördübet Limanı, between Mersincik Burnu at the north; and, Gökova SEPA border at the south. The total area of *Posidonia* (calculated by GIS) is 13,005,918 m². Around 92% of the *Posidonia* distribution in Gökova SEPA exits within the southern coast area (i.e., coasts of the South, south-west of Gökova settlement). Figure 2 illustrates the distribution of seagrasses within Gökova SEPA.

Posidonia can provide a range of regulating services, in addition to carbon sequestration, as discussed in Box 1.

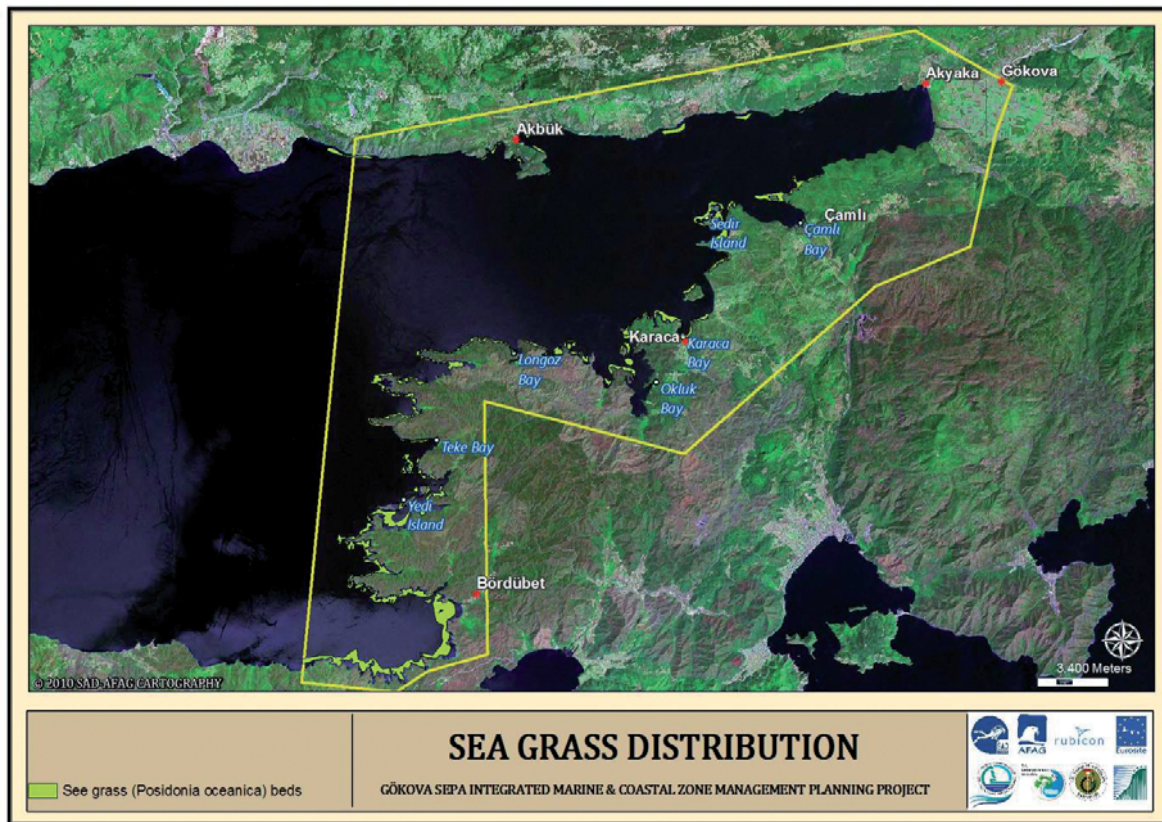


Figure 2. Distribution of seagrasses in Gökova SEPA (Source: Kırac and Veryeri, 2010).

Box 1. Seagrass meadows (*Posidonia oceanica*)

Posidonia oceanica are a type of land-based flowering plant, which returned to the marine environment some 120 to 100 million years ago. They form vast underwater meadows (also known as beds) at a depth of between 0 and 50 metres in the open seas and in the brackish and saltwater coastal lagoons. *Posidonia oceanica* is endemic to the Mediterranean and a highly productive system supporting high levels of biomass (Lo Iacono *et al* 2008). Despite being endemic its distribution is restricted due to anthropogenic disturbances; their total surface area within the Mediterranean is about 38,000 km² (Mangos *et al* 2010).

Posidonia seagrass communities provide a wide range of Ecosystem Services:

- The *Posidonia* meadows are the leading Mediterranean ecosystem in terms of biodiversity provision, supporting a quarter of its recorded marine species over an area estimated to cover almost 1.5% of the seabed.
- They serve as spawning grounds and nurseries for many commercial species and the source of major primary production, thereby supporting the fishing industry.
- They protect beaches against erosion (by reducing hydrodynamism and by trapping sediment in the mat). The dead leaves of *Posidonia oceanica* found on shores act as a natural barrier reducing the energy of the waves and minimizing erosion. They also play an important role in beach and dune systems.
- They encourage water transparency, thereby supporting tourism and providing an effective tool for monitoring the quality of coastal waters.
- They trap and absorb man-made CO₂. According to a recent report seagrasses are the most effective species in terms of long-term carbon storage (Laffoley and Grimsditch, 2009).
- They produce oxygen and are known as the “lungs of the sea” with +/- 14 lt O₂/m²/day capacity on average
- They cycle nutrients through their plant growth.
- They operate as coastal water filters. Subsurface rhizomes and roots stabilize the plant while erect rhizomes and leaves reduce silt accumulation.

Source: Based on Mangos *et al* 2010

3.3.2 Micro-climate stabilization

Oceans play a role in regulating the atmosphere and modulating weather. While it is thought that this ecosystem services is provided by Gökova SEPA, there are no scientific studies defining this service.

3.3.3 Disturbance Regulation

Flood and storm protection. Marine flora and fauna can help defend coastal regions by dampening and preventing the impact of tidal surges, storms and floods. This disturbance alleviation service is provided by a diverse range of species, such as salt marshes, mangrove forests and sea grass beds, which bind and stabilize sediments and create natural sea defences (Huxley, 1992; Davison and Hughes, 1998 as reported in Beaumont *et al* 2007). These natural sea defence systems protect infrastructure and investments in vulnerable coastal areas, and would need to be replaced by man-made alternatives if damaged or lost. This service is important in Turkey given the concentration of socio-economic activities on Turkey's coasts; 27 of Turkey's provinces border the sea and 30 million people live by the coast (UNDP, 2010). It is also considered important in Gökova SEPA, given the communities that live along the coastline and the importance of tourism infrastructure.

Coastal erosion is a natural phenomenon widely observed in the Mediterranean, particularly in coastal zones with soft substrate. According to the European Environment Agency (EEA, 2006) 20% of European coasts are threatened by erosion (i.e. around 20 000 km).

The Mediterranean's *Posidonia* meadows provide protection against erosion through three main functions. Firstly, its foliage, which limits hydrodynamics by 10 to 75% under the leaf cover (Gacia *et al.*, 1999). Secondly, the banquettes formed by its dead leaves and rhizomes on beaches - that can reach a height of between 1 and 2 metres - builds a structure that protects the coastline against erosion (Guala *et al.*, 2006, Boudouresque *et al.*, 2006). Thirdly, the *Posidonia* matte traps sediment (Dauby *et al.*, 1995, Gacia and Duarte, 2001), thus contributing to their stability. Jeudy de Grissac, 1984 estimated that the degradation of a one meters thickness of *Posidonia* duff could lead to the coastline retreating by twenty meters.

According to Kruger *et al*, 2004, large sections of the beach area in the Gulf of Gökova are suffering from erosion and over the last 35 years the beach line is estimated to have receded by 40 to 70m. The previous dense vegetation of Oleander, Tamarisks, Willow and Pine Trees can be recognized by remains of roots and shoots, which are now partly submerged. The erosion process around Kadın Azmak increased following the clearing of beach vegetation, construction of a wave breaker and pier and repeated dredging of the harbour.

3.3.4 Waste remediation

A significant amount of human waste, both organic and inorganic, is deposited in the marine environment. This waste would require additional treatment if it were to be taken up by terrestrial systems, and therefore would entail increase treatment costs. Marine living organisms store, bury and transform many waste materials through assimilation and chemical de and re-composition (Beaumont *et al*, 2007). The capacity of marine ecosystems to absorb, detoxify, process and sequester waste shows a wide variation. Some toxic pollutants, such as heavy metals, cannot be converted into harmless substances, whereas some organic waste can even encourage ecosystem development through its biomass and benefit ecosystems. Marine ecosystems provide an ecosystem service for the quantity of waste below the threshold at which it becomes harmful to them (Mangos *et al* 2010).

While this service is thought to be provided by Gökova SEPA, there are no site specific studies defining or quantifying this service for the area.

3.4 Cultural Services

3.4.1 Spiritual, religious and cultural heritage

The marine environment may be linked to the cultural identity of a community, or associated with religion, folk lore, painting, cultural and spiritual traditions. Communities that live by and are dependent on the sea for their livelihood often attach special importance to marine ecosystems that play a significant role in the economic or cultural definition of the community (Beaumont *et al* 2007).

Gökova SEPA is considered to have a strong water heritage. The NGO Friends of Gökova-Akyaka are currently undertaking a study as part of the Euromed Heritage 4 program of the European Commission; the study's objective is to rediscover the Mediterranean's water heritage. While studies of the spiritual, religious and cultural values specific to the marine environment have not been undertaken it is clear that within Gökova SEPA a number of communities have developed in and around its bays and traditional (small-scale) fishing is still important to a number of households.

Akyaka was the location of the historic city of Idyuma and has remains reaching back to at least the 4th century B.C. when it was founded as a Carian city. The Idyuma urban zone may have extended from the immediate east of Akyaka to the village of Kozlukuyu, three kilometers away. The acropolis, 200 meters of city walls and several rock tombs are located along a steep climb 600 meters above sea level. The acropolis was explored by the French archaeologist Louis Robert in 1937. Today Akyaka is well known for its distinct architecture based on the designs of Nail Çakırhan, who combined the traditional building style of his hometown Ula with the necessities of common life. In 1983 he was awarded the Aga Khan Prize for Architecture for the house he built in Akyaka.

Building on its cultural heritage, Akyaka hopes to become a 'Slow City.' This could change the quality of tourism in the area (see Box 2).

Box 2. Akyaka's bid to become a 'Slow City'

Cittaslow is a movement founded in Italy in 1999, which now has a growing international network of over 120 towns in 18 countries across the world that has adopted a set of common goals and principles. Cittaslow towns aim to support local businesses, foster local traditions, protect the environment, welcome visitors and encourage active participation in community life.

Seferihisar, 50 km west of Izmir, became Turkey's first slow city in October 2009 and Akyaka is in the process of becoming Turkey's second. Akyaka aims to develop a world-renowned boutique holiday resort that respects nature (including organic agriculture and sustainable fisheries management), preserves its architectural heritage, promotes local traditions and food, and focuses on sustainable ecological tourism. Cittaslow accreditation will brand the area, and help to attract more domestic and international tourists throughout the year.

3.4.2 Education and research

Marine living organisms provide stimulus for education and research. Beaumont *et al* (2007) cites a number of uses of marine information including: the study of microbes in marine sediments to develop economical electricity in remote places; the inhibition of cancerous tumour cells; the use of *Aprodite* sp. spines in the field of photonic engineering, with potential implications for communication technologies and medical applications; the development of tougher, wear resistant ceramics for biomedical and structural engineering applications by studying the bivalve shell. In addition, marine biodiversity can provide a long term environmental record of environmental resilience and stress.

There have been a number of scientific studies of Gökova SEPA underpinning the development of an action plan for the area and the potential of further studies of the areas important biodiversity including its *Posidonia* meadows is significant. The site can also be used to educate school children and visitors of the services offered by the marine environment.

3.4.3 Recreation and Tourism

Marine ecosystems provide the basis for a wide range of tourism and recreational activities, resulting in significant employment opportunities for coastal communities and contributions to GDP. Tourism is an important activity within Gökova SEPA and closely linked to the marine environment. A range of marine based recreational activities are currently offered including kite surfing, boat tours and sailing.

3.4.4 Landscape and amenity

Landscape and amenity services provided by marine ecosystems attract tourists and generally make the area an attractive place to visit and live. This benefit can be captured through property price premiums in the area and the returns to coastal businesses (restaurants and hotels) relative to non-coastal businesses.



3.4.5 Biodiversity non-use

Biodiversity non-use relates to the benefits people derive from marine organisms unrelated to their use. Such benefits can be motivated by bequest values (the value placed on ensuring the availability of marine ecosystems for future generations), and existence value (a benefit derived from simply knowing that the marine ecosystem biodiversity exists).

3.4.6 Option value

Option value relates to currently unknown potential future uses of marine biodiversity and reflects the importance of more uses being discovered in the future. The biodiversity may never actually be exploited, but there is benefit associated with retaining the option of exploitation.

VALUATION OF ECOSYSTEM SERVICES



7

In 2008, a World Bank study put the total annual figure for all marine ecosystem services at more than US\$20 trillion. This estimate only accounted for the marine ecosystem goods and services for which a market already exists and is therefore considered to be an underestimate.

This section presents, where possible, monetary estimates for the ecosystem services identified in Table 2 as being present at Gökova SEPA. The monetary estimates have been derived using market pricing or value transfer valuation approaches. Market price approaches include the use of market prices to value traded ecosystem services and also the so called cost based approaches. The use of **market prices** for marine ecosystem services that are traded reflect a lower bound estimate of its value, as they do not capture the consumer surplus⁷ element of value. They are therefore only proxies of welfare value. However, such estimates are still very informative and relatively straight forward to derive. **Cost based approaches** take the cost of replacing a service or averting a damaging impact on a marine resource as a proxy for the value of the benefits provided by the marine environment. They suffer from the same complications as market prices and risk the under-valuation of non-market goods

Value transfer (also called benefits transfer) involves the application of values from an existing study (often called the 'study site') to a new study (often referred to as the 'policy site') where conditions are similar and a similar policy context is being investigated. Value transfer is a practical means of demonstrating the monetary value of marine benefits. It is cheap and quick relative to primary research, but there are a number of factors which influence the reliability of the transfer exercise. The quality of the original study is obviously a key consideration for value transfer applications. In order to minimize errors / uncertainty, the primary research study should be based on adequate data and a theoretically sound approach. The degree of similarity between the study site and the policy site is also a major factor. Value transfer will be more reliable if the policy

⁷ Consumer surplus is the amount an individual is willing to pay above the market price. The price reflects the cost of obtaining a good, not the actual benefit derived from its 'consumption', which is equal to the market price plus consumer surplus.

site is located within the same region / country as the study site, and displays similar site characteristic (e.g. size, services and availability of and distance to substitutes). Other factors affecting the reliability of the value transfer exercise include: the reference condition (i.e., how closely the baseline at the study site matches the baseline at the policy site); the proposed change in the provision of the service (i.e., the magnitude of the change and whether the valuation is of a change in the quantity or the quality of an attribute); and the range/ scale of the commodity being valued (e.g., one site or many sites valued and physical area).

As well as providing *welfare measures* an attempt has been made to illustrate the importance of these ecosystem services in terms of the jobs they create and their contribution to local livelihoods.

The marine ecosystem services valued are – fish, salicornia, carbon sequestration, protection against coastal erosion, waste treatment and tourism and recreation. Where relevant, background is provided on these services – i.e., physical (quantitative) data, management structure, pressures and opportunities for development. For the regulating services (carbon sequestration, protection against coastal erosion, waste treatment) a review of relevant valuation evidence for the region is also presented.

4.1 Provisioning Services

4.1.1 Fish

4.1.1.1 Background

The fisheries of Gökova are relatively well studied, and this section draws on work by Ünal & Erdem (2009b), Ünal (2010) and Kırac and Veryeri (2010).

There are three fishery co-operatives in Gökova SEPA. The oldest cooperative – Akçapınar Fishery Cooperative was founded in 1973⁸, while Akyaka Fishery cooperative was founded in 1992 and Sarni-Akbük Fishery cooperative in 1999. According to Kırac and Veryeri (2010) around 60% of small scale fishermen in Gökova SEPA are members of coopera-

tives, while Ünal and Erdem (2009b) state that 87% of traditional fishermen in Inner Gökova Bay belong to the Akyaka or Akçapınar cooperative. Table 3 summarises some general characteristics of Akyaka and Akçapınar cooperatives. Sarni-Akbük Fishery cooperative is estimated to have 12 members.

Table 3. General characteristics of Akyaka and Akçapınar fishery cooperatives

Characteristic	Akyaka			Akçapınar		
	2004	2006	2008	2004	2006	2008
Registered members	29	35	40	26	30	30
Active members	24	26	32	26	30	10
Active member ratio (%)	86	74	80	100	100	33
Registered ratio	37	81	75	100	88	88
Non-members	-	8	13	-	4	4
Employees	2	2	2	2	2	2

Source: Ünal & Erdem 2009b

Box 3 presents additional information on Akyaka Cooperative, based on field interviews in March 2011.

Box 3. An overview of Akyaka Cooperative

The Akyaka Co-operative consists of 41 members, the majority of which (30 members) are totally dependent on fishing (others are also involved in agriculture). Fishing is practiced using long line/ paragat and the main species caught are seabream, red mullet and mackerel.

In the past shrimp were an important resource valued at 35-40TL/kg, but they have disappeared from the area. The reasons for this are unsubstantiated but could be related to pollution, sediment deposited in the sea following the 2004 earthquake or overfishing by trawlers. Groupers have also declined over past 10 years – due to illegal fishing. Hot water from a nearby thermal power station may also be affecting the hydrology and hence fish productivity.

The cooperative building also acts as a fish market and is open daily from 9am – 5pm. This cuts out the need for middlemen and as a result only 8% of cooperative members market their fish outside the cooperative (selling to restaurants or middlemen) compared to 57% in Akçapınar (Ünal & Erdem 2009b). The cooperative has data for the past 10 years on the quantity of fish caught and price. The price is determined by the cooperative and is adjusted at beginning of summer and winter to provide a fair price to customers. The co-operative takes 12% of revenue to pay for the rental of the building and salaries of 3 cooperative staff.

Source: Field interviews March 2011.

⁸ This was originally the Gökova and Akçapınar Region Fishery Co-operative. In 1992 the fishermen of Akyaka left the cooperative and founded the Akyaka Fishery Cooperative.

Small scale vessels dominate fishing activity, with fishing boats averaging around 8.1 meters in length. A trawler sometimes operates in the area and there are 3 purse seiners operating in the region.

In July 2010, six No-fishing Zones were declared covering a total area of 23km², or approximately 7% of the total marine area of Gökova SEPA (307 km²). The decision to designate these no-fishing zones was reached collaboratively with the area's three fishing cooperatives, The Ministry of Agriculture and Rural Affairs, GDNAP, the Undersecretariat for Maritime Affairs and the Turkish Coast Guard Command.

According to Dr. Mustafa Erdem (Muğla University) small scale fishermen face a number of challenges. It is dangerous for small boats to go far from the bay in bad weather and fish per unit of effort and incomes are declining. They would like to see the non-take zones reduced around Akyaka and Karacasöğüt. The biggest issue is that no-fishing in the no-take zones is not enforced and illegal activities threaten the sustainability of the fishery. Illegal spearfishing, which targets high value species such as groupers, is ongoing and tends to be highly organized and profitable.

There are currently 4 people responsible for patrolling the area but this is not enough for Muğla's 1,224 km coastline; the longest in Turkey. Furthermore fines are too low to discourage illegal activity. If caught a spear fisherman will be fined 700TL and their catch, worth up to 3,000TL, will be confiscated⁹. While the cooperatives support the no-take zones in the interest of a sustainable fishery, without strong enforcement they will not work and local fishermen will suffer.

4.1.1.2 Valuation

Table 4 reports the quantity and value of fish species in Gökova SEPA in 2009-10. The landing value is estimated at 332,854 TL (US\$ 207,550). Significant species in terms of value are Stripped mullet (*Mugil spp.*), Common Pandora (*Pagellus erythrinus*), Sea Bream (*Sparus aurata*), Dentex (*Dentex dentex*) and White Grouper (*Epinephelus aeneus*).

According to Ünal and Erdem (2009b), 90% of fish from traditional fisheries is marketed locally, that is sold to locals directly from the fishery cooperatives or to local restaurants and middlemen. The remaining 10% is sold to Fethiye, Bodrum, Izmir and Denizli.

Table 4. Quantity of fish marketed by Akyaka & Akçapınar cooperatives in Gökova 2009-2010

Common name	Latin Name	Landing Volume (kg)	Landing Volume (%)	Price/kg TL	Landing value (TL)	Landing value (%)
Goldblotch grouper ¹	<i>E. alexandrinus</i>	125	0.8	35	4,375	1.3
White grouper	<i>Epinephelus aeneus</i>	7,55	5.0	45	33,975	10.2
Dusky grouper	<i>Epinephelus marginatus</i>	45	0.3	30	1,350	0.4
Caramote prawn	<i>Panaeus kerathurus</i>	2	0.01	45	90	0.02
Octopus	<i>Octopus vulgaris</i>	800	5.3	15	12,000	3.6
Common Pandora	<i>Pagellus erythrinus</i>	2,650	17.7	25	66,250	19.9
Common sole	<i>Solae solea</i>	20	0.1	30	600	0.2
Gilthead Seabream	<i>Sparus aurata</i>	1,300	8.7	35	45,500	13.7
Two-banded sea bream	<i>Diplodus vulgaris</i>	480	3.2	15	7,200	2.2
Stripped mullet	<i>Mugil spp.</i>	2,400	16.0	30	72,000	21.6
Dentex	<i>Dentex dentex</i>	900	6.0	40	36,000	10.8
Goldband goatfish	<i>Upeneus molluccensis</i>	565	3.8	23	13,125	4.2
European hake	<i>Merluccius merluccius</i>	300	2.0	15	4,500	1.4
Barracuda	<i>Sphyraena sp</i>	295	2.0	15	4,425	1.3
Other species		4,352	29	7	30,464	3.2
TOTAL		14,989	100	22	332,854	100

Source: Ünal 2010

Note: A restaurant in Akyaka sells grouper for around 54TL/kg.

⁹ Other fines include 387 TL for fishing without a licence, and 1,562 TL for illegal use of lights by purse seiners

Table 5 shows the quantity and value of species caught in Gökova inner bay for the year 2006-2005 (Ünal & Erdem 2009b). This data also covers two cooperatives. Grouper are by far most significant species accounting for 31% of the total value, followed by shrimp (10%), octopus (9%) and Common Pandora and Common Sole both at 8%.

Based on the data presented the value of the fishery increased from 235,160TL in 2005/6 to 332,854TL in 2009/10, despite the catch being roughly 40% lower. This is explained by increased prices. For example, Grouper increased from 33.5TL to 45TL, Dusky grouper from 17.5TL - 30TL and Glod-blotch grouper from 21TL to 35TL.

Table 5. Quantity and Value of Fish Marketed in Gökova Inner Bay 2005-2006 (covers 2 co-operatives)

Species	Quantity (kg)	Average price ¹	Value (TL)	% of value
Octopus (<i>Octopus vulgaris</i>)	3,842	7.5	27,762	9
Amberjack (<i>Seriola dumerili</i>)	161	11.5	1,833	1
Hake (<i>Merluccius merluccius</i>)	1,642	5	5,711	2
Red Mullet (<i>Mullus spp</i>)	187	13	2,486	1
Narrow barred Spanish Mackerel (<i>Scomberomorus commerson</i>)	267	10	1,672	1
Leer Fish (<i>Licia amia</i>)	62	9	555	0.2
Gilthead Seabream (<i>Sparus aurata</i>)	938	25.5	23,295	7
Grey Triggerfish (<i>Balistes capriscus</i>)	210	5	752	0.2
Common sole (<i>Solae solea</i>)	824	30.5	24,643	8
Painted Comber (<i>Serranus cabrilla</i>)	120	5	312	0.1
Barracuda (<i>Sphyraena sp.</i>)	1,517	5	5,084	2
Horse Mackerel (<i>Trachurus spp</i>)	305	10	3,024	1
Picarel (<i>Spicara smaris</i>)	300	4	767	0.2
Goldblotch grouper (<i>E.alexandrinus</i>)	170	21	3,729	1
Two-banded sea bream (<i>Diplodus vulgaris</i>)	792	12.5	10,113	3
Shrimp (<i>Panaeus kerathurus</i>)	1,106	31	33,516	10
Stripped mullet (<i>Mugil spp.</i>)	900	11.6	10,499	3
Common Pandora (<i>Pagellus erythrinus</i>)	1,549	17.5	24,778	8
Chub mackerel (<i>Scomber japonicas</i>)	345	4	784	0.2
Sliver Scabbardfish (<i>Lepidopus caudatus</i>)	404	5	1,419	0.4
Bogue (<i>Boops boops</i>)	900	4	2,301	1
Grouper (<i>Epinephelus aeneus</i>)	2,905	33.5	10,0782	31
Sea bass (<i>Dicentrarchus labrax</i>)	141	20	2,671	1
Brushtooth lizardfish (<i>Saurida undosquamis</i>)	1,309	4	4,800	1
Brown meager (<i>Sciaena umbra</i>)	126	12	1,512	0.5
Goldband goatfish (<i>Upeneus molluccensis</i>)	761	10	7,538	2
Dusky grouper (<i>Epinephelus marginatus</i>)	56	17.5	1,038	0.3
Atlantic Bonito (<i>Sarda sarda</i>)	2,167	5	4,586	1
John Dory (<i>Zeus faber</i>)	87	10	772	0.2
Sauppe (<i>Sarpa salpa</i>)	334	8	2,658	1
Dentex (<i>Dentex dentex</i>)	148	32.5	5,036	2
Dusky Spinefoot (<i>Siganus sp.</i>)	543	5	1,714	1
Northern Pike (<i>Esox lucius</i>)	349	13	4,684	1
Axillary Sea bream (<i>Pagellus acerna</i>)	584	6	2,334	1
TOTAL	26,051	9	235,160	100

Source: Ünal and Erdem 2009b.

Notes: 1/ See Annex 4 for information on standard deviations and background on how fish prices fluctuate by key species throughout the year.

Table 6 provides monthly data on the quantity of fish caught by species by the Akyaka Cooperative in 2010, and the price range per kg (seasonal changes on the price of fish are evident). The prices reported are broadly consistent with those reported in Table 4. The total catch for Akyaka Cooperative in 2010 is estimated at 15,279kg, or 12,552kg if the discarded fish are deducted from the total. This is higher than the total catch presented in Table 4 of 14,989kg for the 2009-10 fishing period. The data in Table 6 only covers one cooperative, while the data in Table 4 covers 2,

suggesting that fish catch has increased recently, or that there is some under reporting in the data presented in Table 4. Also remarkable is the catch composition. The most important fish are sea bream and mullet. This suggests that stocks of grouper have been affected. This concurs with the analysis undertaken by Ünal and Erdem, which randomly sampled grouper species during 2007. The study results indicated that 88% of groupers sampled are caught below the legal size of 30 cm, which raises significant concerns for their sustainability (Ünal and Erdem, 2009b).

Table 6. Akyaka Fisheries Cooperative 2010, Volume of Fish by species / kg

Fish Type	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total	%	Price / kg / TL
Horse mackerel (<i>Trachurus sp</i>)	100		73	180	80	70		117	99		80	200	999	6.5	15-12
Brown meagre (<i>Sciaena umbra</i>)	90								116		60		266	1.7	15
Grouper (black)	6.6	9.6	23.8	42.3	37.8	35	15		15.7	8.9	10	42.5	247.2	1.6	30-40
Grouper (<i>Epinephelus aeneus</i>)				118.3	23.8	87	90		67	38.3	58	22.9	505.3	3.3	37-45
Rabbitfish (<i>Siganus sp</i>)	1.5		5.9	2.6									10	0.06	10-12
Octopus (<i>Octopus vulgaris</i>)	228.2	51	324.7	179.1							14	95.9	892.9	5.8	10-12
Common dentex (<i>Dentex dentex</i>)	54			297		175	84	214	13		34	109	980	6.4	35-45
Gilthead seabream (<i>Sparus aurata</i>)	50		55	192	124	91	38.5	90	142	122.7	119	341	1,365.2	8.9	35
Common pandora (<i>Pagellus erythrinus</i>)	339	101	446		437		171		339	629	536	860	3,858	25	10-37
Two-banded seabream (<i>Diplodus vulgaris</i>)	103	49	230				53	320	138	84	58	123	1,158	7.5	10-23
Saddled seabream (<i>Oblada melanura</i>)				197		108		42					347	2.0	12-15
Grey Mullet (<i>Chelon labrosus</i>)		33	80	124	20	30		80			60		427	2.8	12-15
Red mullet (<i>Mullus spp</i>)	93	21	200	105	87		30.3	23.4	95	39.7	139	286	1,119.4	7.3	15-40
Red mullet ("Paşa")					106								106	0.6	
European barracuda			20	75		188		100	70	16			469	3.0	12-15
Discarded fish	120	159	246	326	246	177	260	230	231	233	228.5	270	2,726.5	17	5-10
Total	1,185	424	1,704	1,641	1,162	961	741.8	1,216	1,326	1,172	1,397	2,350	15,279		

Source: Akyaka Fisheries Cooperative

Recreational fishing is also practiced in the area using fishhooks (at Akyaka artificial harbour, the front of the diving board, the beaches of Çınar, the mouth of Akçapınar, the dock at Çamlı, Akbük Bay and at sea) and using spear-guns (around Maden dock and the coast between Akçapınar and Sedir Island).

Ünal and Erdem undertook 486 surveys of recreational fishermen over the period April – December 2008 (Ünal and Erdem, 2009b). Around 75% of anglers claim to consume their catch, while the rest sell them. The most common fish caught were: pandora (2,772 kg/year), sea bream (1,280 kg/year), striped mullet (1,474 kg/year), sea bass (883 kg/year), two-banded sea bream (830 kg/year); amberjack (558 kg/year) and groupers (504 kg/year). Only 50.6% of fishermen were found to respect the daily allowable catch of 5kg, with 21% reporting a daily catch of 16kg and above. Recreational fishermen therefore catch a significant amount of fish, which may impact on the commercial viability of small-scale fisheries. Only 33% of anglers had a recreational fishing licence, and almost 60% indicated that they were unaware of the legal fishing lengths and other regulations. Fines for fishing without a licence were not strictly enforced.

The variability in the data on fish catch and the fluctuations in price highlight the difficulty of establishing the value of the fishery in Gökova SEPA. Furthermore the value should be based on a sustainable harvest level, which is not specified for the area, and there are concerns that the fishery is currently on an unsustainable path – due largely to illegal fishing. A value of 332,854 TL has been adopted for this study. This is an underestimate given that it does not include the value of recreational fishing and may be based on under reporting of actual catch, however it may better reflect a sustainable fishery resource value.

4.1.1.3. Economic Impact

The Gökova SEPA fisheries generate income and employment for local economies of Akyaka, Akçapınar, Sarnıç-Akbük, Çamlı, Ören and Gökçe. There are an estimated 115 small-scale fishing boats operating in Gökova SEPA – Akyaka (42), Akçapınar (21), Sarnıç-Akbük (13), southern coast of the bay Bördübet and Çamlı (19), Ören (16) and outside of the bay – Bodrum and Datça (8) (Ünal 2010). However, fishermen have stated that their income is not sufficient and that they have to find extra work.

Ünal *et al* (2010) evaluated small-scale fishing operations in six fishing areas in Turkey over the 2002-2003 fishing season¹⁰. In terms of structure the small scale fishing industry is multi-species multi-gear in nature and is characterized by small scale fishing vessels that use gill nets, trammel nets, long-lines and lift nets. Fishing boats are usually wooden 5-15 meters in length and locally built. Each vessel is operated by 1 or 2 men (rarely do three join the business). A variety of highly valued species are targeted such as red-mulletts, sparids and groupers. The catch volume ranges from 2-7.2 kg a day, which is sold in local markets. Ünal & Erdem (2009b) estimated the daily catch volume to be 5-10kg. Sometimes low value species are consumed by the household.

Table 7 presents socio-demographic and economic characteristics of small-scale fishermen in Gökova SEPA, and includes Foça for comparison. The results for 2002-3 are based on Ünal *et al* (2010) and those of 2008 are based on surveys in September and October 2008 under the SMAP project. The average age of the coastal fishermen in Gökova Bay is 45, Akçapınar is 51, and Akyaka is 42.4. Many of the young population do not want to fish and as a result the fishing community is ageing. The number of fishermen for whom fishing is their main occupation is also declining and in 2008 was 76% in Akyaka and 57% in Akçapınar.

¹⁰ The areas studied were Foça, Akyaka, Akçapınar, Karaburun, Mordoğan and Marmaris. The focus here is on the findings of the results for Foça, Akyaka, Akçapınar given that these sites are study sites the GEF-UNDP project.

Table 7. Socio-demographics and economic characteristics of small-scale fishermen

Fishery Co-operative	Akyaka		Akçapınar		Gökova	Foça
	2002-3	2008	2002-3	2008	2008	2002-3
Mean age of fishermen	43	42.4	45	51	45	48
Professional fishing years (mean)	23.4	20.2	23.5	29	22.6	26.2
Size of household (mean)	4.4	3.1	4.3	2.9	3.1	4.1
Dependent family members (mean)	2.4	2	2.6	1.9	2	2.5
Fishery as main occupation (%)	95	76	100	57	69	53
Fishery as sole income source (%)	63	60	46	64	62	34
Covered by social security (%)	58	48	77	79	59	37
Home owner (%)	62	40	8	79	54	40
Married (%)	77	72	89	87	77	95

Source: Ünal, 2010 and Annex 4 SMAP (2008 average figures for Akyaka and Akçapınar)

Fishermen were generally not satisfied, with 41% claiming that they want to quit fishing, 51% stating that their income from fishing is too low, and 90% implying that they do not want their children to choose to be fisherman. All fishermen interviewed rated the future prospects for the fisheries as bad (Ünal and Erdem, 2009b). The average sea workday in Gökova is 195 day/boat/year.

Ünal *et al* (2010) generated information on the costs and earnings of the capture fisheries from personnel interviews (32 in Foça, 19 in Akyaka and 26 in Akçapınar). This information is not collected on a regular basis by the relevant Turkish authorities. Data was collected on operational costs including – vessel costs (vessel and gear repair, maintenance expenses and vessel insurance),

labour costs (wages) and running costs (fuel, lubricating oil, ice, bait, food and supplies for crew), and capital costs covering opportunity cost and depreciation.

The results are summarized in Table 8 and show that 56% of vessels in Foça, 16% in Akyaka and 65% in Akçapınar faced negative gross cash flow. The Akçapınar Fishery Cooperative should show results as good as Akyaka. The fishery has a younger and more powerful fleet and the average price of fish is higher, while in other respects it is very similar to Akyaka. The cause is thought to be misreporting by respondents of the Akçapınar cooperative. Ünal *et al* (2010) concluded that the livelihoods of the small scale fishing sector is threatened by irregular and relatively low income levels.

Table 8. Economic / financial results of small scale fishing

	Total earnings	Net cash flow ¹	NP/TE (%) ²	ROI (%) ³	TC/TE (%)
Foca	133,011	22,928	17.2	26	83
Akyaka	144,982	64,500	44.5	160	55
Akçapınar	75,779	-20,084	-26	-27	127

Source: Ünal, 2010

Notes: 1/ Economic performance was determined by net cash flow (NCF) (or net profit (NP)) calculated as the value of landings minus costs; 2 NCF/total earnings (TE) ratio-expresses net profit as a percentage of TE. A ratio of more than 10 can be considered good (Tietze *et al*, 2005). 3/ Financial performance was measured by NCF/investment ratio, also referred to as the ROI. A level of 10% is generally considered to be a good result.

4.1.2. Salicornia

Salicornia is a salt tolerant plant that grows in salt marshes and on beaches. It is a favourite starter in restaurants in the area. There are estimated to be 100 people collecting salicornia during the season April–August. A restaurant is estimated to use 1 ton per season. There are an estimated 40 restaurants operating in Gökova SEPA. Assuming that 50% of restaurants serve salicornia this would equal 20 tons. At a market price of 5TL/kg this is valued at 100,000TL per year. It is readily available all over the coast and is not considered to be over harvested.

4.2 Regulating services

4.2.1 Carbon sequestration

4.2.1.1 Existing estimates

Mangos et al (2010) estimated the carbon storage function of the Mediterranean Sea as a whole and based on this provided disaggregated values for individual Mediterranean countries. The Mediterranean Sea accounts for only 0.8% of ocean area, therefore it plays a small role in world climate regulation. However, a recent estimate (Huertas, 2009) proposes the value of 78 kilo moles of carbon $\pm 15\%$ per second for the Mediterranean Sea as a whole. This corresponds to an annual average rate of anthropogenic CO₂ sequestration of 11.8 t/km²/yr, which is around twice the average for the World Ocean (Gruber, 2009).

Adopting Huerta's (2009) estimate, Mangos et al (2010) estimate the total sequestered volume for the Mediterranean at 108 million tonnes of CO₂ per year¹¹. As reported by Mangos et al (2010) this quantity represents a mere 5% of the CO₂ emitted by activities in the Mediterranean riparian countries (UN Data).

The average price for carbon for the year 2005 was used - 20.5€/t of CO₂ (World Bank, 2006). This

results in an annual regional value of 2.2 billion € (108 Mt x 20.5 €/t). This value was distributed amongst the riparian states based on their share of the total volume of CO₂ emitted using statistical data provided by UN Data. The value for Turkey is estimated at 230 million Euros per annum. This provides a ball park estimate of the value of marine carbon sequestration in Turkey generally. Available site specific data and current carbon values were used to estimate this service at Gökova SEPA.

4.2.1.2. Value of carbon sequestration at Gökova SEPA

Based on GIS assessment the distribution of *Posidonia* in Gökova SEPA is 1,300ha (Kıraç and Veryeri, 2010).

A number of global and regional studies have measured the carbon storage of *Posidonia* species both in its biomass (including aboveground and belowground vegetation) and its soil organic carbon. For instance, the estimates available of soil organic pools under *Posidonia oceanica* beds have been published based on samples of the vertical matte walls of the meadows at seven heavily vegetated Mediterranean sites (Mateo et al 1997). This estimated a matte/sediment storage capacity of 2.1 t CO₂/ha/yr. Duarte et al (2010) carried out a meta-analysis for the net community production of different seagrass species globally and estimated the aboveground carbon sequestration rate to be in the range of 32.5 t CO₂/ha/yr, assuming an average dry weight of 672g/m² (average depth of 5 m).

For the purposes of this study global averages defined both for the living biomass and the soil organic carbon by the Nicholas Institute for Environmental Policy Solutions at the Duke University (Murray et al, 2010) have been adopted (Table 9). This study demonstrates that the biggest carbon pool for *Posidonia oceanica* lies in the soil organic pools, with a global average of 500 t CO₂/ha.

¹¹ One tonne of carbon corresponds to 11/3 or 3.67 tonnes of CO₂

Table 9. Global averages and standard deviations of the carbon sequestration rates and global ranges for the carbon pools by habitat type

Habitat Type	Annual Carbon Sequestration Rate (tCO ₂ eq/ha/yr)	Living biomass (tCO ₂ eq/ha)	Soil organic carbon (tCO ₂ eq/ha)
Seagrass	4.4 +/- 0.95	0.4 –18.3	66–1,467
Tidal Marsh	7.97 +/- 8.52	12–60	330–4,436
Estuarine Mangroves	6.32 +/- 4.8	237–563	1,060
Oceanic Mangroves	6.32 +/- 4.8	237–563	1,690–2,020

Source: Murray *et al* 2010

While carbon credit markets do not yet cover projects related to the marine environment it is highly likely that markets for ‘Blue’ Carbon will emerge in the future. This is discussed in more detail in Section 6. An estimate of creditable carbon can be derived for seagrasses associated with their avoided loss.

Removal of seagrass results in the release of previously stored CO₂ from both biomass and soil and an end to the annual carbon sequestration function. The total creditable carbon is therefore equal to the release of stored carbon over a relevant timeframe plus the annual carbon sequestration rate.

By using the market price of carbon, it is possible to calculate the value of creditable carbon, associated with their avoided loss. A lower bound of US\$11.2/tCO₂ eq was adopted based on the average price of traded carbon on the voluntary

markets in Turkey in 2010 (Peters-Stanley *et al* 2011) and an upper bound of US\$20/tCO₂ eq (based on EU Emission Trading System (ETS)).

Table 10 presents the results of the analysis. The carbon value Gökova’s *Posidonia* meadows is estimated at US\$792,064 – 1,414,400 a year (US\$609-1,088 / ha), with a present value of US\$5,658,954 – US\$10,105,276. This assumes that soil carbon is released at 50tCO₂eq/ha/yr, over a period of 10 years, and is based on a 10% discount rate. The monetary value of this service will fluctuate depending on the price of carbon, and the discount rate used in the analysis. It should be stressed that these values are based on a market existing for ‘blue’ carbon, the site being able to generate verifiable site specific estimates of current carbon storage and sequestration functions, and ensuring the site’s long term protection and maintenance.

Table 10. Potential carbon sequestration value of *Posidonia* meadows at Gökova SEPA

Posidonia surface (ha)	Carbon sequestration† (tCO ₂ eq/ha/yr)	Soil carbon released†** (tCO ₂ eq/ha/yr)	TOTAL Annual carbon loss per site (tCO ₂ eq)	Value (US\$11.2 / tCO ₂ eq)			Value (US\$20 / tCO ₂ eq)		
				Annual Value US\$/ha	Annual Value / US\$	PV (10 years, 10%), US\$	Annual Value US\$/ha	Annual Value / US\$	PV (10 years, 10%), US\$
1,300	4.4	50	70,720	609	792,064	5,658,954	1,088	1,414,400	10,105,276

Based on Duarte *et al* 2010 & Murray *et al* 2010

Assuming a 10 year release period of soil carbon after habitat destruction

4.2.2. Protection against coastal erosion

4.2.2.1. Existing estimates

Mangos *et al* (2010) estimated the benefits of coastal erosion protection provided by marine ecosystems using the expenditure avoided approach. The following three steps were undertaken:

- **Determining the length of built-up coastline that could benefit from protection.** Since the density of coastal urbanization was not available for all Mediterranean countries, a 20% erosion figure established for the European coasts was used along with an estimate urbanization coefficient of 80%. On this basis it emerges that coastal erosion is affecting 16% of the Mediterranean coasts, i.e. 7,360 km.
- **Assessing the presence of effective *Posidonia* meadows** along the built-up and eroded coastline identified in step 1. Pasqualini *et al.* (1998) estimated that the *Posidonia* meadows covered some 35,000 km² in the Mediterranean. Given the size of the 0-50 m bathymetric section in which this plant can thrive, it would thus cover some 40% of the benthic area corresponding to 0-50 m depth. As *Posidonia* tends to be abundant in areas with soft substrate (which represent about 50% of the coast), and given the geographical dispersal of *Posidonia*, it is estimated that 90% of the *Posidonia* meadows are established in coastal zones threatened by erosion. The provision of an effective protection service against erosion depends on various characteristics such as the size of the meadow, its maturity and the intensity of the erosion affecting the coast. Using the estimate that over 10% of the European coasts demonstrate the existence of protection mechanisms against erosion (EEA, 2006) and assuming that 50% of the *Posidonia* meadows provide an effective protection against erosion at the regional level it is estimated that 3,312 km of *Posidonia* meadows provide an effective protection service against coastal erosion.
- **Monetary assessment of the value of the protection provided.** It is assumed that the economic value of these benefits is equivalent to the expenditure avoided (investment and

maintenance costs)¹². In 2001, expenditure on coastal erosion defence observed along European coastlines amounted to 3.2 billion Euros. It can thus be estimated that European spending on erosion defence amounts to about 160,000€ per km of coastline.

At the regional level, the valuation shows that the *Posidonia* meadows allow the riparian countries to avoid annual spending of about 530 billion €/yr, covering investment and other costs (i.e. maintenance costs). For Turkey the value is estimated at 60 million euro per annum. This is a crude estimate based on the length of the coastline and a default unit value of 160,000€ per km of coastline. It does not reflect the risk of erosion or the site specific expenditure that would be needed to protect areas at risk.

4.2.2.2. Valuation of erosion control at Gökova SEPA

There are no site specific studies of the risks faced by Gökova SEPA's coastline or the role *Posidonia* meadows play in defending the coastline against erosion or estimates of expenditure on protection activities or infrastructure.

The total length of coastline with *Posidonia* beds is estimated to be 159 km (14.7 km in the northern coast and 144 km on the southern coast) (Kıraç and Veryeri, 2010). Using a transfer value of 160,000 € per km of coastline (Mangos *et al*, 2010) The value of protection against coastal erosion is 160,000 € per km of coastline * 159 km = 25.4 million € per year. Around 8% of the coastal areas in Gökova SEPA estimated to be occupied by man-made structures (human settlements, hotels, coastal facilities such as piers, docks and roads) (Kıraç and Veryeri (2010)). A conservative estimate of the erosion protection service offered by *Posidonia* meadows would be 2.03 million € per year (US\$ 2.85 million).

4.2.3. Waste treatment

4.2.3.1. Existing estimates

Mangos *et al* (2010) considered the liquid waste produced by human activities, which is the main pollutant of the marine environment. The

¹² This expenditure breaks down as 53% for new investment, 38% for maintenance and 9% for the purchase by the public authorities of property threatened by coastal erosion (EC, 2004).

'combined approach' is recommended for wastewater treatment by the European Commission (EC) and MEDPOL (MEDPOL, 2004). This is based on the emission threshold for waste and a quality objective for the receiving environment. However, some waste is still inadequately treated such as diffuse waste, for which no viable treatment solution has been found and due to the limits of the treatment techniques applied for example.

Mangos *et al* (2010) value this service on the basis of an environmental tax. Such a tax would allow environmental costs to be included in water pricing, and is in line with the EC's Water Framework Directive (EU_WFD, 2000/60/CE) which requires EU members to introduce water pricing policies which reflect both financial and environmental costs. In France, these taxes are levied by the Water Agencies and are based on the specific situation and usage (domestic or non domestic pollution, diffuse pollution or breeding). In 2005 the environmental tax for domestic use at the department of the Bouches du Rhône, stood at 0.18€/m³. This zone is considered to be representative of the French Mediterranean seafront and features both highly urbanised and industrialised sectors (Marseilles, Fos) and other protected ones (Camargue, Calanques). This is used to value the waste assimilation service provided by marine ecosystems across all the Mediterranean riparian states.

In 2005 the Mediterranean coastal population stood at about 148 million (adapted from Attané and Courbage, 2001). Average domestic water consumption for these countries stands at 99 m³/yr per inhabitant (FAO Aquastat, 2000). Given that 35% of the Mediterranean population lives in coastal areas, and assuming an identical *per capita consumption*, water consumption is estimated in coastal areas at 14.5 km³ per year. At the regional level, the value of the service for domestic consumption is estimated at 2.6 billion Euros. The value of this service for industrial use is based on the volume of industrial water discharged directly into the Mediterranean sea, as assessed by MEDPOL, (in *Blue Plan 2005, statistical appendix*), i.e. 557 million m³ per year (or 0.56 km³/yr) and evaluated on the same basis as for domestic consumption at 0.18€/m³, i.e. 100 million Euros. The total value for the service is therefore estimated at 3 billion Euros (excluding agriculture).

The value of waste treatment per country is calculated on the basis of the estimated consumption per country of domestic water by the coastal populations and discharge of industrial water into the Mediterranean Sea, breaking down the overall assessment of the benefit by country according to the method described. The value for Turkey is estimated at 229 million Euro per annum.

The absorption by marine ecosystems of toxic substances (heavy metals, organic pollutants, persistent organic pollutants) or the treatment of recyclable substances such as nutrients beyond the reprocessing capability of these ecosystems should not be counted as a service. Therefore the service is limited to the treatment of recyclable matter, within the limits of these ecosystems' capacities. It was assumed that the limit is not exceeded when waste is treated using the combined approach. This waste treatment service is valued on the basis of a tax paid in order to consolidate and perpetuate a situation which is already acceptable from an environmental point of view.

4.2.3.2. Valuation at Gökova SEPA

Mangos *et al* (2010) estimated the waste treatment service of Turkey's marine environment to be 229 million Euro per annum. The total length of the Turkish coastline including the islands is 8,333 kilometres. Total length of Gökova SEPA is 272km (or 3.2%). This suggests that 7.3 million Euros (US\$10,259,200) per annum can be apportioned to Gökova SEPA waste treatment service.

4.3. Cultural services - tourism and recreation

4.3.1 Background

The coasts of Gökova SEPA are primarily used for tourism purposes. The area is close to important tourism centres such as Bodrum and Marmaris and is between two large regional airports - Bodrum-Milas and Dalaman, making access to the area relatively easy. The tourism season starts in the second week of April with residents from Muğla and neighbouring cities making recreational day trips to the area, especially at weekends. The most intensive period is between June and September.

Muğla ranks among the top four tourism destinations in Turkey (along with Antalya and İstanbul) with nearly 3 million visitors in 2009 (Muğla Valiliği 2010a). Muğla Province contributes a quarter of all Turkey's annual tourism earnings (*ibid*). Tourism activities have been increasing in the region over recent years: between 1998-2008 tourism number increased by 68% (1.7 million tourists in 1998 rising to 2.9 million visitors in 2008) (Bahar 2008). This is due to: rising income levels; an increased in urbanization resulting in more demand for vacations; the increase in the number and the diversity of tourist facilities; and, the development of transportation facilities (airports and highways). The increasing number of tourists necessitates new and/or improved infrastructure services such as hotels, restaurants, clean water, cleaner beaches, larger refining facilities, more waste collection vehicles and larger storage areas (SMAP, 2010). However the capacity of the area is limited, therefore instead of looking for ways of increasing the number of tourists, the tourism strategy should be centred around offering a high quality tourism experience in line with the site's carrying capacity. A study of the area's tourism carrying capacity is yet to be undertaken.

Table 11 summarises the location and types of tourist facilities in the SEPA.

Table 11. Location and types of tourist facilities

Location	Services
Incekum	Beach, Buffet
Cicek cove	Beach, camping
Bördübet 1	Beach
Bördübet 2	Beach, restaurant, café
Amazon	Beach
Arbuk	Beach, shower, restaurant, camping, buffet
Turnali 1-4	No service
Çınar Beach	Beach, restaurant
Maden Iskelesi	Beach, accommodation, restaurant
Akyaka	Beach, restaurant, accommodation, camping
Boncuk Cove	Beach, buffet, shower
Kufre Cove	Beach
Okluk Cove	Restaurant, shower

Source: Kiraç and Veryeri (2010)

Box 4 provides an overview of tourism in Akyaka, the main hub for tourism in the SEPA.

Box 4. Tourism and Recreation in Akyaka



Akyaka is a coastal district, situated at the far end of the Gulf of Gökova. It is bordered in the north by the almost 1,000m high mountains, and in the south by the wetlands of the Gökova plain. The district has a population of just over 2,600 permanent residents, however numbers dramatically increases during the summer season to 16,000, when people use their summer homes.

According to the head of the Municipality, an estimated 60,000 people visit Akyaka per year. This is much higher than official sources (Muğla Valiliği 2010b), which estimate around 15,000 visitors but this is based on visitors staying overnight in MOT licenced hotels. Tourism and recreation are vital to the economy representing 60% of the district's GDP and employing around 500 people. There are around 170 small businesses – restaurants, cafes, hotels engaged in tourism.

According to the head of the Municipality, the town has a bed capacity of around 1,800 (including 600 person tent capacity). This is higher than the 388 establishments registered with the Ministry of Tourism. There are 23 boutique hotels and apartments (16-17 rooms inside). Apartments cost around 90-120TL /day, and Boutique hotels around 180 TL for 2 people (full board), falling to 120TL in the winter.

There is potential to further promote small boutique hotels in the area to complement the town's aspiration to become a 'Slow City' and to promote ecotourism (see Box 2). The tourism sector could be strengthened by developing a well trained work force and introducing mechanisms to more fairly share the benefits from tourism amongst the community.

Box 5 provides an overview of the main beaches in Gökova SEPA. Many beaches, for example Akyaka, Akçapınar, Çınar and Akbük are leased by protocols to municipalities or headmen by the GDNAP. The main purpose of the protocols is to satisfy the requirements of the visitors and to protect the environment.

At Akçapınar, Gökçe, Çetibeli villages on the way to Marmaris, there are some small-sized restaurants. Because of this tourism potential, the populations of Çetibeli and Gökçe have recently increased, bringing some construction pressure.

Box 5. Overview of Beaches of Inner Gökova Bay

Akyaka beach is approximately 250 meters long and 25-30 meters wide and has been awarded a 'Blue Flag'. An estimated 38,000 – 40,000 sun loungers were sold in 2008 (SMAP, 2010) at 3TL per person / day, resulting in a revenue of 114,000 – 120,000 TL. SMAP (2010) estimates that there are an additional 30,000 visitors per year who do not use lounges, therefore the number of people visiting Akyaka beach can be estimated at about 70,000 per year. Assuming that there are 200 days in a season, there are approximately 350 visitors per day. The beach is polluted by rainwater carrying dirt from the town. The Akyaka jetty which is used by fishing and tour boats has a negative effect on coastal hydrodynamics, and strong erosion is observed on the southern coast of the Kadın Azmak.

Akçapınar Beach is mainly used by day visitors. The beach has very favourable wind conditions for **recreational activities** and kite surfing and ski sports activities operate on part of the beach / sea but there are no facilities for visitors.

Çınar beach is rented annually from the Municipality through competitive bidding (this is a sub-rent arrangement from GDNAP). The rent for 2011 is 57,000 TL. The beach has three full-time staff, and two additional workers are employed for the busiest months of the year - July and August. The Çınar Beach Restaurant is open throughout the year offering local breakfast and fast food based on local produce. Efforts are made to protect the area, for example, by warning people not to make bonfires and by cleaning-up the beach. Around 90% of visitors are Turkish from İzmir, Ankara and, Istanbul who often stay in Akyaka summer homes or apart-hotels, or daily picnickers (called 'sepetçi' in Turkish) from Aydın and Denizli Provinces. The capacity of the beach is about 150 people. Assuming 60 high-season days, about 9,000 thousand people make use of the beach a year. Visitors are attracted by the beach's natural beauty and peace and quiet. Sun-loungers and umbrellas are available for rent at 3TL/person/day. The beach is too crowded for activities such as canoeing. On the main road above the restaurant, the Municipality applies a parking fee. It is suggested that GDNAP provides information on the site's protected status as people are unaware of this, and signage indicating that fires etc are not allowed. **Çınar and Gökçe beach** are being increasingly used each year. Solid and liquid waste pollution is a problem and the use of these beaches need to be sustainably managed

Çamlı Beach though small can be used for swimming. Off season, the beach is used for boat repair and maintenance. It is also used for transport to Sedir Island.

Sedir Island Beach. The most important feature of Sedir Island is its ooid sand, which in Turkey is only found at this site. Every year, about 100,000 local and foreign tourists visit the island. In 2006 the SMAP project prohibited walking or sunbathing on the sand in order to protect it. Visitors may swim in the water and use chaise-lounges, showers, and toilets that are behind the beach.

Akbük Beach is 1km long and has a natural SIT status (degree 1)¹³ and the capacity for about 1,000 people. MELSA - a private company of Muğla Provincial Institution has been running the beach for the past 2 years. They operate under an annual contract or protocol between Muğla Province and GDNAP. There is one full time employee and during the high season (2 months) 7 additional staff are taken on. A restaurant is open throughout the year mainly offering fast food. The company also clean-up the beach and hire parasols and day beds for 5TL per person. There is an entrance fee of 2 TL (1 TL for students), which includes parking and WC-shower facilities. The busiest months are July & August and 80% of their customers are Turks coming from İzmir, Ankara and Istanbul. Not many foreigners visit the beach because it is 25km from Akyaka center and not very well known. Their customers are mostly staying in Sarnıç Village at a distance of 5km from seaside and the daily pick-nickers ('sepetçi') coming from Akyaka or from other parts of region. There is also the Altaş restaurant, which many tourists reach by yacht.

Other beaches in Gökova bay include Hayıtlı, Kandilli, Turnalı, Karacasöğüt and Boncuk. Almost all of these beaches are used by day visitors and tour boats. In general these beaches need to restrict visitor numbers, manage waste and provide basic services for visitors.

Source: based on SMAP III (2010) and interviews March and June 2011

¹³ The Ministry of Culture and Tourism, General Directorate of Conservation of Cultural and Natural Assets assigns conservation status of varying degrees in Turkey based on the "The Law of Conservation of Cultural and Natural Properties" (dated 21.07.1983; No: 2863; amended by law no: 3386 and 5226). "First degree natural sites" are sites of exceptional natural characteristics that should be conserved and only used for scientific purposes. "Second degree natural sites" are conserved areas where some tourism-oriented construction can be allowed.

Box 6 provides an overview of lodgings in the Bördübet area.

Box 6. Overview of Lodgings in Bördübet

There are two hotels located in Bördübet - the Golden Key Hotel and the Amazon Club. The Golden Keys Hotel has 38 rooms, 12 of which are reserved for a British tour company, and employs 20-25 people. The hotel is open from May to the end of October and occupancy rates are 60-70% over the season. It has access to a small 500m beach which is reached by boat.

Amazon club employs 21 people and is 500m from the beach. It caters largely for Turks. The Club has 14 mini bungalows made of pumice stone, which stay cool in the summer, and 7 gypsy caravans that sleep 2 or 4 people (160TL per night). In total the site can accommodate 50 people and its high season covers a period of around 90 days. There are restrictions on development as the Club is located within a conservation area. The Club would like to use the many bays and islands nearby that are largely deserted. Many yachts sail around the area and moor for a night and use the Club's restaurant. These boats don't have anywhere to dispose of their rubbish and the Club therefore collects the rubbish by dingy. The Club would like to build a jetty for the boats which would also serve as a rubbish disposal point. The environmental impact of constructing jetty and using the deserted bays and islands would need to be considered, but could be developed as part of a sustainable tourism plan for the area.

Source: Field interviews March 2011

4.3.2 Tourism Survey

Data on the tourist numbers, duration of their stay, composition and expenditure patterns, and occupancy rates specific to the site is not available from official or published statistics. A tourism survey was therefore carried out in Gökova SEPA June 21-24 2011 to derive this information. The survey aimed to generate information on expenditure that could be used to estimate the value of tourism at the site as well as visitors views on their tourism experience and management of the area. In addition to visitors, 7 tour operators, 28 hotels and 23 restaurants were interviewed to understand the demand for their services, their profitability and the challenges that they face.

A team of 6 conducted the surveys. The survey was field tested on the 20th June following which

the survey instrument was adapted in order to try and prevent misunderstandings by both interviewees and the interviewer's. The final survey instrument is provided in Appendix 2.

Two days were spent surveying in Akyaka and its surrounding beaches (covering visitors, tour operators, restaurants and hotels), one day in the Northern section of the Gökova Bay at the Akbük, Çınar and Maden beaches, and one day in the Southern section of the SEPA covering visitors and restaurants catering to yacht tourism in Karacasöğüt, tourists and businesses in Sedir Island and restaurants and hotels in Çamlı Village.

For the visitor survey a random selection process was adopted whereby every third person at the local beaches and other coastal utilisation zones was approached. Restaurants, hotels and tour operators were also randomly selected (for example, every two restaurants at the Kadın Azmak, every two apart hotel in downtown Akyaka).

The results of the survey are provided below.

4.3.2.1 Visitor survey

In total 169 visitor surveys were conducted; however, 14 surveys were discarded because they were either not completed properly or the respondents were home owners staying over an extended time in the area and therefore not considered to be tourists. This resulted in a sample size of 155.

The nationality of those surveyed is summarized in Figure 3. Around 71% of visitors are Turkish nationals. Of foreign visitors over 50% are from the UK, with the remainder from other European countries including Germany, the Netherlands, Denmark and Belgium. This is consistent with the data of the Ministry of Tourism, which shows that in 2010 more than 50% of foreign tourists arriving in Muğla were from the UK, followed by German, Dutch, and Belgian visitors (Governorship of Muğla 2010)¹⁴.

¹⁴ The Muğla Governorship has carried out two studies on the tourism sector of the region: A cluster analysis of the sector including a macro-scale strategic plan and an international competitiveness analysis (August 2010).

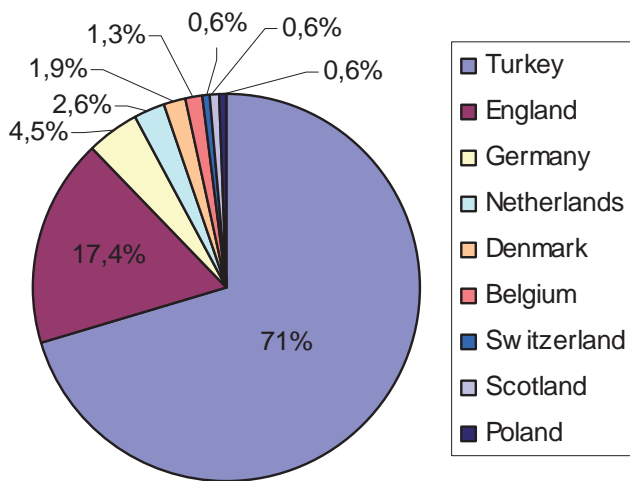


Figure 3. Nationality of visitors to Gökova SEPA (Source: Tourism survey 2011).

An equal gender distribution was observed with 49% of interviewees being male and 51% female. There was a good age distribution with 28% of interviewees between 36-45 years of age, 26% between 26-35 years, 15% between 46-55 years and 56-65, 8% between 18-25 years and 8% over 65 years.

For Turkish interviewees 40% had a monthly income range of 1,500-2,500 TL, 24% were in the highest income cluster of more than 3,500 TL, 18% earn between 650-1,000 TL, 11% 1,000-1,500 TL and 7% 2,500-3,500 TL.¹⁵ The results suggest that the nationals visiting Gökova SEPA represent the upper and low-middle socio-economic groups.

The monthly income levels of the foreign visitors are as follows: 35% earned between 1,500-3,000 €, 24% less than 1,500 €, 22% between 3,000-5,000 €, 17% more than 6,500 € per month and 2% between 5,000-6,500 €.

In terms of educational attainment 7% had a Master's degree, 51% had attended university, 28% high school and 13% primary school.

Around 52% of the sample is visiting the site for the first time, this suggests a high percentage are return visits. Among the Turkish visitors, 53% were returning for a second time or more compared to

33% among the foreign visitors. Around 70% of the day trips are return visitors.

Overall 41% are single day-visitors (84% of day visitors are Turkish nationals) and around 19% of the sample had come to the area as part of a package tour (consisting of 90% foreign visitors).

60% of the interviewees were aware of the area's conservation status as a result of word of mouth, the fact that they come regularly to the MCPA, internet and TV. Generally, interviewees were happy with their tourism experience: 44% rate their experience as "excellent," 38% as "good" while the remaining 18% rated their experience as satisfactory or poor (Figure 4).

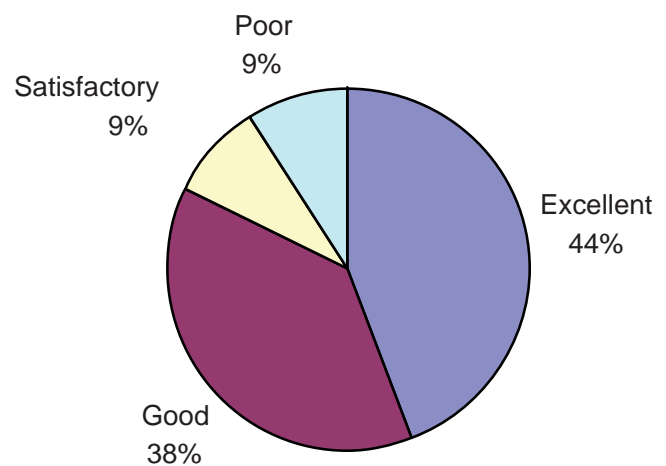


Figure 4. Quality of Tourism Experience in Gökova SEPA

The main characteristics of Gökova attracting interviewees are shown in Figure 5, in order of mentioned times. Accordingly the SEPA's unspoiled nature and natural scenery; peace and quiet (including the fact that the area is not over populated by tourists); and its clean seas (including to a great extent the traditional coastal experience as a whole: sea, beach and sun) come up as main points of attraction.

¹⁵ Note that 15 people or 12% of the Turks refrained from answering this question.

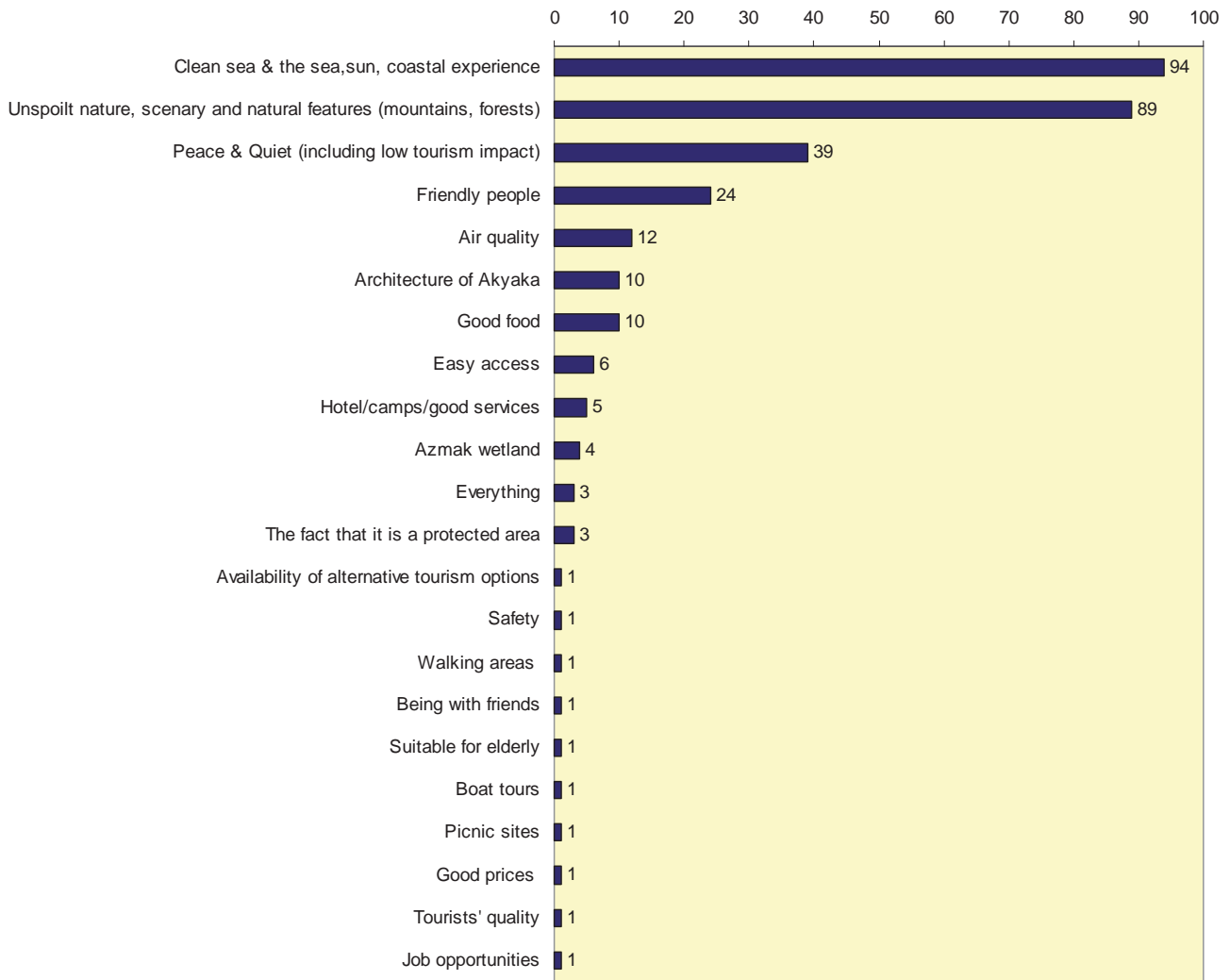


Figure 5. Views reflecting what the visitors like in Gökova SEPA

On the other hand, visitors raised the following concerns (in order of frequency in which they were mentioned): infrastructural problems (unmaintained facilities and services such as toilets, showers, changing cabins, especially at the campsites and Sedir Island); mosquitoes, street & beach

garbage and dirtiness and high prices. Other issues raised by the respondents are limited beach space, too many people, limited car park facilities, pollution of the sea & wetland, loud music, stray dogs, and a lack of social activities especially for children.



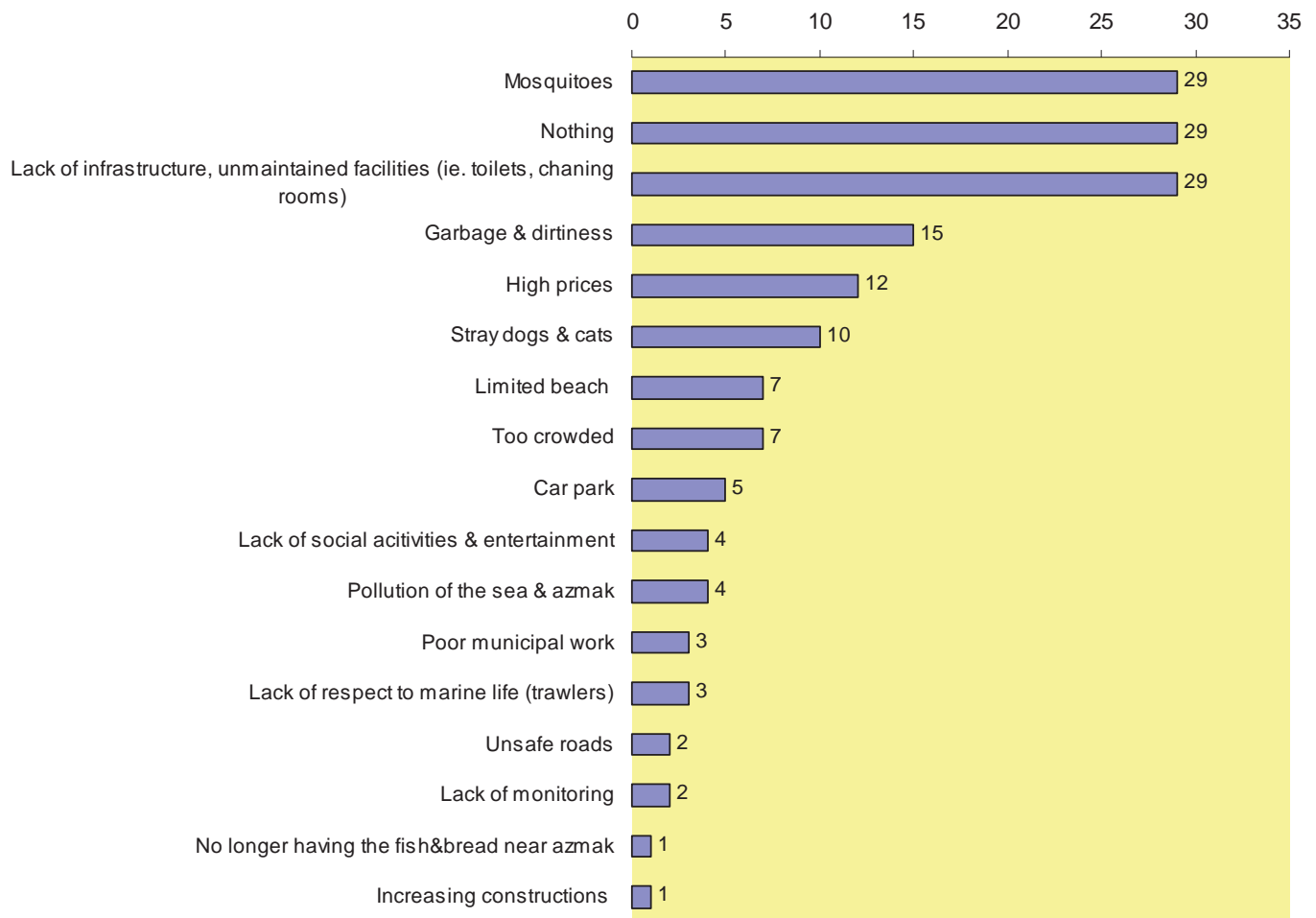


Figure 6. Views reflecting what the visitors do not like in Gökova SEPA

Some suggestions offered are waste management and recycling, improvements in facilities and environmental standards (such as parking lot, monitoring of the daily boat tours as well as construction and compliance with existing regulations), controlling the development of houses and other buildings, creating a dog shelter, playgrounds for children, encouragement of yatching, implementing awareness raising activities and a better functioning municipality to facilitate all of these actions.

4.3.2.2. Valuation

The valuation of tourism in Gökova SEPA is based on an estimate of visitor numbers and the tourism expenditure derived from the tourism survey. There are three broad types of visitors to the area – local and foreign tourists, day visitors and homeowners who only stay in the area for the summer months.

Local and foreign tourists. According to Muğla Provincial Tourism Office there were over three million visitors to the province in 2010. Data is available on the bed capacity of the Ministry of Tourism’s licenced establishments in the province (Table 12). This provides an indication of the number of tourists coming to Ula district (which includes Akyaka), i.e, 13,636. It is reasonable to attribute all these visitors to Akyaka as accommodation is negligible elsewhere in the district. Note that this number is restricted to the Ula District and does not include campsites. However, establishments licenced by the MOT has to fulfill a certain quality standard and the survey of hotels indicated that only 10% of establishments are licenced by the MOT, with the majority (75%) licenced by the municipality. This estimate therefore is a definite underestimate of tourist numbers.

Table 12. Licenced establishments in Muğla province

District	Bed Capacity	% of Total	Number of Tourists
Fethiye	12,439	14%	437,176
Marmaris	26,676	30%	937,543
Bodrum	39,775	45%	1,397,915
Dalaman	153	0.2%	5,377
Datça	421	0.5%	14,796
Yatağan	0	0.0%	0
Milas	1,135	1.3%	39,890
Kavaklıdere	0	0.0%	0
Köyceğiz	70	0.1%	2,460
Ula	388	0.4%	13,636
Ortaca	6,547	7.4%	230,098
Center	398	0.5%	13,988
TOTAL	88,002	100%	3,092,881

Source: Muğla Provincial Tourism Office 2010

According to SMAP III there are 122 boarding establishments in the inner Gökova bay and Sedir Island, with a bed capacity of 2,500. In addition camping facilities can accommodate 1,500. The restaurant capacity is 3,500 seats (SMAP III). Most of the hotel and hostel operations in the region are concentrated in Akyaka. Among the other districts, there are 3 hotels at Çamlı village, 2 at Bördübet and some rental villas at Gökçe.

Based on the available information it is **assumed that Gökova SEPA as a whole receives at least 30,000 visitors per year.** This is considered to be a conservative estimate, as it assumes that 90% of the accommodation accounts for just over half the visitor numbers and other estimates have put visitor numbers in Akyaka alone as high as 60,000.

Day visitors. Day visitors from Denizli and Muğla are common, as Gökova Bay is the nearest seashore for both cities. These visitors use picnic sites, forest camping, and Akyaka, Akçapınar, Gökce and Çınar beaches, Hayitli Cove, Asarcık, Kandilli Cove, and Sedir Island, and are generally attracted by the areas' beaches and wetland. Day visitors often bring their own food and drinks and therefore do not contribute much to the local

economy, but can impact the area with their waste (picnic leftovers, charcoal remnants, plastic bags etc). There are no official statistics of day trips, however it is possible to estimate visitor numbers based on daily bus usage and car park occupancy.

The Akyaka Transport cooperative was established 30 years ago and operates 18 buses with a 32 person capacity, offering a service between Muğla town center and Akyaka. They mostly cater for Turkish citizens. The normal fare is 4 TL and 3 TL for students. They also have a seasonal Marmaris-Akyaka trip (60-70% are tourists on day trip returns) which transports 50-60 people per day. The season runs from the beginning of May to the end of September, peaking between mid June and mid September. During the peak season they transport 500-750 people per day. The estimated number of visitors arriving by coach is then 84,375 (this is based on 135 days (4.5 months) * 625 people a day). The Municipality also runs a bus/minibus shuttle service between Muğla town center and Akyaka charging 3 TL/person or 2.5 TL/student, which runs every 2 hours. In 2010 they transported 60,000 people, or about 164 people/day. It is thought that a very small percentage of these passengers would be tourists.

The main car park at the mouth of the wetland has a capacity for 100 cars (3 people per car is stated as the average). Parking tickets cost 3TL per car. In addition, 150 cars park to the side streets during the peak season. Occupancy rates are unknown. Assuming full occupancy in the car park over a 3 month season (90 days) would equate to 9,000 cars and 27,000 people. Assuming that 50% of cars are visiting for touristic purposes, results in 13,500 visitors arriving by car per year.

An estimate of 100,000 day visitors has been used. This is based on the number of visitors arriving by coach (84,370) plus 50% of car park arrivals (13,500).

House owners visiting the area in summer. Summerhouse owners are mostly located at Akyaka, Gökova and Çamlı. In Akyaka, of a total of 2,100 residences 1,212 are summerhouses (57%). In Gökova there are around 100-150 summerhouses out of 900. The population of Çamlı in the summer exceeds 2,000, although officially the population is 969.

Based on the survey results, visitors to Gökova spend 10 days on average (excluding day trippers), ranging from 2 to 120 days for Turks (median 7) and 2 to 21 days (median 10) for foreigners (Figure 5). When day trippers are included the average length of stay is 6 days for Turks and 8 days for foreigners. According to the hotel survey, visitors stay an average of 6 nights, and according to the Major of Akyaka visitors stay 4-5

nights on average. The reason why the tourism survey reports a higher average length of visit is due to the inclusion of a small number of visitors who stay longer than 15 days. There are 2 Turks staying 30 days, 1 staying 40 days and one staying 120 days. Removing the Turk staying for 120 days the average length of staying overall is 8 days and the average overall 9 days.

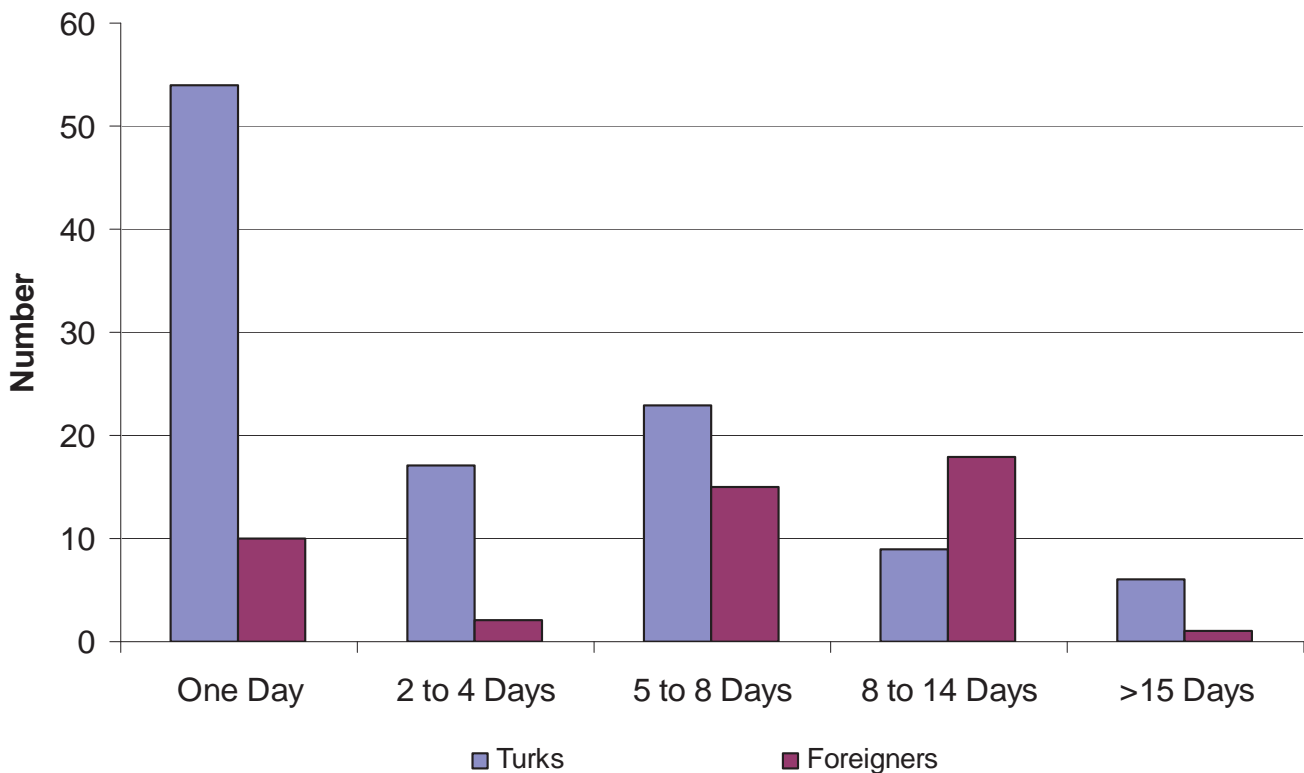


Figure 7. Length of stay for Turkish and foreign visitors in Gökova SEPA

Valuation based on tourism survey

Survey results reveal an average daily expenditure of 112 TL/person (with a median of 80 TL and range between 7TL and 675 TL). The wide range in expenditure is explained by the inclusion of both package tours and day trippers in the analysis who have different expenditure patterns.

Based on the average expenditure figures reported in Table 13 foreigners spend over twice as much as Turkish visitors both as overnight visitors and as day visitors. Not surprisingly the expenditure for day

visitors is roughly half of those who stay overnight, it is assumed on account of accommodation costs.

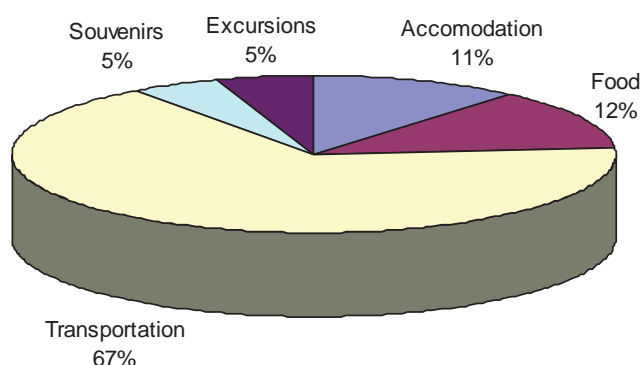
Tourism in Gökova SEPA is estimated at 49,994,800TL (US\$30,548,257). This is based on 30,000 overnight visitors per year staying an average of 10 nights and 100,000 day visitors per year and average expenditure data derived from the tourism survey as documented in Table 13. If a more conservative estimate of an average of 5 nights stay is adopted, tourism in Gökova SEPA is estimated at 27,347,400TL per year (US\$17,051,104).

Table 13. Summary of Daily Expenditure by Visitors to Gökova (TL)

Category	No.	% of overall sample	Average/ day	Min/ day	Max/ day	Median/ day	No / year	Value / year ¹ based on 10 nights	Value / year based on 5 nights
Foreigners	46	30%	201	50	675	193			
Turkish	109	70%	73	7	400	50			
Day trippers – Foreigners	6	4% ⁴	120	50	193	125	10,000 ²	1,200,000	1,200,000
Day Trippers – Turkish	52	33% ⁴	50	7	300	26	90,000 ³	4,500,000	4,500,000
Overnight visitors – Foreigners	13	13.4% ⁵	233	65	675	189	4,020 ⁶	9,506,400	4,753,200
Overnight visitors – Turkish	54	55.7% ⁵	90	8	400	75	16,710 ⁶	15,039,000	7,519,500
Tour visitors – Foreigners	27	27.8% ⁵	204	58	386	193	8,340 ⁶	17,462,400	8,731,200
Tour visitors – Turkish	3	3% ⁵	143	100	200	130	900 ⁶	1,287,000	643,500
Overall	155		112	7	675	80		49,994,800	27,347,400

Notes: 1/ Equal to number of visitors per year * average expenditure per day; for overnight visitors this is multiplied by 10 to reflect the average number of days spent in Gökova. 2/ Based on survey results 10% of day trippers are foreigners and 90% Turkish. The total number of day visitors is assumed to be 100,000 per year ; 3/ Based on survey results that 10% of day trippers are foreigners and 90% Turkish. The total number of day visitors is assumed to be 100,000 per year; 4/ As a percentage of the total number of day trippers (i.e., 58); 5/ As a percentage of total number of overnight stays (i.e., 97); 6/ Based on survey results of percentage of overnight visitors (foreigners, Turkish and tour, non-tour) and estimated total number of overnight visitors of 30,000.

Looking at the sample as a whole, transportation is the highest category of expenditure (67%) followed by food (12%) and accommodation (11%) – Figure 6. This analysis does not include visitors on package tours.

**Figure 8.** Distribution of visitors' expenditures in Gökova SEPA

4.3.2.3. Tour operators

Of the 7 tour operators surveyed, 6 offer boat excursions (including one offering Blue Voyage trips) and 1 was a kitesurfing enterprise.

Based on the survey responses eight companies offer boat excursions out of Akyaka - Akyaka Cooperative, Kadın Azmak Cooperative, MEPAR tours, Captain's Travel, Çamlı Cooperative, Gökova and two others. There are two additional marine transportation cooperatives within the SEPA, one in Karacasöğüt and another in Akçapınar but the latter is not an active one. On average, tour operators remain open 7 months of the year.

Daily boat excursions range from 12.5 – 25 TL per person, averaging 19 TL (taking into account the changing prices throughout the season). The monthly average number of customers per

company is about 1,185 people ranging from 80-5,000 (this number varies and depends on the individual boat capacities). Based on the average number of customers and prices one company earns around 157,605 TL per year¹⁶. For all 8 companies operating out of Akyaka this would equal 1,260,840 TL a year. No numbers were provided for Blue Voyage customers, however the cost is about 600TL/person per trip.

One of the tour operators also rents bikes; this activity costs about 10 TL/person and on average 14 people per month rent bikes throughout the year.

Five full-time staff are employed on average in each enterprise and few of them employ additional part-time or seasonal staff members (2 out of 7 employ double or triple number of part-time staff).

All of the surveyed tour operators were aware of Gökova's protection status as MCPA. Tools used to market the tour operator's services include internet, face to face, brochures (in hotels, stands in the region), collaboration with foreign tour companies, word of mouth and advertising on the radio.

Customer feedback includes:

- Customers like the quietness and the protected nature of Gökova Bay and the Azmak
- Customer satisfaction is correlated with the quality of the tour/activity including tour operator's knowledge of foreign languages, cleanliness and quality of gear
- Customers often complain about mosquitoes and stray dogs

Tour operators had the following concerns about management of Gökova SEPA:

- Infrastructural problems including disruptions in electricity and water supply provided by the local municipality and delays to infrastructural works

- Too much emphasis on quantity rather than quality of the tourism experience provided
- Sea pollution (especially from the Blue Voyage boats)
- Insufficient parking facilities

4.3.2.4. Restaurants

The survey covered 23 restaurants located in various parts of the SEPA including Akyaka, Karacasogut and Çamlı. With the restaurants in Çamlı (estimated as 5) and in Akbük (2), the total number for the whole SEPA is 40 restaurants (excluding kiosks for toast etc and small cafés). This survey is therefore considered to cover around 57% of the small to large scale establishments operating in Gökova SEPA.

The awareness on the site's MCPA status is very high (only 1 restaurant representative out of 23 was unaware of this). Around 50% of restaurants remain open throughout the year, 26% are open for 6 months a year and 24% for less than 5 months a year.

Around 50% of restaurants offer fish, the most popular species being Grouper (*Epinephelus aeneus*), Gilthead seabream (*Sparus aurata*) and Sea bass (*Dicentrarchus labrax*), followed by dentex and red mullet. Restaurants procure their fish from the local fish cooperatives, directly from the fishermen, fish markets and wholesales.

Restaurant capacity ranges from 15 to 200 people with an average of 76. The price of a meal on average is 18.5 TL per person.

The distribution of the part time versus full time employees is shown in Figure 7, the average for both full time and part time employees is 2.

¹⁶ 19TL per trip * 8295 customers per year (1,185 customers for 7 months)

Number of Restaurants

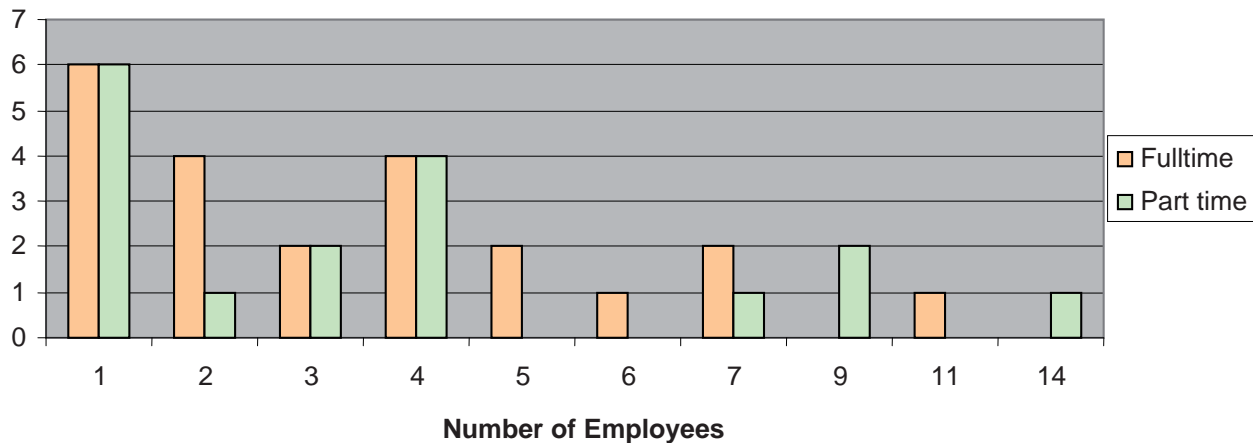


Figure 9. Number of Part and Fulltime Employees

Table 14 provides details on the number of months restaurants operate and the number of customers per day and per season (based on a 90 day high season and 270 day off season). The total number of customers estimated across the 20 restaurants for which survey responses were provided is 1,823,790 per year, or an average of 91,189 per restaurant per year.

The restaurants market themselves through the internet & social networking sites, word of mouth (through their customers), signboards, brochures and discount agreements with tour companies (for example in İzmir and Bodrum).

In terms of trends in visitors, 43.5% of restaurants think that visitor numbers have fallen the past 5 years, 30.5% believe no change has occurred and 26% think that visitor numbers have increased.

Restaurants generally do not have a very positive picture about their future: they don't see their business prospering as there is a drop in the number and quality of tourists as well as services; some are in financial debt even during the tourism season; prices are going up; some are dependent on visitors arriving by sea but that this source is threatened by pollution; the season is short and it is difficult to find good quality staff; and tourism capacity is already saturated thus the restaurant business is unlikely to develop.

Very few (4) see their business getting bigger (one person sees that the prospects are good since the quality of the fish is good), and one interviewee remarked that if the area is successfully protected, the tourist numbers will increase.

The following issues regarding the management of Gökova SEPA were raised:

- Insufficient tourism and urban planning resulting in infrastructural problems - e.g., a lack of drinking water, bad road conditions and a lack of public toilets
- Pollution (in azmak and on the pier) and the release of untreated waters into the environment (sea pollution)
- Uncontrolled and unattractive developments coupled with a lack of monitoring and poor implementation
- Existence of unlicensed operations
- Lack of coordination between local and central government (i.e., the same maintenance works are done over and over again)
- Lack of conservation awareness and poor involvement of stakeholders (other than public authorities and NGOs) in conservation projects;
- Short and insufficient tourism season (season starts late)

- Lack of footpaths (besides the shoreline/coast)
- Dogs left behind by summer house owners when the season is over, which tourists are afraid of
- Low quality of the visitors
- Limited accommodation and restrictions on economic development
- Not enough promotion of local products by businesses

Table 14. Customers per year for surveyed restaurants

No	Operational months	Number of Customers in high season (per day)	Total number of customers in high season/year	Number of Customers in low season (per day)	Total number of customers in low season/year
1	12	240	21,600	0	0
2	12	900	81,000	10	2,700
3	3	750	67,500	0	0
4	3	120	10,800	0	0
5	12	45	4,050	17	4,590
6	3	105	9,450	0	0
7	12	4,500	405,000	0	0
8	12	1,050	94,500	420	113,400
9	12	750	67,500	0	0
10	5	720	64,800	0	0
11	12	1,530	137,700	30	8,100
12	12	2,400	216,000	240	64,800
13	6	2,400	216,000	900	81,000
14	4	80	7,200	20	600
15	6	NA	NA	NA	NA
16	7	NA	NA	NA	NA
17	6	NA	NA	NA	NA
18	12	100	9,000	30	8,100
19	12	100	9,000	40	10,800
20	12	100	9,000	50	13,500
21	12	300	27,000	95	25,650
22	5	150	13,500	25	1,500
23	6	170	15,300	35	3,150
TOTAL		16,510	1,485,900	1,912	337,890
Average		825.5	74,295	95.60	16,894
Total (12 months only)		12,015	1,081,350	932	251,640

4.3.2.5. Hotels

As part of the tourism survey 28 hotels were interviewed comprising a range of establishment types as presented in Figure 8. A high percentage - 92%, of the surveyed institutions were aware of the site's protection status.

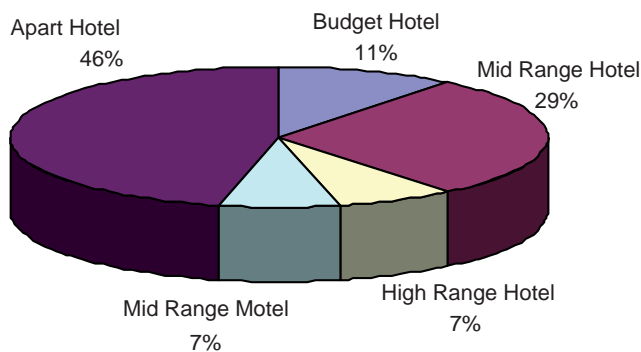


Figure 10. Surveyed Hotel Types

Around 75% of the hotels/apartments had a municipal licence and 10% had a Ministry of Tourism licence; the rest did not indicate any type of licence. The room capacity ranged between 2 and 150 with an average of 20 rooms. Bed capacity ranged between 6 and 350 with an average of 48 beds. Table capacity ranged between 0 and 350 with an average of 20.

During the high season, a room costs between 50-230 TL/night (the average being 130 TL) while during in the low season the price range drops to 25-175 TL/night (the average being 62 TL). Visitors stay between 2 and 30 days, and on average 6 days. Occupancy is strong in the high season with 42% of hotels indicating that they are at 100% occupancy, 14% at 90% and 18% at 80%. However during the low season occupancy rates falls by 50% to 80%. This high Summer demand increases the pressure for more hotel construction in Akyaka and raises the expectations of the people outside Akyaka to get their fair share from the tourism activities.

Hotels use the following marketing tools: Internet (their own site's web link; publicity in the net; social network sites); brochures; e-mailing; tour agencies; direct marketing; newspaper publicity; word of mouth (through their customers and loyal customers who come back); signboards; and, marketing in the university (for apart hotel).

The number of full time employees ranges between 1 and 40 (the average is 4). The number of part time employees is between 1 and 40 (the average is 6).

In terms in trends in visitor numbers 53% believe that visitor numbers have increased in the past 5 years, 21% think they have declined and 18% indicate that it has not changed.

About 65% of the hotels are hopeful about their future (they see the potential of the region, wish to increase the quality of their service and intend to expand). About 20% think that no change will occur in their business.

Hotel operators raised the following concerns about how Gökova is used and managed:

- Problems with the municipality and infrastructure (trash and dirtiness, insufficient car parks, roads, lack of water, poor planning and management, municipality remains understaffed and underfunded, subjective treatment due to corruption, municipality not open to change, bad timing of the infrastructural works)
- Lack of monitoring in the protected zones (pollution above azmak due to agricultural activities and conservation is not prioritized in planning decisions)
- Illegal buildings and developments need to be controlled
- The site is not being promoted and marketed sufficiently
- Dogs and mosquitoes need to be controlled
- New ideas should be developed in order to extend the tourism season (Slow City is considered to be a positive initiative)
- Need to develop a zone for sports and foot paths
- Increasing number of apart hotels in the region reduces the economic productivity of the hotels
- Constructions (road etc) and other infrastructural problems affect their business (for example, electricity shortages have messed up AC

machines and sea pollution is mentioned as an issue)

- More attention should be given to customer satisfaction and quality-price balance

4.3.3. Valuation of Key Activities

This section provides additional information on the range of activities offered within Gökova SEPA derived from existing reports and data and field interviews March 2011.

Boat trips to Sedir Island. In Akyaka 10-12 boats offer trips to Sedir Island for 200-300 TL for a whole

day (excluding food). There are also around 25 boats in Çamlı Village offering a return trip for 10 TL. Boat owners claim to inform people that they are in protected area. In 2010 close to 100,000 local and foreign tourists visit the island. Assuming 75% of visitors take boats from Çamlı Village and 25% from Akyaka, this results in a revenue to boat owners of 750,000TL + 6,250,000TL = 7,000,000. Sedir island is open from the 20 April to the end of September.

Trips to Sedir island include a 10TL per person payment to MOT. Table 15 provides an overview of visitor numbers and tourism fees to Sedir Island.

Table 15. Sedir Island - visitor numbers and tourism fees

Archeological Site	Visitors (foreigners & locals)		Visitors with a museum pass	Number of visitors part of a group	Total number of visitors	Number of MOT cards sold	Revenues Generated (TL)
	Regular fee paying visitors	Free visitors					
Sedir Island	43,953	10,491	14,116	31,390	99,950	3,227	470,720

Source: Ministry of Culture & Tourism

A total of 99,950 visitors (foreigners & locals) visited Sedir Island in 2010. This generated around 70,720 TL (or approximately 235.360 €) for the Ministry of Culture & Tourism. About 10,491 visited for free (seniors etc), 31,390 came as a group and therefore received a group discount, 14,116 had a special museum pass issued by the MOT and 43,953 people paid the regular entrance fee.

Bilimtur-Bilkent Tourism and Investment Company have an annual rental contract with the DOSIM (a company of Ministry of Culture and Tourism) obtained through competitive bidding. In season they employ four full-time staff to manage the beach and cafe. They also provide a 'protection' service - warning people not to enter the beach or take sands and also inform people to enter the sea from the wooden platform, use the showers before and after swimming. The Ministry of Culture and Tourism is responsible for cleaning up the beach and other security issues and a staff member is present throughout the year to protect and maintain the area.

There is a **daily boat tour co-operative operating out of Akyaka**. There are 10 members, with 8 boats of 10-30 meter length that can carry 100-200 people. In addition to trips to Sedir Island, these boats offer trips to the bays in the area and also bring people from other areas such as Marmaris to Akyaka. Between 25,000 - 30,000 trips are made in one season (July - mid-October), costing around 20-22TL per person. This results in a revenue of TL500,000-660,000 a season. A 100 person capacity boat employs 6 people and a 200 people boat 10-12 people. Out of season co-operative members spend time maintaining their boats, but do not have other jobs. Each year boat owners have to renew their licence with Directorate of Maritime Affairs. According to co-operative members people are generally not aware that they are in a protected area, and this could therefore be promoted through signage and leaflets.

Kite surfing. There are at least three kitesurf schools active in Akçapınar, in the area known as 'Araplar Mevkii' - Kitesurf Academy, Kiteboard Gökova and Gökova Rüzgar.

Gökova Rüzgar Sports is one of Turkey's biggest kiteboarding schools and is affiliated to the International Kiteboarding Organization (IKO). It has been working in Akyaka for 4 years. Their kite surfing activities currently take place in Akçapınar Beach and a total of 380 meters of marine area is allocated for this (Kıraç and Veryeri 2010). They also offer sailing and sea kayaking tours. In 2010 they had a total of 140 students over the season (March - September). A training course (9hrs over 3 days) cost 540TL¹⁷, resulting in a revenue of 75,600TL. Charges for free riders include 15TL for storage, transfer and assistance on the beach and 150TL per day for equipment hire. There could be 200 free riders a day, and this is the company's main income. Assuming 50 kites a day for 100 days and 160TL in charges results in a revenue of 800,000TL (this is probably an overestimate as some would have their own equipment). Total revenue is therefore estimated at 875,600 TL/year.

There are no limitations on number of schools working on the beach and in this sense the beach is being treated as an open access resource, with little incentive to sustainably manage it. There is a formal process for obtaining a water sports certificate from the Water Sports Committee governed by the Major and including representative from GDNAP and the MOT. However, many people operate illegally. In order to safely and sustainably manage the area two schools are considered optimal, however, in 2010 there were four schools in operation. Teaching areas need to be properly managed to be safe, for example a distance of 100m from swimmers should be clearly demarcated and 2 kites / 4 students per instructor is recommended. The site could support 300 'free riders' if managed properly.

For the 2011 season there will be an entrance fee of 10 TL for the beach per kitesurfer, which will go to MELSA, a company tied to Muğla Governorship, to maintain the toilets and road etc.

Wind Surfing. Gökova Bay is closed to all motorized water sports making the inner bay, which has plenty of wind, an attractive and secure location for wind surfers. May - November are ideal for windsurfing.

Sea Canoeing. Sea canoeing is a popular way of observing the historical and natural beauty of the area and could be further developed.

Sailing. The bay is suitable for year round sailing due to the continuous strong winds in the area, particularly between May-November. Muğla province is also where the majority of Turkey's national sailors come from, so there is a strong sailing heritage on which to build.

Gökova Sailing Club, located in Karacasöğüt, opened in 2002. The club acts as a marina (the closest marina is in Marmaris, to the South) and offers accommodation and a restaurant. The club attracts sailors from around the world - but in particular from Europe (France, UK, Spain, Italy and Holland), USA and Canada. The marina has a capacity for 50 boats and is full between July and August, and 80% full the rest of the year. The club operates as a commercial venture and as an academy focussed on training children. The club has 38 members and offers sports membership for children in the community. It runs programmes with local schools and weekend and holiday training courses for children (6 children in the national team are students here). The village located nearby the club could provide produce to the club. This service could be developed as people arriving from sea typically look for somewhere to buy fresh food, souvenirs and to generally connect with local people.

A recreational sailing and training centre could be developed in Akyaka. This would require designating a protected zone or bay of around 300-400m². A potential site is at the end of the public beach, which is currently used as a café.

Other activities include hiking, biking, rock climbing and paragliding. The marine and coastal landscape provides an attractive backdrop for these activities, therefore part of their value may be attributed to the marine ecosystem. Both Akyaka and Gökova have walking routes through very beautiful natural and cultural landscapes, and the local NGO GAS-Der has produced a booklet for nature walks in the area. There are many bike routes in the region, which provide a different perspective of the area's natural assets. Some villages and the downward road of Sakar Pass offer particularly attractive views. At the top of the rocky Çınar beach, there are many

¹⁷ 800 TL per course is the intended price for the 2011 season.

opportunities for rock climbers of various abilities. Rock climbing is also possible in Akyaka. On a dirt road on the right side of Sakar Pass there is a fire observation post at an altitude of 900 meters, which is a suitable area for paragliding.

Table 16 Summarises the value of sea related recreational activities on offer at Gökova SEPA. These estimates are based on a number of assumptions and are gross estimates, that is costs have not been deducted.

Table 16. Marine related recreational activities valuation

Activity	Value /year TL	Comment
Boat Tours – Sedir Island	7,000,000	Assumes 25% of visitors travel by boat from Akyaka and 75% from Çamlı village Gross (expenses not deducted)
Sedir Island Entrance fee, payable to MOT	70,720	Gross
Boat Tours by Akyaka Cooperative (excluding Sedir Island)	500,000- 660,000	Gross
Estimate revenue for all boat tours companies operating in Akyaka based on tourism survey (see Section 4.3.2.3)	1,260,840	Gross. Based on the average number of customers and prices one company earns around 157,605 TL per year ¹⁸ . This is lower the estimate provides above for Akaka Cooperative, which is considered to be one of the larger operators. For all 8 companies operating out of Akyaka this would equal 1,260,840 TL a year.
Kite surfing	875,600	Only for one company out of 3 operating in the area. This company is considered to have a higher level of activity than the other 2 companies.
Sailing	No estimate	

As previously mentioned beach zones are rented out by GDNAP either to other public authorities through protocols or certain private entities through a bidding process. This generates income for GDNAP. The Business Development Unit (BDU) in GDNAP's headquarters in Ankara coordinates these rental agreements. A public authority can sub-rent the site or beach facilities

in question to third parties. Table 17 summarises the available information on GDNAP's rent agreements in Gökova SEPA in 2011. The total estimated rental revenues for GDNAP for 2011 is 472,811 TL without counting the sub-rental values of the beach and other coastal facilities. This is an underestimation due to the fact that sub-rents are typically higher.

¹⁸ 19TL per trip * 8295 customers per year (1,185 customers for 7 months)

Table 17. Daily use areas being rented out by GDNAP and their values for 2011

Beach/Site Rented	Operator	Buildings & Services	Rent / Revenue for 2011 (TL/year)	Subrent (TL / year)	Comment
Gökova Picnic area-1 (Bungalows)	Yücel A.Ş.	Information and administration building, sunbathing platform, changing room, shower	374,054	N.A.	
Gökova Picnic area -2	Yücel A.Ş.	Refreshment bar, shopping unit	50,150	N.A.	
Akçapınar Village Araplar Zone Daily Service Area	Ula District Governorship	Kiosque, portable toilet), arbour	Exempt according to protocol	50,000	
Sarıç Village - Akbük Daily Service Area	Muğla Governorship Special Provincial Administration – MELSA	Kiosque, toilet, changing room, open shower, arbour, wooden pier	19,757	N.A.	This is not a rental arrangement. 20% of the turnover is given to GDNAP (figure from 2010)
Akyaka Public Beach Daily Service Area	Akyaka Municipality	Umbrellas and chaise-longues	19,596	N.A.	
Çınar Bay	Akyaka Municipality	Kiosque, toilet, changing room	9,254	57,000	
Karaca Village Gemioturan Area Daily Service Area	Marmaris District Governorship)	Pier, kiosque, arbour, toilet and changing room	N.A (as of 8.8.2011)	N.A (as of 8.8.2011)	The district governorship could not do the bid in 2011; GDNAP will carry out the bid
İncekum - Çamlı Village	Marmaris District Governorship	Kiosque, toilet, changing room, chaise-longues, umbrellas, arbour	N.A (as of 8.8.2011)	N.A (as of 8.8.2011)	A protocol needs to be made between the Forestry Directorate. Accordingly, in the future, 35% of the gross revenues will be paid to GDNAP

4.4. Summary of Valuation

Table 18 summarizes the monetary values derived for Gökova SEPA ecosystem services. The total annual value is estimated to be US\$31.2 million per year. This provides an initial value of the site, which needs to be refined through further study. This value incorporate provisioning services - fish and salicornia, regulating services - carbon sequestration, erosion protection and waste treatment, and cultural services - tourism and recreation. It is considered to be an underestimate in that conservative estimates have been used for example for tourism and a number of potentially important services are not included in this total. Ecosystems services thought to be present (or

potentially present) at the site which cannot be estimated due to a lack of scientific information and/or data are - raw materials such as natural medicines, genetic resources and ornamental resources, which have yet to be studied at the site; the role the marine environment plays in microclimate regulation, the role of the marine environment in flood and storm protection, the sites heritage value and educational value and the sites landscape and amenity value.

Around 55% of the value is attributable to tourism and recreation in the area highlighting the importance of sustainably managing the tourism industry to ensure this flow of revenue. This estimate is based on visitor numbers built up from published

data and information on the site, and expenditure data derived from the tourism survey. It is considered to be an underestimate of tourism value in that it is based on market prices (expenditure data) and therefore does not capture the consumer surplus elements of value and a conservative estimate of visitor numbers was adopted.

The estimate of waste treatment function of Gökova SEPA is also significant (around 32.5% of the total). However this value is based on a value transfer approach and needs to be refined through site specific studies. This first requires scientific studies to define the provision of this service at the site. This service could then be estimated based on avoided treatment costs. Given that half of the municipality budget in Akyaka is reportedly spent on waste water management this natural service provided by the marine environment is considered to be of importance to the SEPA.

The value of fish is estimated at US\$332,854. This may be an underestimate as it does not include the value of recreational fishing and may be based on under reporting of actual catch, however it may better reflect a sustainable fishery resource value. It also reflects a gross rather than net benefits

(that is costs have not been deducted). The variability in the data on fish catch and the fluctuations in price highlight the difficulty of establishing the value of the fishery in Gökova SEPA. Furthermore the value should be based on a sustainable harvest level, which is not specified for the area, and there are concerns that the fishery is currently on an unsustainable path – due largely to illegal fishing. Analysis of fish stocks are therefore needed to assess the sustainability of the fishery. The fishing industry is also important for local livelihoods and to the cultural identity of the area.

The valuation results highlight the economic importance of the site's Posidonia meadows, which result in the benefits of carbon sequestration and erosion protection. The carbon sequestration value could be refined through site specific studies of the storage and sequestration functions performed by Gökova's Posidonia meadows. Such studies would be timely given the current interest in developing a market in Blue Carbon (this is discussed further In Section 5). The erosion protection function of the posidonia meadows further enforces the need to protection this ecosystem. Again this value could be refined by site specific studies defining the provision of this service.

Table 18. Summary of valuation results for Gökova SEPA

Service	Value/ year US\$	Valuation approach	Comment
Fish	332,854	Market prices	This is not based on a sustainable harvest rate, which is unknown. This estimate does not include recreational fishing and may be based on an under-reporting of fish catch. This is a gross value – costs have not been deducted
Salicornia	62,350	Market price	Market price of 5TL/kg and assumption that 50% of restaurants in area demand 1 ton per season This is a gross value – costs have not been deducted
Carbon sequestration	792,064	Market prices (avoided cost approach)	Assumes development of market in blue carbon credits analogous to the forest carbon market. This value is therefore not currently 'captured'. Based on market price of carbon of US\$11.2 / tCO ₂ eq
Erosion control	2,844,800	Benefits transfer	Mangos <i>et al</i> (2010). Based on 160,000 Euro per meter of coastline, 159 km of <i>Posidonia</i> beds in Gökova SEPA and 8% of the area at risk.
Waste treatment	10,259,200	Benefits transfer	Based on Mangos <i>et al</i> (2010) estimate for Turkey of 229 million Euros apportioned to the study site based on length of its coastline.
Tourism / Recreation	17,051,104	Market prices	Based on a conservative estimate of tourist numbers (30,000 overnight visitors and 100,000 day visitors per year) and a survey of tourist expenditure
TOTAL	31,231,572		

OPPORTUNITIES TO INCREASE REVENUE FLOWS FROM GÖKOVA SPA



10

5.1. Background

This section draws on the economic analysis undertaken to identify new potential income generating activities that can increase revenue flows to Gökova SEPA.

A key component of the GEF-UNDP project, under which this economic assessment has been undertaken, is to identify new and innovative financing arrangements for the site. Underpinning the identification of appropriate financing mechanism is a clear scientific understanding of the services being provided by the marine ecosystem, a quantification of this service (in biophysical terms), and an understanding of its economic value and of the beneficiaries. Potential services provided at the Gökova include (in addition to fish) are carbon sequestration, disturbance regulation, waste assimilation and tourism benefits.

It should be noted that other components of the GEF-UNDP project are focused on the identification of feasible income generating options for the site, the determination of cost-offsetting mechanism and the development of a business plan for Gökova. Therefore this section only provides an overview of the opportunities for financing falling out of the economic analysis and a high level discussion of potential new and innovative financing mechanisms. Many of these mechanisms such as carbon credits for blue carbon and PES type arrangements are only considered to be viable in the long term due to the fact that markets in these services are still developing globally and/ or institutional arrangement in Turkey do not yet permit their use.

A typology of potential financing mechanism is provided in Table 19. This categorises potential mechanisms into external flows, mechanism for generating funding such as taxes, and market based charges. At present the site is financed through budget allocations from the Turkish government, donor support for specific projects and revenue from tourism. In addition, revenue from fishing is important to local communities in the area.

Table 19. Typology of potential financing mechanisms

External flows	Generating funding	Market based charges
Domestic government / donor assistance	Licensing and royalty fees	Tourism charges
Private voluntary donations	Fiscal instruments	Resource-use fees
Environmental funds & debt for nature swaps	Benefit & revenue sharing	Payments for Ecosystem services (PES)
	Cost sharing	Mitigation banking and biodiversity offsets
	Investment, credit & enterprise funds	Blue Carbon Markets

Source: Adapted from Emerton et al 2006

Markets in marine ecosystem services are beginning to emerge around the world. Formal markets now exist to regulate commercial fisheries and potential markets are being proposed for marine biodiversity offsets and carbon sequestration. In addition focused business deals and payments for ecosystem services (PES) are being forged to invest in restoration and conservation of specific marine ecological systems and the services that they provide (Forest Trends and the Katoomba Group 2010). The sections below discuss some of these potential financing options and their applicability to the Gökova SEPA. The focus is on opportunities for capturing blue carbon, Biodiversity offsets and PES, as innovative approaches that may present in time new and innovative financing for the site.

5.2 Finance mechanisms

5.2.1 Fiscal instruments

Taxes on summerhouse owners may be an option in some areas.

5.3 Market-based charges

5.3.1 Tourism charges

There are a range of tourism fees levied by different institutions – for example Sedir Island is run by the MOT, the daily use areas are run by GDNAP and Akbüük is run by the Muğla Government. Co-ordination across institutions generating revenue within Gökova SEPA and arrangements for the re-investment of revenues in the area needs or be strengthened.

The Blue Voyage trips operate within Gökova SPA, with Sedri Island being one of their destinations. The possibility of charging boats entering the SEPA could be explored. This charge should at a minimum cover the costs of their environmental impacts (waste, congestion, noise). Such a system would require monitoring of boats entering the SEPA. It is understood a waste collection boat is proposed for the area by the municipality for which there will be a charge.

5.3.2 Marine Carbon Markets

Due to the fact that they store large amounts of carbon and are threatened by conversion and pollution, seas grasses could be a viable target for carbon finance. This would require data on carbon sequestration rates, on site storage, emission profiles and the cost of protection. There are currently no markets for credits generated by ‘blue’ (marine) carbon activity. A logical venue for considering blue carbon payments would be through the United Nations Framework Convention on Climate Change (UNFCCC) process. Currently, the only blue carbon activity that could potentially be covered under the UNFCCC would be mangrove protection, possibly falling under the auspices of Reduced Emissions from Deforestation and Degradation (REDD+)¹⁹.

Global markets aimed at reducing GHG emissions offer a potentially large economic incentive to avoid the conversion of coastal ecosystems. This idea is analogous to REDD. Incentives to retain rather than emit blue carbon would preserve biodiversity

¹⁹ Reducing emission from deforestation and forest degradation (REDD) is a payment scheme designed to compensate landowners for the value of carbon stored in their forest that would otherwise be released into the atmosphere. REDD + additionally recognises efforts for reforestation and sustainable forestry.

as well as a variety of other ecosystem services at the local and regional scale (Murray *et al*, 2010).

Participation in a market for blue carbon will involve some costs associated with measuring, monitoring and verifying seagrass loss and carbon stocks, establishing a baseline against which emission reductions are measured, and enforcing contracts and monitoring transactions. There are no available estimates of these costs and they tend to be 'upfront' and therefore need to be carefully assessed before parties proceed with protection efforts (Murray *et al*, 2010).

Box 7 details a scheme for mitigating *Posidonia* loss and disturbance at Göcek-Dalaman SEPA.

Box 7. Mitigating carbon loss

A scheme to mitigate the impacts of anchoring in the marine environments, especially in Göcek-Dalaman coves, commenced in 2009 with the creation of 50 mooring sites. Each mooring site can reduced/stopped the degradation of at least 30 m² of *Posidonia* meadows, therefore for all 50 mooring sites 1,500m² of sea grasses may have been protected (assuming all site are surrounded by the sea-grass). This will contribute to a minimum of 124.5 kg C fixation per annum¹⁹. GDNAP is willing to increase the number of these sites both in Göcek-Dalaman coves and the other sites where high marine traffic observed.

5.3.3 Payments for Ecosystem Services

Payments for Ecosystem Services (PES) are contractual and voluntary transactions where a 'buyer' agrees to pay a 'seller' conditional on delivery of an ecosystem service, or implementation of a land use or management practice likely to secure that service. Following the successful development of terrestrial PES systems, markets for marine ecosystem services are now being explored and could become an important source of new financial for marine protected areas in the future. For example a PES might create a financial incentive to protect, restore, or sustain a marine ecosystem service such as shoreline protection and the provision of fish nurseries. Establishing PES often takes years, requiring detailed studies to define the service being provided (this is crucial for a credible PES), estimate its value and undertake extensive stakeholder engagement to build trust and commitment.

Payments for Ecosystem Services are not operating at present in Turkey. Currently, no state regulations or incentives for PES have been developed.

5.3.4 Biodiversity offsets

Biodiversity markets are a potentially powerful tool for internalising traditionally externalized costs and compensating good practices. For example, if a business has to pay to mitigate its residual impact on marine species, it either has to bear the cost of mitigation or develop elsewhere to avoid this cost. Conversely, if businesses can be financially compensated for protecting or enhancing a rare marine species or habitat there will be an economic incentive to protect habitat.

Payment systems for biodiversity compensation include: biodiversity offsets, mitigation banking, conservation banking, habitat credit trading, fish habitat compensation, BioBanking, complementary remediation, conservation certificates. Some are based on compliance with regulation while others are done voluntarily for ethical, competitive, or pre-compliance reasons. They all aim to reduce biodiversity loss and build the cost of biodiversity impacts into economic decisions through markets or market-like instruments and payments (Marsden *et al* 2010).

'Species banking' and biodiversity offsets are mechanisms by which development in one location is exchanged for protection of the same species or community at another comparable habitat. While an offset that attempts to achieve **no net loss** is preferable from an ecological and social standpoint, less comprehensive forms of impact compensation, in which funds are set aside for biodiversity management or valuable biodiversity is protected elsewhere, can be a first step towards better biodiversity footprint management or even eventually a regulated offset system.

Marine biodiversity supports the marine ecosystem services upon which many communities depend. Where regulation for coastal and offshore development is strong, species banking and marine biodiversity offsets could become an important mechanism for marine conservation.

²⁰ Personal communication, Harun Güçlüsoy

CONCLUSIONS AND RECOMMENDATION



11

6.1. Conclusions

Gökova SEPA is among the first Special Environmental Protected Areas declared in Turkey (in 1988) and is protected on account of its biodiversity, historical and cultural importance. Gökova's biodiversity supports a range of ecosystems services that contribute to the economic welfare of a range of beneficiaries, support local communities and Turkey's GDP. The total annual value of Gökova SEPA is estimated to be US\$31.2 million per year. This represents an initial valuation of the site, which needs to be refined through further study.

This value incorporates provisioning services - fish and salicornia, regulating services - carbon sequestration, erosion protection and waste treatment, and cultural services - tourism and recreation. It is considered to be an underestimate in that conservative estimates have been used for example for tourism and a number of potentially important services are excluded. Ecosystems services thought to be present (or potentially present) at the site which cannot be estimated due to a lack of scientific information and/or data are - raw materials such as natural medicines, genetic resources and ornamental resources, which have yet to be studied at the site; the role the marine environment plays in micro-climate regulation, the role of the marine environment in flood and storm protection, the site's heritage value and educational value and the site's landscape and amenity value.

Around 60% of the site's value is attributable to tourism and recreation in the area highlighting the importance of sustainably managing the tourism industry in order to secure this revenue flow. The tourism survey clearly demonstrates that visitors' key motivations for coming to the area are related to its natural assets (i.e., its unspoilt nature, peace and quiet and clean seas). It is critical therefore to protect the marine environment on which this tourism revenue depends.

The valuation results highlight the economic importance of the site's regulating services, in particular the site's posidonia meadows, which result in the benefits of carbon sequestration and erosion protection. The carbon sequestration value could

be refined through site specific studies of the storage and sequestration functions performed by Gökova's *posidonia* meadows. Such studies would be timely given the current interest in developing a market in Blue Carbon.

The value of fish is estimated at US\$332,854 per annum. This may be an underestimate as it does not include the value of recreational fishing and may be based on under reporting of actual catch, however it may better reflect a sustainable fishery resource value. The economic value should be based on a sustainable harvest level, which is not specified for the area. Analysis of fish stocks are therefore needed to assess the sustainability of the fishery.

The sites ecosystem services are also important to local livelihoods and economies. According to the major of Akyaka, between 60-80% of Akyaka's economy is dependent on the coast, therefore marine protection is important for the economy. Tourism and recreation are vital to the Akyaka's economy representing 60% of the district's GDP and employing around 500 people. There are around 170 small businesses – restaurants, cafes, hotels engaged in tourism. In addition around 50 people are employed in the two hotels operating in Bördübet. There are also a number of households dependent on fishing. For example, in Akyaka there are around 60 households involved in fishing while in Akçapınar around 70% of the population is engaged in fishing. Recent studies however indicate that the livelihoods of the small scale fishing sector is threatened by irregular and relatively low income levels. A key reason for this is considered to be the high level of illegal fishing activity.

These jobs are important within an area where unemployment rates are high and alternative job opportunities are limited. The unemployment rate at Akyaka is 8%, compared to 3% for the region and in Inner Gökova bay around 40% of the population have incomes below the minimum wage.

Despite their economic, cultural and economic importance the quality and quantity of Gökova's ecosystem services are threatened by a range of pressures including over fishing and illegal fishing activities, tourism pressures and coastal developments.

6.2. Recommendations

The key recommendations of this study are provided below. These recommendations highlight priorities in terms of the future economic valuation of the site's ecosystem services as well as priority management issues.

Fishery valuation and management

- The valuation should be based on a sustainable harvest rate (quantity) multiplied by revenues minus costs. Scientific studies of fish stocks are therefore required to determine sustainable harvesting rates.
- Time series data is needed to understand the change in stock overtime and to monitor whether or not the fishery is on a sustainable path or not.
- The area needs to be properly monitored in order to stem current illegal activities which threaten the fishery resource and undermine the effectiveness of the no-take zones.

Refining the valuation of the site's regulating services

- Good economic valuation is underpinned by good scientific evidence. This often particularly important for regulating services. Site specific scientific studies of the provision of these services are required to better understand these services and inform the valuation. This includes the following regulating services – carbon sequestration, erosion control, flood and storm protection and waste assimilation.
- A priority area of research is considered to be studies of the services offered by the site's *posidonia* meadows. In particular, site specific studies of the carbon sequestration and storage rates of Gökova's *posidonia* meadows would position Turkey to potentially benefit from the emerging market in Blue Carbon.

Developing a sustainable tourism industry

Tourism needs to be developed and managed in a way that complements that area's status as a marine protected area.

- A study of the area's tourism carrying capacity is needed to understand the limits to tourism development in the area.
- Development of tourism master plan / strategy is recommended. This should focus on offering a high quality tourism experience in line with the site's carrying capacity rather than increasing tourism numbers. The master plan should be aligned with the area's marine protection status and build on its proposed accreditation as a 'slow city'. The master plan would explore mechanisms for minimizing tourism pressures on Gökova's SEPA (such as marine and coastal pollution from solid and liquid waste), and for improving tourism related infrastructure
- Opportunities for further developing water sports in the area should be explored. While activities such as canoeing and sailing could perhaps be more widely introduced, it is evident that kite boarding activities need to be managed on Araplar Mevkii to prevent overcrowding and potential safety issues.
- Tourism charges could be introduced more consistently across beaches, assuming that these beaches are able to provide a satisfactory level of service.
- Opportunities for introducing souvenirs of the area and promoting locally produced food could be explored as a way of further strengthening the area's identity as a marine protected area / slow city.
- Better signage and information for visitors and residents on the ecological importance of the area and its protection status is recommended. Everyone visiting the site should be

aware that it is a protected area and people working in the tourism sector could play a role in disseminating this information. This could help strengthen the area's images / brand and improve the quality of the tourism offering.

- The tourism sector could be strengthened by developing a well trained work force and introducing mechanisms to more fairly share the benefits from tourism amongst the community.

Time series analysis and Socio-economic studies

- Parallel to GDNAP's determination to carry out regular biodiversity assessments and socio-economic studies at the different SEPAs of Turkey, valuation studies should be carried out in Gökova SEPA at regular intervals in order to observe changes in the value of benefits derived from the range of ecosystem services and the trade-offs that occur between these. Over time, comparative valuation studies can help choose between different management options that will be optimal for the site's sustainability.
- A socio-economic study specific to Gökova's SEPA could be undertaken to better inform the development of the area and guide the design of possible mechanisms to promote benefit sharing among local communities.

Economic valuation of wetlands

This study undertook a qualitative assessment of Kadın Wetland (see Appendix 3). An economic valuation of this and other wetlands in the area would demonstrate the economic importance of these sites and should also draw out how these wetlands ecosystem interrelate with the coastal and marine environment.

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APPENDIX 1. LIST OF INTERVIEWS, APRIL 2011

Name	Organisation	Position
İsmet Zorlu	GDNAP Muğla	City Planner
Ahmet Çalca	Akyaka Municipality	Director
Can Görgün	Akyaka Fisheries Cooperative	Director
Taner Özcan	Akyaka Fisheries Cooperative	Assistant
Bahar Suseven	Friends of Akyaka-Gökova Association	Director
Yavuz Aksakal	Gökova Wind Kitesurf	Partner
Özgür Ceylan	Gökova Wind Kitesurf	Partner
Oğuzhan Yenigün	S.S. Akyaka Gökova Wetlands Tourism and Boat Transportation Cooperative	Director
Bekir Erdoğan	GDNAP Muğla	
Kaan Erge	Muğla Provincial Tourism Office	
Filiz Mutlu	Muğla Provincial Tourism Office	Assistant Director
Ahmet Dallı	Muğla Provincial Agriculture Office	Director
Osman Kurt	Muğla Provincial Agriculture Office - Fisheries Dpt	
Hakkı Dereli	Muğla Provincial Agriculture Office - Fisheries Dpt	
Mustafa Erdem	Muğla University - Fisheries Faculty	Dr.
Mesut Çakmak	Orfoz Restaurant	Operator
Mehmet Gümüş	S.S. Akyaka Sea Motor Transportation Cooperative	Director
Şaban Akbaş	Golden Key Hotel - Bördübet	Technical service
Cengiz Tecelli	Amazon Camping	Owner
Kaan Tecelli	Amazon Camping	Owner
Elif Keskin	Gökova Sailing Club	General Director
Haluk Karamanoğlu	Gökova Sailing Club	Owner
Serdar Ahıskalı	World Heritage Travelers Association - Turkey	Member of Board
İsa Erken	Çınar Beach Restaurant	Operator
Deniz Drken	Çınar Beach Restaurant	Operator
Özgür Uyanık	Akyaka Municipality	Environmental Unit
Serdar Pekmezci	Akyaka Transportation Cooperative (Number 40)	Assistant Director
Erkan Uzun	Akyaka Transportation Cooperative (Number 40)	Director

APPENDIX 2. TOURISM SURVEY INSTRUMENT

Strengthening the System of Marine and Coastal Protected Areas of Turkey

Tourism survey for Gökova SEPA

Tourist Survey

Name of interviewer:.....

Date:.....

A. Background on interviewee

A1: Nationality:.....

A2: Is this your first visit?

If not, how many times have you visited the site?.....

B. Information on visit & expenditure

B1: **[foreigners only]** How many days are you spending in Turkey?.....

B2: Are you on a day trip?

If not, how many days are you spending in Gökova?.....

B3: What is the purpose (motivation for) of your visit?

Tourism Business Visiting friends/family Other:.....

B4: Are you travelling:

On a package tour Individually

B5: Are you travelling:

Alone As a family As a couple Other:.....

B6: *If* travelling as a family – how many people are in your group?.....

Per family:

B7: What is the total budget for your visit?

Per person:.....

Per couple:.....

B8: Can you estimate your expenditures on (as individual/couple/family):

Accommodation (per day):.....

Food (per day):.....

Souvenirs (per trip):.....

Excursions/activities (per trip):.....

Travel to Gökova (airfares, bus, transfer/taxi, car rental, petrol costs etc.):

C: Views on Management

C1: Do you know that Gökova is a (marine) protected area ? YES NO

C2: How would you rate the quality of your tourism experience in Gökova?

Excellent	Good	Satisfactory	Poor

C3: What do you like about Gökova?

C4: What don't you like about Gökova?

C5: What improvement would you like to see?

D: Socio-economic information

D1: Gender Male Female

D2: Age

18-25 26-35 36-45 46-55 56-65 65-above

D3: Occupation:.....

D4: Income per person /per month

Turkish Nationals (TL)

650-1000 1001-1500 1501-2500 2501-3500 3500-above

Foreigners (€)

under 1,500 1,501-3,000 3,001-5,000 5,000-6,500 Above 6,500

D5: Education

N.A. Elementary High School University Post Graduate

Name of interviewer:.....

Date:.....

E. Survey of Tour Operators (travel agencies) & specialised activities

E1: How many months of the year are you open for?

E2: Type of tour/activity offered and price (per person)

- | | |
|---|---|
| <input type="checkbox"/> Daily Boat excursions: | <input type="checkbox"/> Blue Voyage: |
| <input type="checkbox"/> Canoeing/Sea kayaking: | <input type="checkbox"/> Paragliding: |
| <input type="checkbox"/> Kitesurfing: | <input type="checkbox"/> Banana boat: |
| <input type="checkbox"/> Sailing: | <input type="checkbox"/> Bicycling: |
| <input type="checkbox"/> Hiking: | <input type="checkbox"/> Rock climbing: |
| <input type="checkbox"/> Other: | |

E3: Price of tour/activity (per person)

E4: Number of customers per month

- | | |
|---|---|
| <input type="checkbox"/> Daily Boat excursions: | <input type="checkbox"/> Sailing: |
| <input type="checkbox"/> Blue Voyage: | <input type="checkbox"/> Bicycling: |
| <input type="checkbox"/> Canoeing/Sea kayaking: | <input type="checkbox"/> Hiking: |
| <input type="checkbox"/> Paragliding: | <input type="checkbox"/> Rock climbing: |
| <input type="checkbox"/> Kitesurfing: | <input type="checkbox"/> Other: |
| <input type="checkbox"/> Banana boat: | |

E5: How many other tour companies are there offering similar services in Gökova?

E6: How many people work in your organization (note how many months a year part time staff work)? Full time staff: Part time staff:

E7: What feedback do you get from your customers about Gökova?

E8: Do you have any concerns about how Gökova is used and managed?

E9: Do you know that Gökova is a (marine) protected area? YES NO

E10: How do you market your services?

Name of interviewer:.....

Date:.....

F Lodges/Hotels/Campsite Owners

F1: Type of establishment

- Budget Hotel
- Budget Motel
- Mid Range Hotel
- Mid Range Motel
- High Range Hotel
- High Range Motel
- Apart Hotel
- Campsite
- Holiday Village (package style)

F2: Is the establishment licenced by

- Municipality
- Ministry

F3: Capacity (number of rooms and beds; tables)

Rooms: Beds: Tables:

F4: Room prices (can provide range):

High season: Low season:

F5: Average number of days spent per tourist (range)

F6: How many people work in your organization (note how many months a year part time staff work)?

Full time staff: Part time staff:

F7: Hotel occupancy (%):

High season: Low season:

F8: Have visitor numbers increased or decreased over past 5 years?

- Increased Decreased No change

F9: How do you rate the prospects for your business over the next 10 years?

F10: Do you know that Gökova is a (marine) protected area? YES NO

F11: How do you market your establishment?

F12: Do you have any concerns about how the Gökova is used and managed?

Name of interviewer:.....

Date:.....

G Restaurants

G1: How many months of the year are you open for?

G2: Do you sell fish? YES NO

G3: If Yes,

G4a: Who do you buy your fish from?

G4b: What are the most popular species?

G4: Capacity:

G5: Average price of a meal

G6: Number of covers

High season:

Low season:

G7: How many people work in your organization (note how many months a year part time staff work)?

Full time staff:

Part time staff:

G8: Have visitor numbers increased or decreased over past 5 years?

Increased Decreased No change

G9: How do you rate the prospects for your business over the next 10 years?

G10: Do you know that Gökova is a (marine) protected area? YES NO

G11: How do you market your restaurant?

G12: Do you have any concerns about how the Gökova is used and managed?

APPENDIX 3: QUALITATIVE ASSESSMENT OF KADIN AZMAK

While this report is focussed on the services and benefits provided by the marine environment, it is recognised that the wetlands in the area are closely integrated with the coastal and marine ecosystems. This section therefore provides a high level qualitative assessment of the services offered by Kadın Azmak in Akyaka. Other wetlands in the area – Akbük, Çınar and Akçapınar, have not been evaluated as part of this report, but are considered to provide similar services to Kadın Azmak.

Wetlands in the area face a number of pressures. The small wetlands of Akbük and Çınar are on the edge of a beach area, used for tourism and are both under threat of being drained for development. They are frequented by Eurasian Fish otters (*Lutra lutra*), two species of turtles *Mauremis caspica rivulata* and river tortoise *Emys orbicularis* and diverse waterfowl species. In Akyaka, the riverine and adjacent wetland habitat has been already heavily degraded by tourism in Akyaka (SMAP III)

Wetlands in the area are being polluted by waste from agricultural, fishing boats, restaurants and street water. Kadın Creek is mainly polluted by domestic waste, while Akçapınar Creek is susceptible to agrochemicals (fertilizers and pesticides) and is at risk of eutrophication in 20-30 years. Furthermore, the opening of Akçapınar Creek to the sea is continuously blocked by sediments, which are regularly removed and put on the side of the creek as an extension or a jetty. This practice has created a jetty almost 100 m in length, which threatens the beach.

Table A3:1 provides a typology of wetlands ecosystem services. This is a comprehensive list of potential wetland benefits organized using an Ecosystem Services Approach (ESA). The benefits provided by a wetland depend on its type and location such that a given wetland will provide a sub-set of the benefits listed, and certain benefits will be particularly important at a given site. The typology presented in Table A3:1 links each ecosystem service to its final benefit or outcome that can be valued in economic terms. An initial qualitative assessment of the services provided by Kadın Azmak has been undertaken rating each ecosystem services as follows: ‘***’ means that the service is important, ‘**’ means that the service is provided, ‘-’ means the service is not relevant at the site, and ‘?’ means that there isn’t enough information to determine whether the services is present or not, so its provision is uncertain. This assessment needs to be refined through a more detailed study of the site. The range of potential wetland ecosystem services is described below.

Table A3:1. Typology of wetland ecosystem services and a qualitative assessment of Kadın Azmak

ES Type	Service	Benefit / outcome	Importance at site
Provisioning Services	Food	Commercial and subsistence fish and wildlife	*
	Fibre/materials	Fibre and construction products, e.g., reeds, wood, leather and aggregate	?
	Water	Public water supply, water for industrial and agricultural usage	?
	Natural medicines	Natural medicines	?
	Biochemicals	Biochemicals and genetics	?
	Ornamental resources	Ornamental resources	?
	Source of energy	Energy provision e.g., hydropower	–
Regulating Services	Transport	Commercial use of waterways	–
	Regulation of GHGs	Carbon sequestration	**
	Micro-climate stabilization	Air quality	*
	Water regulation	Flood protection	**
	Aquifer recharge	Flood protection (water supply captured under provisioning services)	?
Cultural Services	Water purification & waste management	Improve water quality / waste management	*
	Erosion control	Erosion control	*
	Spiritual, religious, cultural heritage	Religious sites, archaeological ruins (historical not recreational value)	*
	Educational	Education	*
	Recreation and ecotourism	Recreational fishing, birdwatching, paragliding, hiking, diving, sailing, canoeing, holiday destination (aesthetic views), archaeological ruins (recreational value)	**
	Landscape and amenity	Property and land price premium	*
	Biodiversity non-use	Non-use value	*

1. Provisioning services

1.1. Food

Wetlands provide food such as fish²¹.

1.1.1. Fibre / materials

Driftwood and associated debris from riverbeds and banks can be used as firewood. In addition mining of gravel and rock for road building is practiced in some countries. Some communities produce wetland based handicrafts such as baskets and mats

²¹ In addition wetlands provide nurseries and breeding grounds for fish. This is considered to be a supporting (intermediate) services, the final benefit of which is captured in the value of fisheries. The reeds in Kadın Azmak are densely located in the south of the creek and provide nursery grounds and shelter for fish.

1.1.2. Water Supply

Wetlands are important stores of water that can be used for domestic, agricultural and industrial purposes.

1.1.3. Natural medicines

Wetland flora and fauna can be used for medicinal purposes.

1.1.4. Biochemicals and genetics

Many wetland areas contain wild species that have the potential to contribute to genetic material for the improvement of commercial species. For example, genes from wild species can be important for improving taste and growth rates of agricultural products, and in reducing the susceptibility to disease.

1.1.5. Ornamental Resources

Some of the wetland plants such as lotus are valued as aesthetic products.

1.1.6. Source of Energy

Running rivers hold potential for generating hydropower.

1.1.7. Transport

Wetlands can provide commercial transportation services for passengers and for goods. Water transport may be an efficient, as well as the most environmentally friendly, means of transport available. In some cases it may be the only practical means of transport.

2. Regulating Services

2.1.1. Regulation of Greenhouse Gases

Conservation and wise use of wetlands and their biodiversity have a role to play in the mitigation of climate change. Wetlands can also provide opportunities for ecosystem based climate change adaptation measures.

2.1.2. Micro climate stabilization

The hydrological, nutrient and material cycles of wetlands may help to stabilize climatic conditions such as temperature and humidity in the area.

2.1.3. Water regulation /flood attenuation

Almost any wetland can provide some measure of flood protection by holding excess storm runoff, and then releasing it slowly. Wetlands can act as storage basins, while swamps, marshes, fens and bogs in particular act as sponges that hold water and release it slowly. The size, shape, location, and soil type of a wetland determine its capacity to reduce local and downstream flooding. While wetlands cannot always prevent flooding, they can still minimise the impact by lowering flood peaks by temporarily storing / holding water and by slowing the water's velocity. In this way wetlands can provide a cost-effective flood defence mechanism as the cost of providing an equivalent amount of storage space through the construction of a dam for example would be considerable.

Wetlands in the area provide flood protection benefits. Marmaris was a huge delta that was built over, and now floods every summer. However there is no quantitative or monetary evidence of this ecosystem services at the site.

2.1.4. Aquifer recharge and discharge

Wetlands connected to groundwater systems or aquifers are important areas for groundwater exchange. Groundwater recharge refers to the movement (usually downward) of surface water into the groundwater flow system. Water which moves from a wetland to an aquifer can remain as part of the shallow groundwater system, which may supply water to surrounding areas and sustain the water table, or may eventually move into the deep groundwater system, providing a long term water supply. This is of value to communities and industries that rely on medium/ deep wells as a source of water.

2.1.5. Water purification and waste management

Wetlands can absorb or dilute wastewater, thus saving on water treatment costs. Wetland plants can filter through flowing waters, trapping sediments and suspended solids and assisting in the removal of excess nutrients and toxic substances. **Sediments**, which are particles of soil, settle into the gravel of streambeds and disrupt or prevent fish from spawning, and can smother fish eggs. Other pollutants -- notably heavy metals -- are often attached to sediments and present the potential for further water contamination. Wetlands remove these pollutants by trapping the sediments and holding them. The slow velocity of water in wetlands allows the sediments to settle to the bottom where wetland plants hold the accumulated sediments in place. Runoff waters often carry **nutrients** that can cause water quality problems such as “algae blooms” that result in low levels of oxygen in the water, which can result in the death of fish and other aquatic life. Wetlands protect surface waters from the problems of nutrient overload by removing the excess nutrients, some of which are taken up and used by wetland plants, and some of which are converted to less harmful chemical forms in the soil. Toxic chemicals reach surface waters in the same way as nutrients, and can cause disease, death, or other problems upon exposure to plants and animals (including humans). In a function similar to nutrient removal, wetlands trap and bury these chemicals or may even convert some of them to less harmful forms.



Figure 11. Kadın Azmak wetland in Akyaka (by Esra Başak)

These functions are especially important when a wetland is connected to groundwater or surface water sources (such as rivers and lakes) that are in turn used by humans for drinking, swimming, fishing, or other activities. These same functions are also critical for the fish and other wildlife that inhabit these waters.

The reeds found in Kadın Azmak are thought to play an important water purification function.

2.1.6. Erosion Control

The bottom of the Kadın Wetland is covered with macrophytes, (water plants) which prevent erosion.

2.2. Cultural Services

2.2.1. Spiritual, religious and cultural heritage

Women use the wetland (creek) because it is believed to have health properties.

2.2.2. Educational

Wetlands provide a means of educating society about the importance of our natural capital, and are sometimes used by schools for excursions.

2.2.3. Recreation and ecotourism

Kadın Azmak is used for recreational boat trips. The tour boats operate as a cooperative, which helps to keep the river clean by removing rubbish. Boats require a licence to operate issued by Municipality. Kadın Azmak Conservation and Use Principles were approved and implemented in December 2010. According to these conservation and use principles 14 “*piyade*” style boats (not more than 10m) of maximum 28 horsepower are permitted to operate on the river. An additional municipality boat is responsible for collecting solid organic waste.

The water in the wetland is very clear (this is likely to be due to the fast current and the water purification function of the wetland), and seagrasses and fishes can be viewed from the boats, making boat tours of the wetlands very popular. A river trip last 30-45 minutes and cost 4TL. There are four big boats, which can take up to 20 people. The small boats take 15 people. The high season lasts 2.5 months. In July there may be a total of 40-50 trips a day. Assuming an average of 3.5 trips per boat this results in a revenue of TL3,220 a day for 75 days = TL241,500²². This is an underestimate as it does not include weekend trips throughout the year.

The wetland is home to more than 200 birds and other species, including the Eurasian Fish otter. The site attracts a small number of birdwatchers, however quantitative data on the number of birdwatchers a year or their related expenditure is not known.

2.2.4. Landscape and amenity

Wetlands are often areas of outstanding beauty. This amenity value is often associated with tourism benefits and sometimes premium property and land prices. A number of houses, hotels and restaurants are located along the banks of Kadın Azmak, which it is assumed benefit financially as a result of their location.

2.2.5. Biodiversity non-use.

Biodiversity refers to the variability among living organisms at genetic, species and ecosystem level, and underpins the provision of ecosystem services in general. The direct and indirect value of biodiversity is generally considered to be captured through other ecosystem services, for example, the water provided by a wetland, or its carbon storage function, or its rich diversity of birds or animals which people are prepared to pay top experience. However biodiversity non-use is not, and is therefore listed as a separate component of value.

²² Based on a large boat: 20 people per trip × 3.5 trip × 4TL × 4 boats = TL 1,120
plus small boats: 15 people per boat × 3.5 trips × 4 TL × 10 boats = TL 2,100.



UNDER 5 HEADINGS

“Strengthening the System of Marine and Coastal Protected Areas of Turkey”

1 Project Rationale and Project Aim

Some 3,000 plant and animal species have been identified along Turkey’s 8,500 km coastline. But Turkey’s marine biodiversity is under serious pressure by human kind. The major threats facing Turkey’s marine areas are the degradation of marine habitats and ecosystems, the overharvesting of marine resources and the conversion and/or destruction of coastal habitats. This Project aims to facilitate the expansion of the national system of marine and coastal protected areas and to improve its management effectiveness. The Project officially commenced in May 2009, and will end in October 2013.

2 Project Sites

The Project is being implemented at six sites in Turkey. The Project covers five SEPAs and one Nature Park. The project areas are:

- Foça SEPA
- Gökova SEPA
- Datça-Bozburun SEPA
- Köyceğiz-Dalyan SEPA
- Fethiye-Göcek SEPA
- Ayvalık Islands Nature Park

3 Project Outcomes

The Project will have achieved the following three outcomes:

- Responsible institutions have the capacities and internal structure needed for prioritizing the establishment of new Marine and Coastal Protected Areas (MCPAs) and for more effectively managing existing MCPAs
- MCPA financial planning and management systems are facilitating effective business planning, adequate levels of revenue generation and cost-effective management
- Inter-agency coordination mechanisms in place to regulate and manage economic activities within multiple use areas of the MCPAs



4 The Project's Contributions to Turkish Environmental Protection

- Contributions to the implementation of the Biological Diversity Convention Programme of Work on Protected Areas which Turkey has been a party will have been implemented.
- The country's system of Marine and Coastal Protected Areas will have been expanded by approximately 100,000 ha, or 44% as compared with baseline levels.
- Fisheries Restricted Areas (FRAs) will have been established within at least two Marine and Coastal Protected Areas and the sustainability of fisheries management achievements will be increased through the extension of a system of FRAs.
- The management capacities of local MCPA authorities will have been strengthened for effectively managing the existing Marine and Coastal Protected Areas.
- The Systems for sustainable Marine and Coastal Protected Area financing will have been strengthened.
- Inter-agency coordinating structures will have been strengthened.

- The agencies and other stakeholders will have been enabled to effectively address both land-based and marine-based threats to marine biodiversity.
- A national-level Marine and Coastal Protected Areas Strategy and Action Plan proposal will have been prepared.
- The sustainability of the MCPA system will have been ensured. The expected stream of positive, long-term impacts on marine biodiversity, and in particular those arising from a shift in current trends, is expected to be able to continue well beyond the Project's completion.

What is a Marine and Coastal Protected Area?

Marine and Coastal Protected Areas (MCPAs) can be established for different purposes, can be designed in different types and sizes and can be managed in different ways. Therefore, there are many different definitions of an MCPA.

The simplest definition of an MCPA is "a mechanism for the conservation of any defined marine area, by means of its legal and physical protection from significant human pressure, thus reserving its inherent natural, historical and cultural features.

Such conservation is maintained by appropriately enacted laws and especially through the support and involvement of the local communities and stakeholders.

Thus MCPAs have a potentially significant role to play in eliminating threats to marine biodiversity in Turkey.





5 Who is conducting this project?

The project is funded by the Global Environment Fund (GEF) and executed by the General Directorate of Natural Assets Protection (GDNAP) of the Turkish Ministry of Environment and Urbanization, in partnership with the General Directorate for Nature Conservation and National Parks (GDNCNP) of the Ministry of Forestry and Water Affairs, together with the General Directorate of Fisheries and Aquaculture of the Ministry of Food Agriculture and Livestock. The United Nations Development Program (UNDP) in Turkey is the implementing partner of the project.

The Ministry of Foreign Affairs, the Turkish General Staff, the Ministry of Development, the Turkish Coast Guard Command, the Turkish Naval Forces Command, the Ministry of Transportation Maritime Affairs and Communications, the Ministry of Culture and Tourism,



Turkey's Marine and Coastal Protected Areas

- Turkey's Mediterranean, Aegean, Marmara and Black Sea coastline is 8,500 km long, excluding the islands. This wide marine and coastal fringe is home to a rich and valuable natural biodiversity. It is an immense and highly important zone, hosting some 3,000 plant and animal species.
- The majority of the existing marine and coastal protected areas are currently managed by GDNAP. In addition to these areas, the General Directorate for Nature Conservation and National Parks, the Ministry of Food, Agriculture and Livestock and the Ministry of Culture and Tourism are authorized to manage and plan the maintenance and careful development of some of the existing marine and coastal protection areas.
- An estimated 346,138 hectares of marine area is presently under legal protection within 31 Marine and Coastal Protected Areas. Currently, about 4% of Turkey's territorial waters is so protected.
- Turkey's marine biodiversity is presently under serious pressure by human kind. The major dangers threatening Turkey's marine areas are the degradation of marine habitats and ecosystems, the over-harvesting of marine resources and the destruction of coastal habitats.

the Marine and Coastal Management Department and Foreign Relations and EU Department of the Ministry of Environment and Urbanization, the Provincial Governors, together with such bodies as Local Authorities, universities, research institutes, national and local NGOs and other local representatives, are among the overall stakeholders of the Project.



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