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Economic Analysis of Fethiye-Göcek Special Environmental Protection Area

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

2013

Prepared by:
Camille Bann & Esra Başak

General Directorate for Protection of Natural Assets (GDPNA)
Mustafa Kemal Mah. Eskişehir Devlet Yolu (Dumlupınar Bulvarı) 9. km (Tepe prime Yanı)
Çankaya/ANKARA
Tel: +90 312 222 12 34 Fax: +90 312 222 26 61
http://www.csb.gov.tr/gm/tabiat

United Nations Development Programme (UNDP)
Birlik Mahallesi 415. Cadde No. 11 06610 Çankaya/Ankara
Tel: +90 312 454 1100 Fax: +90 312 496 1463
http://www.tr.undp.org
Empowered Lives. Resilient Nations.

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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 Protection of Natural Assets 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
General Director

Table of Contents

List of Tables

List of Figures

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Exchange rates

1 TL = $ 0.528

1 TL= € 0.4

1 € = $ 1.30

Acronyms

DSİ	General Directorate State Hydroulic Works
EC	European Commission
EIA	Environmental Impact Assessment
ESA	Ecosystem Service Approach
EU	The European Union
IUCN	International Union for Conservation of Nature
GEF	Global Environment Facility
GDPNA	General Directorate for Protection of Natural Assets
GDNCNP	General Directorate for Nature Conservation and Natural Parks
GDP	Gross Domestic Product
MEDPOL	the marine pollution assessment and control component of Mediterranean Action Plan
MELSA	Muğla Provincial Government Company
MoEU	Ministry of Environment and Urbanisation
MoFWA	Ministry of Forestry and Water Affairs
MCPA	Marine and Coastal Protected Area
PA	Protected Area
REDD	Reduced Emissions from Deforestation and Degradation
SEPA	Special Environmental Protection Area
TÜDAV	Turkish Marine Research Foundation
TURMEPA	Turkish Marine Environment Protection Association
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme

Yönetici Özeti

Fethiye-Göcek Özel Çevre Koruma Bölgesi (ÖÇKB) Muğla İli sınırları içinde, yaklaşık 816 km² lik alanı kapsar. Kıyısal uzunluğu 235 km, deniz alanı 345 km² olan alan 1988 yılında Özel Çevre Koruma Bölgesi ilan edilmiştir (Derinsu, 2009). Koruma alanına adını veren iki belde büyüklük, gelişim seviyesi ve geleceğe yönelik planlama açısından birbirinden farklıdır. Fethiye İlçesi 3,060 km²'lik alanı kaplayan, gelişmiş bir kent ve turizm bölgesidir. Fethiye körfezinin yolcu gemilerini ağırlayacak şekilde gelişmesini öngören planlar, bölgede doğa korumadan ziyade büyük ölçekli turizmin teşvik edildiğini göstermektedir. Öte yandan, Göcek yat turizmine odaklı, uluslar arası üst gelir gurubuna da turizm hizmeti veren küçük bir yerleşimdir.

Bu çalışmanın amacı Fethiye-Göcek 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 sürdürebilir 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.

Türkiye'nin Deniz ve Kıyı Koruma Alanları Sisteminin Güçlendirilmesi Projesi hedeflerinden "Deniz ve Kıyı Koruma Alanları için finansal planlama ve yönetim sistemleri geliştirilmesi ve uygulanması ile etkin iş planlaması, yeterli gelir üretimi ve etkin yönetim maliyetinin sağlanması" kapsamında hazırlanan çalışma, Fethiye-Göcek ÖÇKB'si için alternatif gelir kaynakları seçeneklerinin tespit edilmesi ve bir iş planının geliştirilmesini amaçlamaktadır. Raporda alandaki ekosistem hizmetlerinin ve değerlerinin tespit edilmesine odaklanılmış, potansiyel finansal mekanizmalar hakkında sadece genel bir çerçeve çizilmiştir.

Fethiye-Göcek ÖÇKB'sinin ekonomik analizi, alan hakkında mevcut veri ve literatür taramasına ve Mart 2012'de kilit paydaşlarla yapılan görüşmelerden elde edilen verilere dayanmaktadır. Ayrıca, muhtemel yarar transfer değerlerini temin edebilmek, alan için belirlenen değerleri karşılaştırmak ve değerleme yaklaşımlarına dair farklı anlayışları görebilmek için, bölgedeki deniz ve kıyı alanlarında yürütülmüş tüm çalışmaları kapsayan bir literatür taraması da yapılmıştır.

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 da açıklamaktadır. Dolayısıyla, "Ekosistem Hizmetleri Yaklaşımı" karar alma süreçlerinde ekosistemlerinin bir bütün olarak ele alınmasını sağlamış ve ekosistemin verdiği hizmetlere değer biçilmesinin önünü açmıştır.

Temel Bulgular

Fethiye-Göcek Bölgesi, bir çok sakin koyu olan, güvenli yelken ve yatçılık imkanları sağlayan, uluslararası çapta tanınan olağanüstü bir deniz alanıdır. Fethiye-Göcek ÖÇKB'nin ekonomisi büyük ölçüde denizel ortama bağlıdır. Bölgenin biyolojik çeşitliliği, bir çok ekosistem hizmetine taban oluşturmakta, bunlar çok sayıda faydalanıcı ve yerel topluluğun ekonomik refahını destekleyerek Türkiye'nin gayrisafi milli hasılasına katkıda bulunmaktadır. Çalışmada Fethiye-Göcek ÖÇKB'sinin bir yıllık ekonomik değeri yaklaşık 210 milyon ABD doları olarak hesaplanmıştır.

Bu, alanın başlangıç aşamasındaki değerini yansıtmaktadır ve daha detaylı çalışmalarla geliştirilmelidir. Tespit edilen değer; tedarik hizmetlerini balık, düzenleme hizmetlerini karbon tutma, erozyon kontrolü ve su arıtımı, kültürel hizmetleri turizm ve rekreasyon olarak kapsamaktadır. Bunlar brüt değerlerdir (yani masraflar düşülmemiştir) ve karbon tutmayla ilişkilendirilmiş faydalar gibi bazı potansiyel değerler henüz elde edilememiştir ("yakalanmamaktadır"). Buna rağmen, bu değerler olması gerekenin altında değerler olarak düşünülebilir. Mesela turizm için tahmini değerler kullanılmıştır ve bazı potansiyel önemli hizmetler hesaplara

dahil edilememiştir. Alanda potansiyel olarak varolduğu düşünülen fakat bilimsel bilgi ve veri noksanlığından incelenemeyen ekosistem hizmetleri bulunmaktadır. 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 hizmetleri sayabiliriz. Peyzaj değeri açısından, Göcek ve Fethiye'de fiyatı zaman içinde artan, deniz manzaralı bir çok konut projesi bulunmaktadır. Ancak bu çalışma kapsamında emlak değerleri araştırılmamıştır.

Alana dair toplam değerin yaklaşık %95'ini turizm ve rekreasyon teşkil etmektedir. Bu ekosistem hizmetine dair değerin tespit edilmesinde yarar transferi yöntemi kullanıldığı göz önüne alındığında, alandaki yıllık 199 milyon ABD doları turizm değeri iyileştirilebilir. Alanın spesifik turizm harcamaları ve ziyaretçi sayılarına (hem geceleyen, hem de günübirlik) ihtiyaç duyulmaktadır. Düzenleme hizmetleri yılda 8,7 milyon ABD doları olarak tespit edilmiştir. Ancak bu hizmetlerin alandan temin edildiğine dair bilimsel çalışmalar bulunmadığı için değerlemede yarar transferi yöntemi uygulanmıştır.

Denizel ekosistem hizmetleri, istihdam ve yerel geçim kaynağı olarak da önemlidir. ÖÇKB ekonomisi (tarımla beraber) servis sektörüne dayanmaktadır. Resmi istatistikler bulunmamakla birlikte, Fethiye'de yaklaşık 10.000 kişinin doğrudan turizm alanında (oteller, ajanslar ve lokantalar) çalıştığı tahmin edilmektedir. Göcek ise tamamen turizme dayanmaktadır.

Tüm ekonomik, kültürel ve ekolojik önemine rağmen Fethiye-Göcek ÖÇKB'sinin ekosistem hizmetleri deniz kirliliği, altyapı ve konut projeleri ve yasadışı balıkçılık gibi çeşitli tehditlerle karşı karşıyadır. Mavi Kart sistemi başta olmak üzere, alandaki yat ve teknelerin sebep olduğu kirliliğin bertaraf edilmesi için Çevre ve Şehircilik Bakanlığı, TVKGM ve diğer kamu kuruluşları tarafından bazı girişimler başlatılmıştır. Ancak bu pilot sistemin daha etkin izleme ve yaptırımlarla, farkındalık yaratarak ve uluslararası teknelerde de uygulanarak geliştirilmesi gerekmektedir.

Öneriler

Çalışma sonuçlarına göre aşağıdaki öneriler geliştirilmiştir. Bu öneriler hem ileride yürütülecek ekosistem hizmetleri değerleme çalışmalarını hem de öncelikli yönetim konularını vurgulamaktadır.

- ÖÇKB'deki balıkçılık faaliyetleri çalışılmamıştır. Her ne kadar balıkçılık bölgedeki temel geçim kaynaklarından birisini oluşturmasa da, alanda yürütülen yasadışı zıpkın ve trol balıkçılığı tehlikesi nedeniyle balık stokları acilen değerlendirilmelidir.
- Balıkçılık değerlemesi, sürdürebilir av oranının (miktar) net faydaya (gelirler eksi maliyetler) çarpılmasına dayandırılmalıdır. Dolayısıyla sürdürebilir av oranının tespit edilebilmesi için alandaki balık stoklarının düzenli bilimsel araştırmalarla incelenmesi gerekmektedir.

Tablo . Fethiye-Göcek ÖÇKB'si değerleme sonuçları özeti

Hizmet	Değer/ yıl ABD$	Değerleme yöntemi	Not
Balık	380.000	Piyasa değerleri	Bu değer sürdürebilir av oranına göre hesaplanmamıştır (alan için bilinmiyor). Sadece Fethiye İlçesinde kaydı tutulan balıkçılık değerini kapsamaktadır ve üretim seviyesini yansıtmamaktadır. Doğrudan lokantalara ve bireysel müşterilere satılan balık değerlerini ve rekreasyonel balıkçılık faaliyetlerini içermemektedir; ayrıca avın eksik beyan edildiği düşünülmektedir. Brüt değerlerdir, maliyetler düşülmemiştir.
Karbon Tutma	944.384	Piyasa değerleri (kaçınılan harcama yaklaşımı)	Orman karbon piyasasına benzer şekilde Mavi Karbon Kredi piyasasının gelişeceği varsayılmıştır. Dolayısıyla bu değer henüz ölçülememektedir ("yakalanmamaktadır"). Karbon piyasa değeri 11,2 $/ t CO2 eşdeğeri olarak alınmıştır.
Erozyon kontrolü	460.200	Yarar transferi	Her kıyı metresi için 160.000 avro, Fethiye-Göcek ÖÇKB'sindeki 27 km'lik Posidonia çayırlarına ve alanın %12'sinin risk altında olduğuna dayanarak. (Mangos ve arkadaşları, 2010).
Atıksu doğal filtrasyonu (arıtım)	8.320.000	Yarar transferi	Mangos ve arkadaşları'na (2010) dayanarak, Türkiye kıyıları için hesaplanan 229 milyon avro'luk arıtım hizmeti Fethiye-Göcek ÖÇKB'sindeki kıyı şeridi uzunluğuna göre (235 km) taksim edilmiştir.
Turizm / Rekreasyon	177.784.517 (harcama) 21,707,084 (rekreasyon)	Piyasa değerleri	Bölgeye gelen ziyaretçi sayılarına dair tahmini (yılda 2.207.940 geceleyen ziyaretçi), ortalama turizm harcamalarına (Bann ve Başak 2011a ve 2011b'ye göre diğer ÖÇKB'lerde yürütülen çalışmalar) ve alanda yürütülen yıllık denizel rekreasyon faaliyetleri gelirlerine dayanarak.
TOPLAM	209.996.185		

- Turizm, bölgenin deniz koruma alanı statüsünü ve bölgenin tarihi ve mimari mirasını bütünleyici bir şekilde gelişmeli ve yönetilmelidir. Spesifik öneriler şöyle sıralanabilir:
  * Alandaki turizm gelişiminin sınırlarını belirlemek için alanın denizel ve karasal turizm taşıma kapasitesi araştırılmalıdır.
  * Deniz turizminin ekonomik etkilerini inceleyen kapsamlı bir çalışmayla denizel turizmden faydalanan birçok sektör ve ekonomideki çarpan etkisi incelenmelidir.
  * Yüksek turizm değerinden ötürü, alana spesifik turizm harcamaları ve ödeme istekliliği araştırması da önerilmektedir.
  * Bölgede kitle turizmi yerine yüksek gelir düzeyine hitap eden bir turizm anlayışı teşvik edilmelidir; başka bir deyişle, gelirlerin artırılmasında kapasiteden ziyade kalite geliştirilmelidir.
  * Alanın ekolojik önemi, koruma statüsü hakkında (denizden ve karadan gelen) ziyaretçiler ve ikâmet edenlere yönelik daha iyi bilgilendirme ve işaretlendirme yapılması önerilmektedir.
  * Turizm gelirlerini sürekli kılmak için kirliliğin (özellikle de atık sulara bağlı kirliliğin) kontrol edilmesi ve izlenmesi gerekmektedir. Bu da farklı kurumlar arasında koordinasyona dayalıdır. Fethiye-Göcek ÖÇKB'sinde yürütülen Mavi Kart sistemi diğer bölgelerde de uygulanması gereken iyi bir başlangıçtır.
  * Turizmin yılın tüm aylarına yayabilecek çeşitli faaliyetlerle geliştirilmesi gerekmektedir. TÜDAV tarafından yürütülen bir çalışma özellikle Ölüdeniz etrafında ekoturizm faaliyetlerine yönelik potansitel olduğunu göstermektedir (TÜDAV, 2012). Göcek'te sadece 4 ay boyunca yat turizmi yapılmakta ve kışın bölgede yaşayanlar için çok sınırlı gelir kaynakları bulunmaktadır. Yelkencilik tüm yıla yayılacak şekilde teşvik edilebilir ve yamaç paraşütü, doğa yürüyüşleri gibi fırsatlar geliştirilebilir.
- Ekonomik değerleme ve özellikle düzenleme hizmetleri iyi bir bilimsel temele dayanmalıdır. Alana özel düzenleme hizmetlerine odaklı bilimsel çalışmalar (karbon tutma, erozyon kontrolü, sel ve frıtınadan koruma, atıksu arıtımı, vb.), bu hizmetleri daha iyi anlamak ve değerlemeye ışık tutmak açısından gerekmektedir.
- Ekosistem kaynaklı faydaların değerindeki değişimi ve bunlar arasındaki dengeleri gözlemlemek amacıyla Fethiye-Göcek ÖÇKB'sinde değerleme çalışmaları düzenli aralıklarla yürütülmelidir. Tercihen, değerleme çalışmaları, senaryo analizleri içermeli ve böylece farklı yönetim seçeneklerine ve alanın sürdürülebilirliğine yön vermelidir.

Executive summary

Fethiye-Göcek SEPA is located in Muğla Province, and covers approximately 816 km² of which 345 km² is the marine zone and has a coastline of 235 km (Derinsu, 2009). The site was granted its marine and coastal conservation status in June 1988. The two towns are quite different in size, level of development and future aspirations. Fethiye covers an area of around 3,060 km² and is a well developed town and tourism destination. Its plans to develop Fethiye bay for cruise ships indicates a wish to promote mass tourism in the area, rather than to focus on conservation. Göcek on the other hand can be characterised as a small town, offering an upmarket, boutique tourism experience centered on yacht tourism.

The objective of this study was to undertake an economic analysis of Fethiye-Göcek 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 GD-PNA-GEF-UNDP project under which this study sits are focused on the identification of feasible income generating options, and the development of a business plan for Fethiye-Göcek 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 Fethiye-Göcek 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 2012. 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

The Fethiye-Göcek region is an exceptional marine area having numerous calm bays for safe sailing and yachting opportunities, which are internationally recognised. To a large extent the economy of Fethiye-Göcek's SEPA is dependent on the marine environment. Fethiye-Göcek SEPA's biodiversity supports a range of ecosystems services that contribute to the economic welfare of a range of beneficiaries and support local communities and Turkey's GDP. The total annual value of Fethiye-Göcek SEPA is estimated to be around $210 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, 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. In terms of amenity value, there are a number of new high-end developments in Göcek and Fethiye with a sea view, which are assumed to generate a premium. However, this has not been investigated in this study.

The cultural services of tourism and recreation account for around 95% of the total value. Given that the value-transfer method has been used for determining the tourism value at the site, the estimate for tourism of $ 199 million per year clearly could be refined. Site specific evidence of tourist expenditures and willingness to pay is required, along with a better understanding of the number of visitors (both overnight and day visitors). Regulating services are valued at $ 8,780,200 per year. However, valuation of these services is based on value transfer estimates as scientific studies on the provision of these services at the site are unavailable.

Marine ecosystems are also important in terms of employment and local livelihoods. The economy of the SEPA is based on the service sector (along with agriculture). While no official statistics exist, around 10,000 people are estimated to be directly involved in the tourism sector (hotels, agencies and restaurants) in Fethiye alone. Göcek is totally dependent on tourism.

Despite their economic, cultural and economic importance the quality and quantity of Fethiye-Göcek SEPA's ecosystem services are threatened by a range of pressures including marine pollution, infrastructure and housing development and illegal fishing activities. Some mitigation efforts have been initiated by the MoEU, GDPNA and relevant public authorities to manage pollution generated by boats and yachts in the region, notably the Blue Card system. However, this pilot system needs improving through better monitoring and enforcement, awareness raising and application to international boats

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.

The fisheries of the SEPA have not been studied. Even though fishing is not a key means of employment and source of livelihood in the region, a stock assessment is urgently needed especially in light of the illegal speargun and trawler fishing activities conducted at the site.

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.

Table . Summary of valuation results for Fethiye-Göcek SEPA

Service	Value/ year ($)	Valuation approach	Comment
Fish	380,000	Market prices	This is not based on a sustainable harvest rate, which is unknown. Only includes fish registered in Fethiye district and does not reflect the production levels. It is likely to exclude fish sold directly to restaurants and individual customers and recreational fishing and may also be based on an under-reporting of fish catch. This is a gross value – costs have not been deducted
Carbon sequestration	944,384	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 $ 11.2 / tCO_2eq
Erosion protection	460,200	Benefits transfer	Mangos et al. (2010). Based on 160,000 Euro per meter of coastline, 27 km of Posidonia beds in Fethiye-Göcek and 12% of the area at risk.
Waste treatment	8,320,000	Benefits transfer	Based on Mangos et al. (2010) estimate for Turkey of 229 million Euros apportioned to the study site based on length of its coastline (235 km).
Tourism / Recreation	177,784,517 (expenditure) 21,707,084 (recreation)	Market prices	Based on a conservative estimate of tourist numbers (2,207,940 overnight visitors per year) and average tourism expenditures (based on other Turkish MCPAs in Bann & Başak 2011a & 2011b) and the annual revenue estimates of the marine recreational activities conducted in the area
TOTAL	209,996,185		

Tourism needs to be developed and managed in a way that complements that area's status as a marine protected area as well as the region's historical and architectural heritage. Recommendations include:

A study of the site's tourism carrying capacity to understand the limits to tourism development in the area.

A comprehensive study of the economic impact of marine tourism to understand the many sectors that benefit from marine tourism and the multiplier effects to the economy. A site specific expenditure study and/or willingness pay study is also recommended given the high tourism value.

Upmarket rather than mass tourism should be promoted, that is revenues should be increased through improving quality rather than capacity.

Better signage and information for visitors (arriving by land and sea) and residents on the ecological importance of the area and its protection status

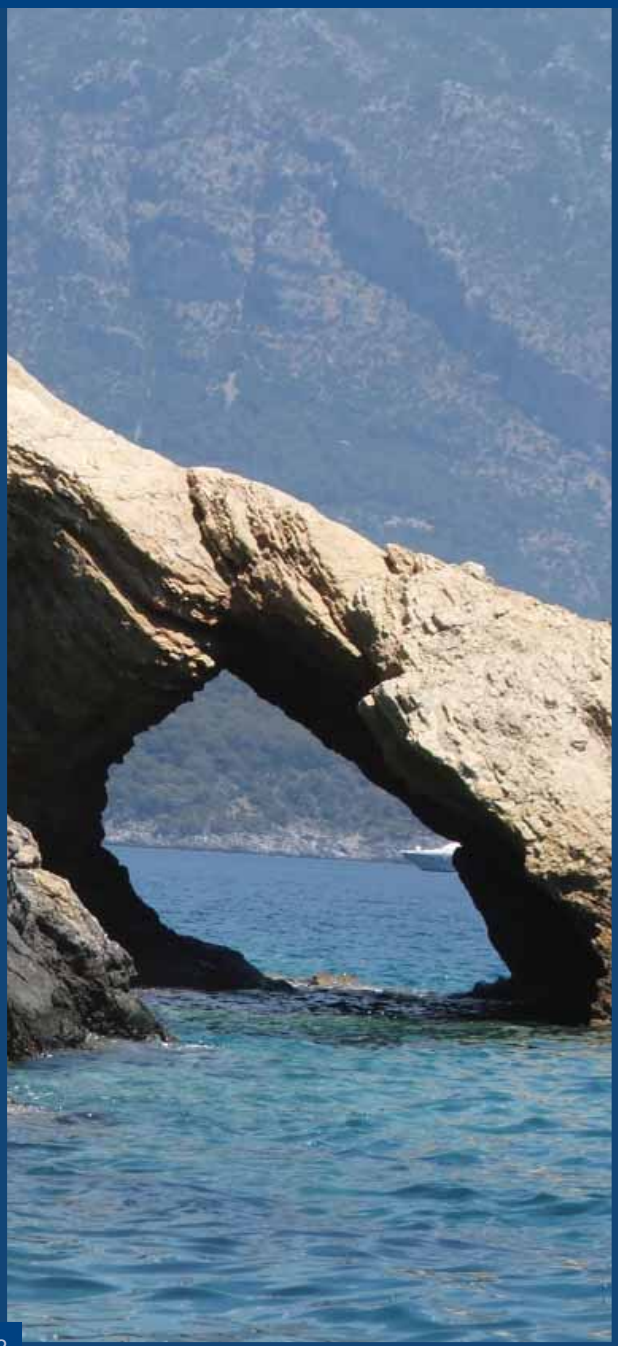
Control and monitoring of pollution (especially sewage waters) is a challenge that requires collaboration between authorities if tourism revenues are to be sustained. In Fethiye-Göcek SEPA the Blue Chip Card system is a good start, which should be upscaled to other areas.

Diversification of the tourism experience. There is a need to develop a wider range of activities that facilitates tourism throughout the year. A study by TÜDAV indicated that there is great potential for eco-tourism activities especially around Ölüdeniz (TÜDAV, 2012). In Göcek there are only 4 months of real yacht tourism and during the winter it is very quiet with very limited income generating opportunities for inhabitants. Sailing could be promoted throughout the year and opportunities for paragliding and hiking explored and developed.

Economic valuation is underpinned by good scientific evidence. This is often particularly important for regulating services. Site specific scientific studies of the provision of regulating services (i.e. carbon sequestration, erosion control, flood and storm protection and waste assimilation) are required to better understand these services and inform the valuation.

Valuation studies should be carried out in Fethiye-Göcek 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. Ideally valuation studies should look at different scenarios and thereby help choose between different management options for the area and cast light on the site's sustainability.

Introduction



This study is an activity under the General Directorate for Protection of Natural Assets -Global Environment Facility - United Nations Development Programme (GDPNA-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.

Objective

The objective of this study was to undertake an economic analysis of Fethiye-Göcek 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 GDPNA-GEF-UNDP project under which this study sits are focused on the identification of feasible income generating options and the development of a business plan for Fethiye-Göcek SEPA. Therefore this report is focused on the identification and evaluation of ecosystem services and only provides a high level discussion of potential financing mechanisms.

Approach

The economic assessment of Fethiye-Göcek 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 24-27 March 2012. A list of people consulted is provided in Annex 1. 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. The study should be viewed as an initial high level economic analysis of the area, which identifies key ecosystem services provided by the site and prioritizes areas for future research and refinement of the economic estimates presented.

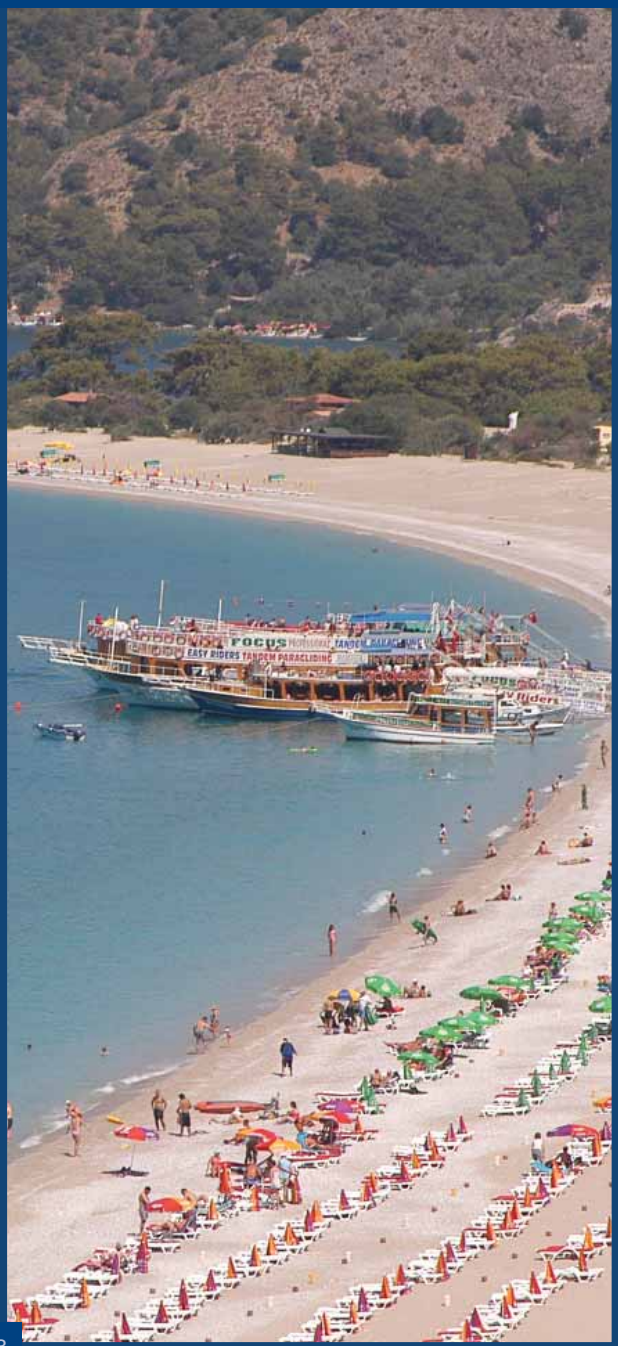
The economic assesment presented in this report is based on three key research studies conducted in Fethiye-Göcek SEPA - a study of the site's marine biodiversity carried out by Derinsu (2009), a study of the carrying capacity of the Göcek Bay by the Middle East Technical University (ODTÜ, 2007) and an assesment of the socio-economic, historical and cultural values of the site by Optimar Consultancy (2010). These research studies laid the foundations for establishing the Use and Conservation Principles determined for Göcek Gulf and Göcek-Dalaman Bays (presented in Annex 2).

An Ecosystem Service Valuation Framework was developed for the economic 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.

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. Annex 1 lists the people interviewed during field visits in March 2012.

Background on site



3

Fethiye-Göcek SEPA is located in Muğla Province, approximately 120 km southeast of Muğla city center. It is situated at the foot of Mendos Mountain, in the east coast of the inlet (Optimar, 2010) at the intersection of Aegean and Mediterranean seas. The site was granted its marine and coastal conservation status by the Decree of Cabinet of Ministers number 88/13019 in June 1988 (ibid). It covers approximately 816 km² of which 345 km² is the marine zone and has a coastline of 235 km (Derinsu, 2009).

Fethiye-Göcek SEPA comprises Fethiye town and 6 sub-districts and 6 villages. Fethiye town, which is in the West of Teke Peninsula, is surrounded by Köyceğiz Town in the northwest, Denizli and Burdur in the North and Antalya in the East (Keskin et al., 2011).

The geological structure of the region is marl and limestone extensions at approximately 2 km distance from the sea, and sedimentary lowlands between the hills and the sea (DSI, 2003 in Koç, 2012). The South coast of the area is covered with steep mountains that rise abruptly from the sea. The mass filling the Eşen Basin and subsidence extending to the land after Fethiye Bay and also covering Fethiye town is known as Babadağ and stretches along the coastline covered with forests (Optimar, 2010). There are bays and inlets along the coastline of the SEPA, including Göcek Bay and Ölüdeniz Lagoon (Blue Lagoon) in Belceğiz Village, which are important marine tourism centers. The twelve islands located in the Northwestern section of the SEPA consists of the following islands - Şövalye, Tersane, Kızıl, Katrancı, Delikli, Kızlan, Hacı Halil, Yassıca and Domuz islands (ibid).

The region has a typical Mediterranean climate with hot summers and mild and rainy winters. Annual average precipitation in the region is between 1,250 and 1,500 mm. Most of the precipitation occurs during winter and spring months. Average summer, winter, and sea water temperatures are 30°C, 12°C, 17°C, respectively (DSI, 2010 in Koç, 2012). Due to the geographical position of the area (mountains extending vertically from the sea), the interiors receive more rainfall than the coasts and humidity is lower than other coastal zones.

Fethiye Bay is connected to open sea by a mouth of 15 km and the marine depth at the entrance to the gulf reaches 800 m (Derinsu, 2009). As such, the central part of the gulf is exposed to southernly winds while Göcek and Fethiye bays, as well as the

Figure 1. Boundaries of Fethiye-Göcek SEPA (Source: Derinsu 2009)

islands that are an extension of the Kapıdağ Peninsula, are relatively well protetected from strong winds and currents and serve as natural ports.

The site's cultural heritage is significant; historical ruins include the ancient Telmessus Theatre and the Algerian Mosque belonging to Ottoman Period (Keskin et al., 2011).

Ecological Overview

The flora of the SEPA consists of shrubs, olive groves, oak groves and citrus trees on the coast and coniferous trees in the higher elevations - Black Pine *(Pinus nigra)*, Red Pine (Pinus bruita) and Cedar *(Cedrus sp.)* (Optimar, 2010). Moreover, Oriental Sweetgum *(Liquidambar orientalis)* is one of the endemic species growing in streams and deltas. Dominant vegetation in the region consists of oaks, wild olives, wild pears, sandal, *P. latifolia*, *Pistachio terebinthus*, carob, laurel, Chasteberry, Sweet Broom, China Berry, *Arceuthos drupacea*, willow, acacia, sumac, Caryophyllaceae. Oriental plane, poplar and alder (ibid). Important herbs of the region are catkins, thistles, efek, reed canary grass, Common couch grass, purple nut sedge, lambs quarters, wild oat, pennyroyal, sage, Orchis coriophora, Atractylis gummifera, and burdock.

As part of a recent marine and coastal biodiversity study of the site, nearly 600 dives at depths of 0-55 m were undertaken at 83 spots within Fethiye-Göcek SEPA. This study identified 1,545 marine species belonging to 24 taxonomic groups (Derinsu, 2009). Among these, 44 were recorded for the first time in Turkey including Vanderhorstia mertensi which is an exotic species for the Mediterranean. The majority of the recorded species (1,225 species) were found in the 5-55 m depth range and the dominating taxonomic group was Polychaeta (with 347 species), followed by Mollusca (288 species) and Crustacea (264 species).

Fethiye-Göcek SEPA hosts 40 species of conservation concern in the Mediterranean listed by the Bern and the Barcelona Conventions as well as International Union for Conservation of Nature's (IUCN) Red List. These include 7 Mollusca species, 6 Porifera species, 6 Crustacea species, reptiles such as Loggerhead sea turtle *(Caretta caretta)* and Nile softshelled turtle *(Trionyx triunguis)*, and mammals such as Mediterranean monk seal *(Monachus monachus)* and Bottlenose dolphin *(Tursiops truncatus)*.

Out of the 5 sea turtle species represented in the Mediterranean basin, 3 species *(Caretta caretta*, *Chelonia mydas*, *Dermochelys coriacea)* are identified in the waters of Turkey. Fethiye Beach is one of the nesting and reproduction areas for Caretta caretta, which is protected under Bern Convention and CITES (Keskin et al., 2011).

The algae species in the region are dominated by Cystoseira spinosa, a species of conservation concern, found on rocky bottoms between 35-40 m and whose habitats are affected by the intensely used bays of the SEPA (Derinsu, 2009).

Furthermore, Okuş et al. (2007) undertook a study of marine biodiversity in the western part of inner Fethiye bay, close to the town center. A total of 118 species belonging to 10 taxonomic groups were detected in the study area, 26% of which were fish species, generally distributed around and beneath the pontoons. The second important group was Mollusca (17%). In general macrobenthic life was detected at the upper 4 m, while Gobius species were observed on the silt sediment. The species composition indicates characteristics of an environment rich in organic material. The most abundant species are mainly filter feeders - Tunicata *(Phallusia mamillata*, *P. nigra*, *Clavelina lepadiformis*, *C. nana*, *and Microcosmus sabatieri)*, Cirripedia species *(Balanus spp.*, and *Veruca stroemit)*, Porifera *(Haliclona mediterranea* and *Chondrilla nucula)*, Polychaeta *(Hermodice carunculata*, and *Sabella spallanzanii)*, Terebellidae (sp.), Bryozoa (sp) and *Mytilus galloprovincialis.*

The distribution of *M. galloprovincialis* is particularly interesting, since this Black Sea species distribution is known to be limited to İzmir Bay. This finding is good biological evidence of organic pollution in the area, together with enhanced freshwater input to the ecosystem. In addition, determination of two lessepsian species from Brachyura *(Thallamita poissonii*, *Charybdis helleri)* points out alterations in natural faunal characteristics. The detrital feeding regime of both species is futher indication of organic pollution in the study area, as is the fact that *Enteromorpha sp.*, which tolerates pollution, dominates the flora of the region.

Pressures

This section presents an overview of the pressures facing the SEPA (summarized in Table 1). It should be noted that the two key areas of the SEPA – Fethiye and Göcek are quite different in size, level of development and development aspirations. Fethiye covers an area of around 3,060 km^2 and is a well developed district center and tourism destination, catering for the mass tourism market. Fethiye is one of the biggest settlements among Muğla Province's districts (see section 2.3). Göcek, on the other hand, can be characterised as a small town, offering an upmarket, boutique tourism experience centered on yacht tourism.

One of the main pressures facing the SEPA is intensive yacht tourism, especially in the Göcek section. The current use of the bays in Göcek is far beyond the carrying capacity determined for the area (ODTÜ, 2007 - see Table 1). As a result marine pollution and anchoring activities are harming the marine vegetation and biodiversity despite the launch of some government initiatives restricting the use of the Göcek Bays (see Annex 2). Awareness of the environmental impacts of yacht tourism is reported to be low.

Similarly in Fethiye, marine biodiversity and the natural ecosystem of the bay are damaged and their long term sustainability is at risk. In order to determine the effects of additional pontoons planned for the marina located in the western part of the Fethiye Bay, an oceanographic study was undertaken in 2006 (Okuş et a.,l 2007). The study consisted of hydrographic measurements and observation of biodiversity by divers specialized in marine biology; 15 scuba and 3 skin dives were undertaken. The study found a thin and relatively less saline surface layer rich in nutrient and organic material. This layer contained high organic materials indicating terrestrial input due to faecal coliform, demonstrating the anthropogenic impact on the area. At the bottom, although there is no difference in the physical characteristics of water, visibility is low due to the weak current velocity which causes a high accumulation of suspended material in the water column. Anchoring activities have also damaged the deep flora and fauna distribution in this section of the SEPA (ibid). For the past 10 years Fethiye has had a wastewater treatement plant in operation and there is a system in place, managed by the MoEU, to collect waste water from the boats (Box 3).

In Fethiye solid waste pollution from marina activity, fisheries and houses has affected species' distribution. Solid waste pollution is especially caused by the upkeep and repair activity observed in the region near the slipway. Samples in summer months clearly identify the effects of yacht tourism

on the bay. On the other hand samples in the rainy season indicate no significant anthropogenic impact (Okuş et al., 2007). Likewise, in Göcek-Dalaman Bays, a positive correlation has been observed between the amount of solid waste and the number of boats visiting the bays (Derinsu, 2009). Gemiler Island Bay, Hamam Bay, Yassıca Islands and Göcek Harbour are the main zones where solid waste tends to accumulate (ibid).

Sedimentation is another important issue affecting the SEPA's ecological integrity. In Fethiye inner port, fresh water comes from the irrigation canals which also transports sediment characterized by silt and mud. Rocks, gravel and sands are observed only in several narrow sections (Okuş et al., 2007). The Municipality is trying to manage the siltation of Fethiye Bay (personnal communication Recai Şeker).

Fethiye Gulf is 9 km^2. The water depth in the Gulf varies - in the eastern part of the Gulf, the depths are quite shallow; however, in the middle parts the depth rises to 20 m. The Gulf is the natural discharge point of Susambeleni, Üzümlü, Eldirek, Kösebükü İplikçi, and Murt streams. Koç (2012) evaluates the environmental effects of sediment transported and deposited at Fethiye Gulf and suggests future measures in the plain and upper basins to minimize possible sediment accumulation. The study determines that approximately 3.62 million m^3 of sediment has been transported to the gulf, narrowing the Gulf area by up to 7 ha. The weight of transported sediment to the gulf is between 2.75 and 2.80 g cm^3. Dissolved oxygen values in the gulf were measured at between 8.0 and 9.0 mg/lt (Okuş et al., 2007).

Sources of materials polluting the Gulf identified by examining samples taken from stations and by observations in the region are: (a) fine and large grained sediment transported during floods due to erosion caused by inadequate vegetation in upper basins;(b) trash material and construction waste material, dumped in canals and streams by local people that are then transported to the Gulf during floods; and, (c) public and private ferrochromous facilities[1]. Koç (2012) concludes that sediment transportation does not occur in discharge canals during the dry season due to the insufficient transportation power of the flow in stream beds; it is only possible with flood discharges. All the canals are located in settlement area limits and thus domestic waste is transported to the Gulf. In addition, inorganic fine grained material is transported by open discharge canals of ferrochromous plants. The high heavy metal contents existing in streams and discharge canals threaten the Gulf.

Development pressures are evident especially in the Fethiye section of the SEPA. In 2010, there was a 64% increase in building permits within Fethiye district's urban zone (Fethiye Chamber of Commerce and Industry 2011). Furthermore, in Fethiye two additional development projects are planned – the Municipality Yacht harbour and a pier for cruise boats. These projects are awaiting their EIA and the MoEU has reportedly requested a carrying capacity assesment for Fethiye bay (personal communication Fethiye Chamber of Commerce and Industry). Currently the bay is not deep enough to receive cruise ships, however many commentators believe that this would be a very positive development for the town as Fethiye bay would then serve as the only stopover point for cruise liners between Antalya and Izmir and therefore would be well utilised. Controlling sedimentation is important to maintain the depth of the bay. Fethiye is already a developed town, and plans to open up the area to cruise ships indicates a wish to promote mass tourism in the area, rather than to focus on conservation.

Many of the beaches used by sea turtles are intensively used and very built up. Usage of these beaches is controlled and monitorted at specific times, however there are concerns regarding the impact of current levels of development and management on the turtles' reproduction processes (see Box 1).

[1] These facilitites have not been able to deposit their fine grained sediment load and this load is therefore carried to the Gulf by canals and streams. The amount of suspended very fine grained material in the water from the discharge canals varies between 1.0 and 16.0 mg/lt. The amount of suspended solids in the samples taken from open discharge canals belonging to ferrochromous facilities varies between 25.0 and 65.0 mg/lt. This indicates that the principal element, except for flood, that causes the Gulf to be filled up with sediment is chrome washing plants. Discharge canals used by ferrochromous facilities to drain their chrome ore washing waters have low flow rates and high concentrations of Cr, Pb, and Hg metals have been found in these canals. ATSDR (1995) and USEPA (1993) state that the contaminated sediments pose both ecological and human health risk throughout the United States, and that roughly 10% of the sediments from the nation's lakes, river, and bays are contaminated with toxic chemicals that can adversely affect aquatic organisms or impair the health of humans or wildlife, who consume contaminated fish or shellfish.

Box 1. Management of Fethiye's Specially Protected nesting beach

Fethiye is one of the most important loggerhead sea turtle (Caretta caretta) nesting sites in Turkey. Fethiye has three beach sections: Çalış (2.5 km), Yanıklar (4.5 km) and Akgöl (1 km). However, unplanned construction and developments to accommodate tourism are threatening nesting population, resulting in a serious decline in nesting (Türkozan, 2000; Türkozan, 2003; Oruç et al., 2003; Ilgaz et al., 2007). In spite of the drop in nesting (there were 191 nests in 1995 falling to 58 in 2004) the average number of nests for 12 consecutive years still makes this beach one of the most important nesting sites in Turkey (8.8% of the nests laid annually) In its Recommendation No. 66 (1998) on the conservation status of some nesting beaches for marine turtles in Turkey, the Bern Convention Standing Committee asked the Turkish government to "secure the remaining un-built beach plots against development" in Fethiye. GDPNA organised meetings in Fethiye with stakeholders in 2010, to find out about the problems in the area. GDPNA also developed an Action Plan for the area to try to resolve problems and to apply beach usage principles in 2011.

As well as sea turtle protection and monitoring project has been incessantly carried out by the GDPNA at the beach since 1989.

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Table 1. Overview of Pressures in Fethiye-Göcek SEPA

Pressure	Description	Context / Policy Driver	Sector Responsible
Intensive use of turtle nesting beaches	The turtle nesting zones on Çalış beach can be harmed by lights and intensive use (see Box 1).		Tourism
Intensive use of marine bays by boats and yachts	Fethiye-Göcek SEPA is one of the most popular yachting areas in Turkey and is served by a number of public and private marinas and docks. In the ODTÜ study (conducted between August and mid-October), it was determined that Göcek Bays alone received over 25,000 boats with an average of 314 boats/day. Anchoring activities (and marine pollution) harm the marine vegetation including the Mediterranean endemic Posidonia oceanica seagrass communities. If the negative effects of the anchors are not mitigated, it is foreseen that the *Posidonia oceanica, Cymodocea nodosa* and *Zostera marina* communities will completely disappear from some of the popular bays in the SEPA such as Büyük Samanlık, Hamam, Bedri Rahmi bays.	- The carrying capacity of Göcek Bay is assessed to be 1,111 boats/yachts at any time. The Coast Guard is responsible for implementing this quota. - The carrying capacity for other parts of the SEPA is unknown. - A marine management plan has not yet been developed for the SEPA	Marine tourism
Solid and waste water pollution caused by yachts	Yachts in Göcek Bay's piers and marinas are estimated to release 28m^3 of wastewater and produce up to 382 kg of solid waste a day. In addition yachts navigating or anchored in Göcek/Dalaman Bays are estimated to release 360m^3 of waste water - excluding bilge water leaks and produce around 4,000 kg solid waste daily (ODTÜ. 2007). Waste water leakages from the boats leads to the deterioration of the water column and sediment quality which in turn affects sensitive marine species. In areas where water is stagnant and tourism activities are intensive, visibility is reported to reduce to about 30 cm.	- Poor compliance with waste disposal rules by commercial and private boats/yachts -Inadequate implementation/ monitoring of existing regulations and process such as the Blue Card system and insufficient patrolling of the bays.	Marine tourism
Marine pollution due to human activities	Analysis of suspended solids at chosen stations of the SEPA ranged from 16.8 to 29.6 mg/L, which is below the Turkish threshold of 30 mg/L, but higher than previous analyses from the Northeastern Mediterranean (Derinsu, 2009). Furthermore, the absorption capacity of heavy metals in Fethiye Bay seems close to saturation. This is due to Fethiye town's intensive terrestrial inputs to the sea. Surface water quality assessments also reveal high coliforms and fecal streptococcus in Yanıklar Beach and Fethiye Bay.	- Insufficient water treatment infrastructure for houses and other buildings. - Inefficient monitoring of activities impacting the SEPAs and functioning system of fines.	Housing developments, terrestrial and marine tourism
Exotic species	A total of 93 exotic marine species belonging to 11 taxonomic groups have been identified within the SEPA. They mainly consists of exotic fish species (23 spp) followed by *Crustacea* (20 spp.), *Polychaeta* (17 spp.) and *Mollusca* (18 spp.) *Magnoliophyta* is represented with one exotic species, *Halophila stipulacea*. The invasive puffer fish causes damage to fishing gear in the region.		Commercial boating
Coastal developments and pressures	Activities related to tourism and agriculture place additional pressure on the SEPA's coastal ecosystems. In particularly there is pressure on surface and ground water sources between Fethiye and Göcek which impacts marine productivity. A 64% increase in building permits has been noted within Fethiye district urban zone in 2010.	- Excessive and uncontrolled housing and tourism developments - Lack of an effective marine management scheme	Tourism and agriculture
Acoustic pollution	The extensive use of the bays in Fethiye-Göcek SEPA by boats (both for navigation and nautical sports) results in noise pollution. These acoustic impacts tend to stress the marine creatures and influence their reproduction, migration, feeding and navigation functions.	Lack of monitoring	Marine tourism
Depletion of fish stocks	Official figures do not exist; however, fish population in the SEPA are threatened by illegal spear gun hunting and trawling activities. Yachts and boats also carry out unregistered fishing in the bays of the SEPA.	Lack of monitoring	Fishing

Source: ODTÜ, 2007; Derinsu, 2009; Fethiye Chamber of Commerce and Industry, 2011 and field interviews

Socio-economic characteristics of site

Fethiye-Göcek SEPA consists of a district center (Fethiye), five towns (Ölüdeniz, Karaçulha, Çamköy, Çiftlik and Göcek) and six villages (Gökçeovacık, İnlice, Kargı, Yanıklar, Kayaköy and Keçiler) (Optimar, 2010). Based on the 2009 census, the relevant districts and villages that fall within the Fethiye-Göcek SEPA have a total population of 102,109 people of which 51% are men (Keskin et al., 2011. Table 2 presents regional population data for 2009.

Table 2. Fethiye – Göcek SEPA Regional Population in 2009

Settlement	TOTAL	Male	Female
Fethiye Center	72,003	36,225	35,778
Çamköy	3,940	2,027	1,913
Çiftlik	2,620	1,358	1,262
Göcek	4,039	2,118	1,921
Karaçulha	12,794	6,452	6,342
Ölüdeniz	4,532	2,383	2,149
Gökçeovacık	380	191	189
İnlice	830	431	399
Kargı	1,501	726	775
Kayaköy	680	351	329
Keçiler	193	99	94
Yanıklar	1,791	891	900
TOTAL	105,303	53,252	52,051

Source: Optimar, 2010

With a population surpassing 100,000 in the summer, Fethiye district center is one of the biggest of the Muğla Province (Optimar, 2010). In fact, 23% of the total population of Muğla lives in Fethiye. According to the 2009 Population Census, the district population increased by 39% in 2009 compared to 37% in 2008. On the other hand village populations decreased by 60% compared to 62% in 2008 (ibid). Other important settlements in the SEPA are Ölüdeniz with a population of 4,531 and Göcek with a population of 4,039. Based on more recent data sources, the population of Fethiye town is now estimated to be around 80,000, with a population of more than 188,000 including the surrounding villages (Fethiye Chamber of Commerce & Industry, 2011). The population of Göcek is 5,000, increasing to 7,000-8,000 in the summer (personal communication Recep Şatır). The literacy rate is 96% for the district (compared with 94% in Turkey overall) with 7% of the residents have graduated from university (Fethiye Chamber of Commerce & Industry, 2011).

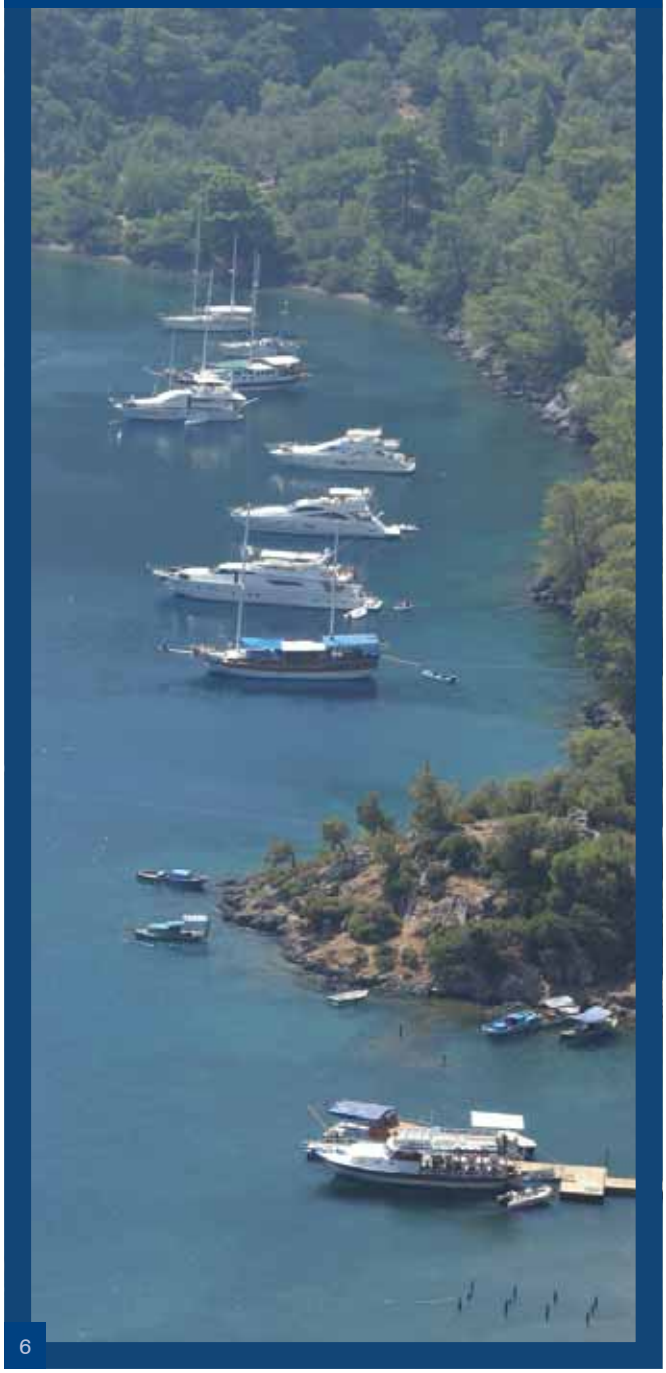
According to the same study, agriculture is prominent in Fethiye with 55% of the population involved in agriculture (around 20,500 people). Most of the agriculturally fertile areas in Muğla are situated in Fethiye town, which is surrounded with good quality land which can be conveniently irrigated. The agricultural area covers 64,522 hectares and consists of 34,157 hectares of farm-land, 6,800 hectares of open vegetable area, 2,498 hectares of greenhouse cultivation area, 4,333 hectares of orchards, 6,123 hectares of fallow area, 10,010 hectares of olive trees and 1.1 hectares of ornamental plants. Wheat is the most important crop with 88,125 tons produced on 235,000 decares in 2010 (Fethiye Chamber of Commerce & Industry 2011). In the same year, 80 tons of organic goods were produced in the district.

According to the Muğla Directorate of Agriculture, tomato, cucumber, eggplant and melon are the most produced greenhouse vegetables. In 2009, 250,000 tons of tomatoes were produced in greenhouses. The export of tomatoes had an important share (97%) in total exports of fresh vegetables and fruits in 2009 (ibid) generating about 115 million euros in 2008 in Muğla (Muğla Directorate of Agriculture, 2010). Cultivation of vegetables brings in total gross domestic income of 352,200,000 TL.

In the 1930s Göcek was dependent on chrome mining. Mining created an important source of revenue for the town and allowed it to develop faster than other areas in the region. For example, it was one of the first districts to have a high school and the majority of its inhabitants over 65 are university graduates. From the 1980s, following the decline in mining opportunities, yacht tourism was developed, promoted by ex President of the Republic Turgut Özal, whose frequent visits to the area attracted a lot of publicity for the town. The town has retained its attraction for celebrities. Today, everyone in Göcek is dependent on tourism in one way or the other (personal communication Recep Şatır).

The socio-economic profile of Göcek town is reported to be higher than its neighboring settlements with a growing shift from agriculture and animal husbandry practices towards the service sector (ODTÜ, 2007). In line with the increase in demand for yachting and tourism accomodation, the number of restaurants and shops have developed to support the (yacht) tourism sector. An upscale real estate market has also gained importance in the town (ibid).

Qualitative Assessment of Ecosystem Services



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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; and,
- 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 provision[2].

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 as a separate service.

Table 3 provides a typology of marine ecosystem services and a qualitative assessment of the marine ecosystem services provided at Fethiye-Göcek 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 3 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 quantity of that service.

The typology presented in Table 3 does not include marine sub-habitat types, which can include hard beds, rocks, muds, sands, gravels, seagrass meadows and caves. The extent of services provided will depend on the specific sub-habitat type. The available data at Fethiye-Göcek SEPA did not warrant this level of detail, with the exception of the Posidonia meadows (seagrasses) which form an important 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 are less essential, as most marine environments deliver most marine ecosystem services, albeit to differing amounts.

Provisioning services

3.1.1. Food

The main food products provided by Fethiye-Göcek SEPA is fish and other related sea products.

3.1.2. 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.

Regulating services

3.1.3. 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 CO_2 emissions and has two interconnected CO_2 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 CO_2 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 CO_2 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; 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 socio-economic 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).

[2] Many marine 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 3. Qualitative assessment of marine ecosystem services and benefits at Fethiye-Göcek SEPA

ES Type	Service	Benefit / outcome	Significance	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
	Fibre/materials	Fibre and construction products, e.g., reeds, and aggregates	?	Households, Industry (construction materials)	Households, Industry
	Water	Public water supply, water for industrial and agricultural usage	*	Agriculture, Industry, Tourism	Agriculture, Industry, Tourism
	Natural medicines	Natural medicines	*	Household	Households, Fishery, Agriculture, Industry
	Biochemicals	Biochemicals and genetics	?	Agriculture	
	Ornamental resources	Ornamental resources	?	Industry	
	Source of energy (fuel etc)	Energy provision e.g., hydropower	-	Energy	
	Transport	Commercial use of waterways	*	Industry	
Regulating Services	Regulation of GHGs	Carbon sequestration	*	Potentially all	Potentially all
	Micro-climate stabilization	Air quality	*	Potentially all	
	Water regulation (storage and retention)	Flood and storm protection	*	Tourism, Industry, Households/ Urban Settlement, agriculture	
	Waste processing	Detoxification of water and sediment / waste	*		
	Nutrient retention	Improved water quality	*	Fisheries, Agriculture	
Cultural Services	Spiritual, religious, cultural heritage	Archaeological ruins (historical not recreational value). Use of marine environment in books, film, painting, folklore, national symbols, architecture, advertising	**	Tourism, Households	
	Educational	A 'natural field laboratory' for understanding marine and coastal processes	*	Households	Potentially all
	Recreation and ecotourism	Recreational fishing, birdwatching, hiking, canoeing, Holiday destination (aesthetic views, hot springs), archaeological ruins (historical not recreational value)	**	Tourism	Potentially all
	Landscape and amenity	Property price premiums due to views	**	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

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 & Cebrian, 1996). These marine plants have a global average biomass of about 180 g/cm^2 and an average net production of about 400 g/cm^2/yr, ranking amongst the most productive ecosystems in the biosphere (The Encyclopaedia 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 CO_2 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). Posidonia can provide a range of regulating services, in addition to carbon sequestration, as discussed in Box 2.

Along with Cystoseira spinosa communities, Posidonia oceanica meadows at the Fethiye-Göcek SEPA show a wide distribution (observed at 34 diving stations out of 83) and have a relatively complex biotope structure (Derinsu, 2009). The faunistic analysis from 13 Posidonia samplings demonstrate a high biodiversity presence with 212 species belonging to 8 systematic groups, dominated by Polychaeta (ibid). Posidonia shoots within the Fethiye-Göcek SEPA show a variation of 10-625 per square meter (ibid). In closed bays of the SEPA with less oxygenation such as Hamam and Büyük Samanlık Bays, the Posidonia leaves were observed to be covered by mucilage and in other bays with heavy boating traffic, the meadows were subject to damage due to anchoring activities (ibid).

Box 2. Seagrass meadows *(Posidonia oceanica)*

Posidonia oceanica are a type of land-based flowing 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 witnhin the Meditterranean is about 38,000 km^2 (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 matte). 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 CO_2. According to a recent report seagrasses are the most effective species in terms of long-term carbon storage (Laffoley & Grimsditch, 2009).
- They produce oxygen and are known as the "lungs of the sea" with +/- 14 lt O_2/m^2/day capacity on average
- The 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

3.1.4. 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 both the marine and wetland ecosystems of Fethiye-Göcek SEPA, there are no scientific studies defining this service.

3.1.5. 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 &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 Fethiye-Göcek 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 & 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.

There is no documented evidence of coastal erosion in Fethiye-Göcek SEPA.

3.1.6. 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 Fethiye-Göcek SEPA, there are no site specific studies defining or quantifying this service for the area.

Cultural Services

3.1.7. Spiritual, religious and cultural heritage

The marine environment may be linked to the cultural identity of a community, or associated with religion, folklore, 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).

Communities living in Fethiye-Göcek SEPA depend on marine resources directly (i.e. fishing) or indirectly (marine tourism and related busineses) for their livelihood. The twelve islands have been a source of inspiration for Turkish artists such as Bedri Rahmi Eyüpoğlu whose paintings can be observed on the rocks in one of its bays.

The cultural heritage of the SEPA is also remarkable. It is thought that Fethiye was first founded in the 16th century B.C. It was captured by Perikles in 362 B.C., then conquered by Alexander in 130 B.C., and then annexed by the Byzantine Empire until 395 A.D. After the Malazgirt War it was annexed to the Seljuk Empire. It was seized by Kemenos in the 1st Crusade, by Menteşe Bey in 1286 and in 1390 by Yıldırım Beyazıt. Ruins belonging to Hellenistic and Roman Ages can be found in the coastal parts of the town. The ancient wall ruins of Ancient Telmessus Theatre and Algerian Mosque

belonging to Ottoman Period are among the most significant historical pieces.

Göcek Gulf is a Lycian settlement situated between ancient Telmessos (current Fethiye) and Kaunos (in Köyceğiz-Dalyan SEPA). Leaving Göcek port towards the Kapıdağ peninsula, one reaches the ancient towns of Krya, Lisai and Lydai (Optimar, 2010). Another significant historical feature of Fethiye-Göcek SEPA is Kayaköy (old name Levissi), whose settlement dates back to 1,500 BC. In 1923, following the population exchange between Turkey and Greece, Western Thracian Turks were placed in the village but could not adapt to this new environment and left the entire village as an open air museum 'ghost town'.

3.1.8. 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.

The Turkish Marine Environment Protection Association, TURMEPA, conducts marine education and awareness activities regionally and is providing education on coastal wetlands and bird watching targeted at high school children in the area and has held meetings about the Posidonia.

Scientific studies on marine species found in the Fethiye-Göcek SEPA as well as coastal planning/ environmental engineering topics (such as the bay's siltation problem) have been conducted as part of Masters or Doctoral theses in accordance with the Turkish Council of Higher Education. Altogether 93 theses have been completed, mainly coordinated by Marine Science and Engineering departments.

3.1.9. 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 Fethiye-Göcek SEPA and closely linked to the marine and coastal environment. A range of marine based recreational activities are currently offered including boat tours both in the bays and in the delta, swimming, and mud baths. In Fethiye town the coastal area includes childern's play areas and is a popular promenade contributing to the health of its citizens.

3.1.10. 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. There are various new high-end developments in Göcek and Fethiye with a sea view, which are assumed to generate a premium. However, this has not been further investigated in this study.

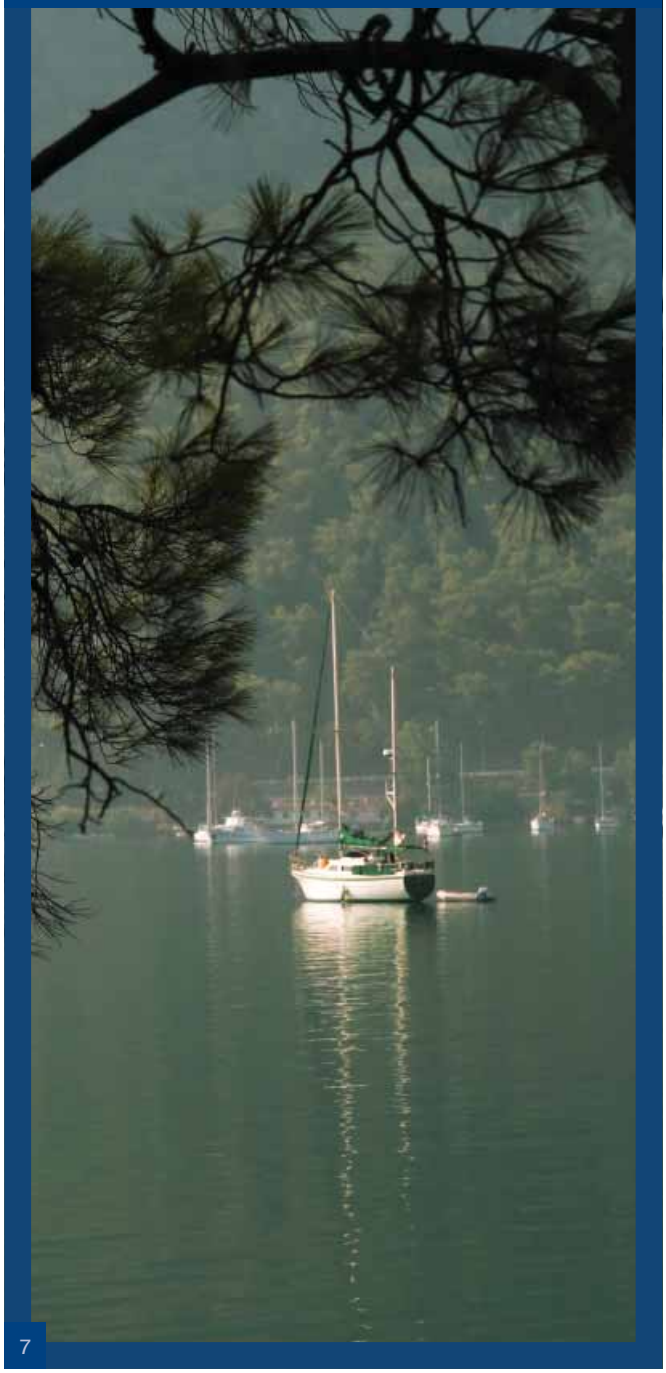
3.1.11. Biodiversity non-use

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).

3.1.12. 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



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In 2008, a World Bank study put the total annual figure for all marine ecosystem services at more than $ 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 3 as being present atFethiye-Göcek 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 surplus[3] 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 site is located within the same region / country as the study site, and displays similar site characteristic (e.g. size, services and

[3] 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.

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 in this study are – fish, 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.

Provisioning Services

4.1.1. Fish

According to official reports, there are 690 fishermen and 197 fishing boats working on Fethiye's coasts. There are also 4 purseiners in the region (Fethiye Chamber of Commerce & Industry, 2011). However, communication with the Fethiye Fisheries Cooperative Head, Ramazan Pehlivan reveals that fishing activities in the marine environment of Fethiye-Göcek SEPA remains relatively modest. The depth of the bay is not very suitable for traditional coastal fishing activities and fishing is seen as a secondary income generating activity to jobs in commerce and the service sector (personal communication). In support of this position, the socio-economic study conducted by Optimar (2010) found that only 0.5% of the interviewees relied on fishing as their main source income.

The main target fish in the SEPA are Mediterranean species such as groupers, amberjack, dentex, snapper, chub mackerel, dolphinfish, sea bream, sea bass, pandora, red mullet, bonitos, two-banded bream, rabbitfish, lobster among others (ibid). Fethiye's Fisheries Cooperative was set up in the 1990's and represents small fishermen of the region (i.e. with boats ranging between 6-10m fishing with set nets (65%) and longlines (35%)). The cooperative has around 90 members of which 20 in Fethiye and 10 in Göcek rely directly on the sea for their living. Small scale fishing is practiced around 230 days of the year; however, the majority of the fishermen work as boat and yacht captains during the tourism season. The majority of the fishermen are reportedly in debt. The purseiners are active around 200 days a year in the region.

Figure 2. Display of fish at Fethiye's central fish market (Source: Esra Başak)

According to Göcek Major Recep Şatır, there has been a loss in fish species in Göcek. All yachts fish, by line or basket, and this has affected fish populations. Restaurants in Göcek buy their fish from Fethiye and in turn 95% of the fish sold in Fethiye fishmarket comes from İzmir (personal communication with Ramazan Pehlivan). Other issues concerning the fisheries in the SEPA are the illegal operation of spear gun hunters as well as the damage caused to fishing gear by dolphins and introduced species such as the puffer fish. Derinsu's (2009) research supports the evidence of illegal fishing in the area due to the limited presence of marine species occupying the higher trophic levels in the food chain.

4.1.2. Valuation

Specific studies do not exist on the targeted species, catch amounts and prices for the fisheries of Fethiye-Göcek SEPA. According to the Fethiye Chamber of Commerce and Industry, fisheries are estimated at 1,500,000 TL (for 2009) ($ 780,000). This is assumed to be a gross value. According to the head of the Fethiye Fisheries Cooperative, 30 people are directly dependent on fishing for their income in

the SEPA across the year (20 in Fethiye and 10 in Göcek) and that all of the 60 boats are operating in the winter. Each active boat is estimated to have an annual average revenue of 22,000 TL (excluding costs). Since 60 boats only operate in the winter (assuming high season is 3 months) and make about 10,000 TL/year, a conservative estimate of the total small scale fishing activities would thus be 1,200,000 TL or $ 633,600[4]. Note that the revenues of the four purseiners have not been included in this approximation for the SEPA. The estimate from the Fethiye Chamber of Commerce and Industry has been used in the calculations.

Regulating services

4.1.3. Carbon sequestration

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 ±15% per second for the Mediterranean Sea as a whole. This corresponds to an annual average rate of anthropogenic CO_2 sequestration of 11.8 t/km²/yr, which is around twice the average for the World Ocean (Gruber, 2009).

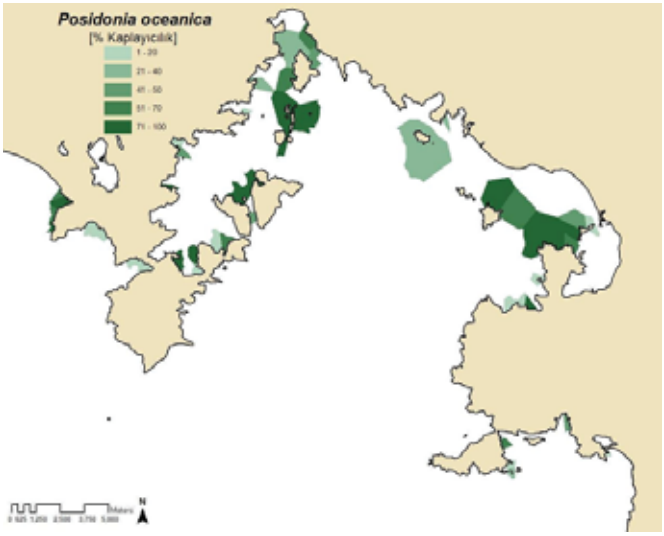
Adopting Huerta's (2009) estimate, Mangos et al. (2010) estimate the total sequestered volume for the Mediterranean at 108 million tonnes of CO2 per year[5]. As reported by Mangos et al. (2010) this quantity represents a mere 5% of the CO_2 emitted by activities in the Mediterranean riparian countries (UN Data).

The average price for carbon for the year 2005 was used - 20.5 €/t of CO_2 (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 CO_2 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 Fethiye-Göcek SEPA.

Value of carbon sequestration at Fethiye-Göcek SEPA

The marine biodiversity assessment conducted by Derinsu (2009) provides the coverage of Posidonia in Fethiye-Göcek SEPA as set out in Figure 3.

Figure 3. Expansion of Posidonia oceanica in Fethiye-Göcek SEPA shown in % of density (Source: Derinsu 2009)



The total surface area covered by Posidonia was not provided in the Derinsu report thus a surface calculator was used to approximate this value. Accordingly, about 28.4 km² of marine biotope consists of Posidonia meadows. That is about 8.2% of Fethiye-Göcek's total marine area of 345 km². As shown in Figure 3, the density of the species varies across the site. The total surface area of dense (100% density) Posidonia is calculated as 15.5 km² in the SEPA, and used in the calculations to derive a conservative estimate of the Posidonia's cabon sequestration value.

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 CO_2/ha/yr. Duarte et al. (2010) carried out a meta-analysis for the net community production

[4] 30 active boats*22,000 TL + 60 "part time" boats* 10,000 TL

[5] One tonne of carbon corresponds to 11/3 or 3.67 tonnes of CO_2

of different seagrass species globally and estimated the aboveground carbon sequestration rate to be in the range of 32.5 t CO_2/ha/yr, assuming an average dry weight of 672g/m^2 (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 4). This study demonstrates that the biggest carbon pool for Posidonia oceanica lies in the soil organic pools, with a global average of 500 t CO_2/ha.

Table 4. 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 CO_2 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 creditabale carbon, associated with their avoided loss. A lower bound of $ 11.2/t CO_2 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 $ 20/t CO_2 eq (based on EU Emission Trading System (ETS)).

Table 5 presents the results of the analysis. The carbon value of Fethiye-Göcek's Posidonia meadows is estimated at $ 944,384 –1,686,400 a year ($ 609-1,088/ha), with a present value of $ 364,101 – 650,180. This assumes that soil carbon is released at 50 t CO_2 eq/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.

4.1.4. Protection against coastal erosion

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.

Table 5. Potential carbon sequestration value of Posidonia meadows at Fethiye-Göcek SEPA

Posidonia surface (ha)	Carbon sequestration† (tCO_2eq/ha/yr)	Soil carbon released†** (tCO_2eq/ha/yr)	TOTAL Annual carbon loss per site (tCO_2eq)	Value ($ 11.2 / tCO_2eq)			Value ($ 20 / tCO_2eq)		
				Annual value $ / ha	Annual Value / $	PV (10 years, 10%), $	Annual value $ / ha	Annual Value / $	PV (10 years, 10%), $
1,550	4.4	50	84,320	609	944,384	364,101	1,088	1,686.400	650.180

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)[6]. 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.

Valuation of erosion control at Fethiye-Göcek SEPA

There are no site specific studies of the risks faced by Fethiye-Göcek 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 18.5 km[7]. 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 multiplied by 18.5 km = 2.96 million € per year. Around 27 km or 12% of the coastal areas in Fethiye-Göcek SEPA is estimated to be occupied by man-made structures (human settlements, hotels, coastal facilities such as piers, docks and roads)[8]. A conservative estimate of the erosion protection service offered by Posidonia meadows would be 354,000 € per year ($ 460,200).

4.1.5. Waste treatment

Existing estimates

Mangos et al. (2010) considered the liquid waste produced by human activities, which is the main pollutant of the marine environment. The '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€/m^3. 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.

[6] 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).

[7] Estimated as 8.2% of 226 km of the total coastline of the SEPA (see section 4.2.1, Figure 3).

[8] Calculated by using Google Earth.

In 2005 the Mediterranean coastal population stood at about 148 million (adapted from Attané & Courbage, 2001). Average domestic water consumption for these countries stands at 99 m^3/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 km^3 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 m^3 per year (or 0.56 km^3/yr) and evaluated on the same basis as for domestic consumption at 0.18 €/m^3, 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.

Valuation at Fethiye-Göcek 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. The total length of Fethiye-Göcek SEPA coastline is 235 km (or 2.8%). This suggests that 6.4 million Euros ($ 8.32 million) per annum can be apportioned to Fethiye-Göcek SEPA waste treatment service.

Cultural Services - Tourism and recreation

4.1.6. Background

The natural and historical assests of the SEPA attract domestic and foreign tourists. Fethiye-Göcek region, easily accessible by Dalaman airport, is an exceptual marine area having numerous calm bays for safe sailing and yachting opportunities (ODTÜ, 2007). Ölüdeniz Lagoon near Belceğiz Village, Turunç Pınarı Bay, Samanlık and Boncuklu Bays as well as 12 Islands region spreading towards the West and Northwest of the Fethiye Gulf make up popular daily or longer term (charter) yacht tourism routes and are used by significant numbers of yachts during the summer season (Derinsu, 2009). Göcek is primarily a yacht tourism destination and one of the key areas for the Blue Voyage.

According to the Tourism Office in Fethiye, Göcek has 20 hotels with a total bed capacity of 2,000, while Fethiye has 850 hotels with a 43,000 bed capacity. There are 189 Travel Agencies, 10 Marinas with a 1,718 mooring capacity, a daily boat capacity of 5,000 and 8 Beaches with blue flags in the SEPA. While no official statistics exist, around 10,000 people are estimated to be directly involved in the tourism sector (hotels, agencies and restaurants).

The SEPA attracts high-end yachting aficionados both from Turkey and abroad (ibid). Fethiye Port's records point to a total of 13,739 foreign tourists in 2010 (Muğla Culture and Tourism Directorate, 2011) and the Fethiye Chamber of Shipping has recorded a total of 4,017 boats and yachts (both foreign and Turkish) that have used the Fethiye Bay and 4,897 vessels in Göcek Bay in 2010 (Fethiye Chamber of Shipping, 2011).

Fethiye district has more marinas than any other district in Turkey. Göcek offers a bay protected from rough winds and sea conditions and 7 marinas serving yachts using the nearby bays. An additional 3 marinas are in operation in Fethiye. Two marinas serve mega yachts (Club and Skopea Marinas). Furthermore, public ports and docks are available in the region and altogether these provide all types of logistic support to yachts and charters (see Table 6).

Table 6. Public and Private Marinas and landing docks in Fethiye-Göcek SEPA

Marina Name	Location	Capacity at sea	Capacity on land	Total	Comment
Fethiye Municipality Marina	Fethiye	180		180	
Göcek Municipality Marina	Göcek	150		150	
Ece Marina	Fethiye	400		400	Can accomodate boats up to 60 meters. Five star marina with a blue flag
Port Göcek (D-Marin)	Göcek	380	150	530	First class facilities. Provides moring services to yatchs up to 45 metres
Club Marina	Göcek	221		221	Private Marina located at Bunhus Bay. Ideal for super mega yatchs
Göcek Yacht Port	Göcek	150		150	
Marinturk Exclusive	Göcek	100	200	300	Located in Poruklu Bay 10 minutes from Göcek centre. The only natural beach in Göcek town is located in this bay
Marinturk Village Port	Göcek	120	200	320	Located in Büngüş Bay. Marina and boat yard
Skopea Marina	Göcek	48		48	Located in the centre of Göcek. Open April to the Middle of November.
Yes Marina Dock		30		30	
Yacht Hotel Marina		30		30	
Park Marina Hotel		40		40	
Letonya Holiday Village		25		25	
Hillside Holiday Village		15		15	
Small boats landing		100		100	
My Marin Yacht Club		67	15	82	
Total		2,056	565	2,621	

Source: Muğla Provincial Culture and Tourism Directorate, 2011 and Fethiye Chamber of Shipping, 2011.

The total boat capacity of the marinas on the coast of Fethiye is 2,621- 2,056 by the sea and 565 on land[9]. This represents around 15% of Turkey's total capacity of coastal marinas (Fethiye Chamber of Commerce and Industry, 2011).

Box 3 describes the wasterwater management system under development in the SEPA.

Tourism Strategy: The Ministry of Culture and Tourism has developed a strategy to 2023 (to mark Turkey's 100 years as a Republic) which is in accordance with Turkey's IX. Development Plan objectives covering 2007-2013. The strategy highlights the importance of diverting the current pressures from coastal tourism by diversifying into health/ thermal tourism, winter sports, nature, ecological, rurally based tourism, congress and fairs, cruiselines and yachting tourism among others (Ministry of Culture and Tourism, 2007). The strategy's intention is to plan holistic tourism corridors, regions, towns and eco-tourism zones rather than individual and independent tourism offerings. The Ministry's objective is to raise the number of visitors to Turkey by 63 million, revenues by $ 86 billion and expenditures by $ 1,350/visitor by 2023 assuming that appropriate infrastructure and accommodation are put in place (ibid).

According to a 2009 law, all commercial activities on the sea would be tied to the Ministry of Culture and Tourism but this is yet to be implemented. Development of large scale accommodation in Fethiye is not possible since there are no suitable lands belonging to the state (in other words the Ministry of Finance).

[9] The Chamber of Commerce & Industry (2011) states slightly different statistics - a total capacity of 1,870 on sea and a total capacity of 2,320 for the region.

Box 3. Managing Waste Water Impacts through the Blue Card (Mavi Kart) System

In an effort to manage marine pollution the Government is piloting the Blue Card System in Fethiye-Göcek SEPA. The Blue Card is a digital monitoring system for the waste (solid waste, grey/black and bilge water) generated by motorized boats. The system, initiated by the Muğla Environment and Urbanisation Directorate, has been in operatation since July 2010. The Blue Card features a recorder both on shore and onboard registered vessels. Information on participating boat's waste water is sent to a central system so the amount of water taken by the boat and returned for treatment can be determined. If a boat has taken two tons of water, it is expected to return the same amount at the treatment facility. The Blue Card should be submitted each time a boat discharges their waste and at marine control points and in theory Port Authorities shoud refuse sea pass and not issue transit licences to ships without the card. A charter on average would have a 4-5 ton waste water capacity tank. A person produces around 50 litres of waste water a day. Therefore if a charter has 10 people it should be producing 500 litres of waste water in a day. After one week at sea it should have around 3.5 tons of waste water. So if it discharges less than this it is likely that the boat is dumping at sea.

TURMEPA (Turkish Marine Environment Protection Association), a Turkish NGO dedicated to marine conservation, have invested 200,000 TL in software for the system and prepared 5,000 cards that are linked to computer systems at 30 marinas, ports, fishermnan shelters, and other boat stopover locations in Muğla. Currently, seven collection points exist within the Fethiye-Göcek SEPA.

In Fethiye the Blue Card is run by the municipality. In 2011 they collected 5,279 tons of waste water. There is no charge for this service and the municipality feels that if they apply a fee, then boats would simply dump their waste at sea, and the cost to the municipality to clean up the marine environment would be a lot more expensive. The cost of waste water treatment is 0.412 TL / ton. There are 24 waste water collection points in Fethiye municipal harbour installed in 2010. In addition there are 4 collection points for fishermen and 3 more collection points in Çalış mainly for the canal boats. This totals 31. In Fethiye at least 5 more collection points are needed as the landing areas can get very congested when the daily boat tours come back at the same time. The system is not yet in place in Ölüdeniz.

All national and foreign boats entering the Göcek Gulf and the Göcek-Dalaman bays are required to discharge their grey/black water and bilge water to the Common Water Acceptance Facility or to the Pumpout boat. TURMEPA has two 17 metre mobile pumpout boats for collecting waste and black water, and a TURMEPA Waste Collection Facility is located near MOPAK. TURMEPA collect the waste and the Municipality transports it to treatment plants and treats it. Two additional boats of 10 m collect solid wate from Göcek bays during the season. In 2010, they collected 7,000 tons of waste water, 600 tons of bilge water and 48,000 bags of solid waste. There are 16 people working on these operations. TURMEPA spends 1,000TL a season in boat fuel to collect the waste water from boats. This service is provided for free, as they are not convinced that boats would voluntarily go to the collection points.

There is a general agreement that the system needs developing. Better monitoring and enforcement, and more waste water collection points are required. Harbour heads are key to the system's success as they issue navigation permits and could support the system more by monitoring tank capacity better, while the MoEU should monitor the waste collection points. Article C of the Local Environmental Commission Decision No 177 dated 24/06/2009 states that waste generators are obliged to pay a waste transfer fee to the licenced waste acceptance units, and those that transfer the waste are required to pay a disposal fee to the disposal units. However no fees are currently in operation. Coastguards and harbour heads could also be responsible for levying fines. There is the need for better information on the Blue Card system, which is not an international system, so that boats planning to visit Fethiye-Göcek understand the system in advance.

According to Okan Arıkan, Fethiye Municipality's harbour officer, there are visible improvements to the marine environment following the introduction of the system. Before winds would bring a significant amount of waste to Çalış beach generated by boats travelling from` Marmaris to Ölüdeniz. There are plans to extend the system to other marine sites.

8

There are also restrictions relating to the development of forestry areas managed by MoFWA, and because Fethiye is in an earthquake risk zone, buildings of more than 2 storeys cannot be built (ODTÜ, 2007).

The Fethiye Chamber of Sea Commerce has 298 members from Fethiye and Göcek. They support the charter (blue voyage) and daily boats. Their main concerns relate to the fact that Fethiye Gulf can't have cruise boats because of the depth of the water and the lack of boat repair zones. The current boat repair location in Karagözler is not sufficient in terms of safety and capacity. An EIA has been approved for a new boat repair zone in Karaot section.

4.1.7. The value of tourism

Overnight vistors (on land)

Site specific data of tourism expenditures is not available for the site. Therefore average daily tourism expenditures estimated in other MCPAs in Turkey has been used based on studies by Bann & Başak (2011a & b) conducted in Foça and Gökova SEPAs. Accordingly, an average daily expenditure of 115 TL/person is applied.

According to the Tourism Office in Fethiye, overnight visitors for Fethiye and Göcek are around 650,000 foreigners and 700,000 Turkish annually (includes visitors to Çalış beach, Ölüdeniz and Hisarönü). The majority of foreign visitors are from the UK (46%), followed by the Netherlands (7%); Germany (6%), Russia (6%), France (5%), other (30%). The harbour head keeps a log of entrance and exit by sea. The tourism office estimates that 23,666 foreign tourists arrived by sea in 2011, the rest come from Dalaman airport.

According to data from the Ministry of Culture and Tourism, the total number of overnight stays in Fethiye was 2,027,940 in 2010 (1,107,306 in Municipality licensed accomodation and 1,620,631 in Ministry licenced accomodation. Based on the above information, tourism is estimated at 336,713,100 TL ($ 177,784,517) a year.[10]

It is important to note that this figure does not capture visitors to Göcek, day visitors to Fethiye and Göcek, or expenditure by people who stay on their boats. It is therefore an underestimate of the real tourism value of the site.

[10] Based on 2,027,940 over night stays * 115 TL/day expenditures

In 2011, around 4,000 people came from Rhodes to Fethiye in July and August. There is only one firm offering the ferry services from Rhodes and demand for this service is high.

Recreational Activities' Valuation

Marinas

The current capacity of buoys in Göcek is 1,111 boats (ODTÜ, 2007). According to Göcek's Major Recep Şatır, this should not be increased as this would put pressure on the bays. There are 2 winter marinas and 6 Summer marinas in Göcek and 1,000 permanent yachts. Göcek public marina / mooring area has the capacity for 150 boats and generated revenues of 750,000-800,000 TL ($ 390,000 – 416,000) in 2011..The total revenue of the marinas in Göcek is estimated to be 8 million euros (18,750,000 TL, $ 10,500,000). While this does not account for costs, it is an underestimate in the sense that it excludes income from restaurants, markets, and secondary technical support services provided to yachts, which are high revenue generating operations. Yacht tourism is very high end tourism and generates significant added value to the Turkish economy, of the order of 5 times the initial investment (personal communication Recep Şatır).

D-Marin World, the biggest marina in Göcek, opened in 1990. It has capacity for 380 boats in the water and 150 on land. When Göcek was a mining town, the site served as a commercial port and there was no marine life. The construction of the marina has then in a sense restored the area. The Marina employs 72 people full time, with an additional 7 people employed in the summer, 85% of whom are local. Their boat yard has a capacity for 250 boats and is located across the bay to the marina to help conserve the marina's environment. They charge 3 Euro per 250 litres of pumped waste water. In 2011, the marina management collected 23,935 litres of grey water.

Ece Marina is the main private marina in Fethiye Bay with a 400 boat capacity. According to the Fethiye Chamber of Commerce and Industry, Fethiye bays host on average 4,000 boats. The Municipal harbour in Fethiye has the capacity for 120 boats, mainly charters and daily boats. Sail boats are not accepted as they can be served by the marinas. Most of the boats, 90 out of the 120, are permanent. The mooring fee is very reasonable compared to the private sector at 1,000-1,200 TL per boat per

year. Boats may also pay for an alcohol licence, which is 200-250 per boat for 2-3 years. There are plans to extend the mooring capacity to 300-400 boats to meet the 'extreme demand'. The total revenue for the municipality run harbour in 2011 was 300,000 – 400,000 TL ($ 156,000 – 208,000 TL).

Box 4. Blue Voyage

Between the wars, writer and painter Cevat Şakir Kabaağaç, lived in Bodrum and wrote an account of his idyllic excursions along Turkey's southern Aegean and western Mediterranean coasts. He called his book "Mavi Yolculuk" (Blue Voyage).

A Blue Voyage typically consists of a 4-7 day cruise on a gulet (wooden yacht), between any two points of the Turkish Aegean. Usually advertised as a Fethiye to Olympos voyage, the boats often stop or start at Kale. From Fethiye, boats call at Ölüdeniz and Butterfly Valley and stop at Kaş, Kalkan and Kekova, with the final night at Gökova Bay.

Tour prices show significant variation due to boat size, length of tour, number of customers; however, a week long tour in the Fethiye, Ölüdeniz, Ekincik routes is between €800-1,000/person. The number of Blue Voyage gulet boats, tour operators and customers does not appear to have been collated by any organisation. It is therefore difficult to estimate the value of this very popular holiday option, the value of which is shared by a number of MCPAs.

Beaches

Ölüdeniz beaches are run by MELSA[11]. There is also a Nature Park in the MPA run by the MoFWA, GDNCNP. These sites are run under a special protocol between 2 Ministries, MELSA and Muğla governorship. MELSA have to give 30% of gross revenues to GDPNA as part of protocol. Of the remaining profit, 80% is spent within Muğla on e.g. waste water investment, maintenace of schools, and the establishment of new sites such as the kite surfing site in Akyaka. This model has inspired other provinces such as Antalya.

Belceğiz – Public Beach. MELSA started managing the beach in 2011. They have ugraded the toilets and built a childrens playground. They plan to construct platform areas on the beach from which to serve drinks. Sun loungers and umbrellas can be hired for 6 TL a day. Services provided on the beach include a kiosk for snacks and drinks, showers, toilets and a lifeguard. The capacity of the beach is 10,000 people a day, and between July and August around 2,000 sun loungers are rented a day generating a revenue of around 744,000 TL ($ 386,880) a year[12]. There are about 50 private bars and restaurants in the area, and MELSA employs 100 people at the site.

Kumburnu Beach in Ölüdeniz is one of the few marine protected area in Turkey charging an entrance fee. In 2010 Ölüdeniz was chosen as one of the best quality beaches in Europe by the World Tourism Agency. According to İbrahim Akoğlu, the managment objective is to keep the beach as natural as possible. The entrance fees are 5 TL per person, 2.5 TL for students, 17 TL per car and 140 TL for a charter bus. The car park has the capacity for 4,800 cars. The entrance fee is seen to work as a defence mechanism for the area as it chokes off demand. The carrying capacity of the site is said to be reflected in the capacity set for the car park – the site is closed to further visitors when the car park is full. In 2011 there were an estimated 416,000 visitors. Revenue per annum is estimated to be between 5.5-6 million TL ($ 2.8 – 3.1 million). This revenue is said to be generated equally from the the sale of sun longers, entrance fees and the sale of food and drinks from the beach's 5 kiosks and 3 restaurants. This demonstrates the significant revenue that can be generated by entrance fees and other charges.

Associated with the beach is a popular lagoon where pedalos and canoes can be hired. An illegal hotel and campsite are located on the shore of the lagoon and the septic tank system is known to exceed its capacity and seep into the lagoon, where there is very little circulation.

Kıdrak Nature Park, located 5 km from Ölüdeniz, is a daily use zone also charging an entrance fee of 4.5 TL per person. The park is managed by the MoFWA and has a capacity of 2,000 people. Between 300-400 people a day visit the park in the high season. The park generates revenues of about 150,000 TL a year ($ 78,000).

In Göcek there is one public beach run by the Municipality, İnlice Beach, 5 km from the town centre. D-Marin also runs a beach club whose revenues in 2011 was 60,000 TL (personal communication with Onur Ungan).

[11] MELSA was founded jointly by the Directorate of Muğla Provincial Special Administration and the Muğla Development Foundation in 1995 for the purpose of contributing to the survival and development of the local handicrafts of Muğla. MELSA also operates one of the site rentals in Ölüdeniz, Fethiye (source: Keskin et al 2011).

[12] 12,000 TL a day * 62 days = 744,000 TL ($ 386,880)

Boat Tours

Popular boat tours in the SEPA include: The 12 island Tour, which includes a boat trip around Fethiye bay. The boats normally stop at 6 islands and cruise by the rest. The normal tour visits Yassıca Adalar (Flat Islands) for a stop and a swim, then Tersane Island for a swim and a visit to the ruins, followed by Akvaryum (Aquarium) for lunch, a swim and a snorkel. Cennet Koyu (Paradise Bay), Kleopatra Hamamı (Cleopatra's bath) and Kızıl Ada (Red Island), with its beach and mud bath; and, Butterfly Valley via Ölüdeniz, which can include opportunities for walking, swimming and visiting ruins.

In Ölüdeniz, 17 boats do day trips visiting, for example, the caves, Butterfly Valley, Karacaören Bay, Gemiler Island. In Fethiye there are an estimated 90 boats charging 25-40 TL per person per tour. The price varies accoring to boat size which ranges from 6-400 people. Out of these 90 boats, 17 are co-operative boats operating between Fethiye and Çalış beach. The total capacity of the daily boat tours in Fethiye is reported to be 5,000 and in 2011 an estimated 350,000 people went on boat tours (personal communication with Saffet Dündar). Using a tour price of 25 TL, the value of daily boat tours is estimated at 8,750,000 TL ($ 4,620,000) per year.

There are 2 boat cooperatives offering daily boat tours in Göcek. One of the cooperatives has 5 overnight/charter boats and 3 daily tour boats, ranging from 12-22 metres. All 8 boats are registered with the Blue Card system and moor at the municipality site. The other cooperative has 18 boats (6 daily boats and 6 overnight/chater boats). The daily tours operate from May to the end of October, with the peak season covering 15 June – 15 September. During the peak season there are 150 people per day for the cooperative with 3 daily tour boats. It is therefore asumed that the other cooperative takes 300 people in the peak season as they have twice as many boats. Demand is 25-30% of the peak season level the rest of the time. In 2011 the price of a daily tour was 40 TL, this will increase to 45 TL in 2012. The value of the daily boat tours in Göcek is estimated at 2,453,413 TL ($ 1,275,774)[13].

The price of charter boats depends on size of boat and demand. A 22 meter boat can cost between 700 and1,200 euro per day and a 12-15 metre boat 400-1,000 TL per day.

Concerns of daily boat owners in Göcek include:

- Some boat owners feel restricted by the Conservation and Use principles (see Annex 2), which means they are not allowed to visit some of the bays such as Hamam bay where there are submarine ruins. However, compliance with this regulation is reportedly an issue.
- Pollution of marine environment coming from Fethiye.
- Wastewater generated by marinas – for example big boats have dishwashers and use a lot of water. They feel the marinas should lead and be exemplary in terms of marine conservation.
- It is recognised that the marine waters of Göcek are exceptional with visibility to 20 meters, but the sea needs protecting to maintain this quality.

Paragliding in Babadağ. Babadağ is 30 minutes from Fethiye, 2.5 hours from Akyaka and 3 hours from Marmaris, and at an altitude of 900 meters offers spectacular views of Ölüdeniz. This was the first place for paragliding in Turkey and is a highly suitable location due to the proximity of the mountains and sea and the good thermal activity which allows a single flight to last between 45-60 minutes. Since July 2011 the site has been rented by the Fethiye Chamber of Commerce and Industry. It was previoulsy managed by MELSA who invested in footpaths and cafes for the site. The Muğla Governorship decided that there should be a cable car constructed to travel up and down the mountain, an investment that will cost around $ 13-14 million. The Fethiye Chamber of Commerce and Industry has committed to install this within the next 5 years.

When MELSA was running the site there were an estimated 59,000 jumps per year (including tandem and simple). The season runs from May to the end of October.

The site is 25 minutes from Ölüdeniz beach, and transportation is provided by a number of private agencies. There are 11 paragliding agencies working in the area, and 118 pilots most of whom are certified with the Turkish Aeronautical Association . There are take off points at three levels (1,700, 1,800 and 1,900 metres), which are utilised according to (wind) conditions. The price per jump ranges from 140-180 TL (includes a 20 TL entrance fee).

[13] 450 people a day * 90 days peak season * 40 TL) + (112 people * 90 days of peak * 40 TL) = 1,620,000 TL + 403,200 = 2,453,413 TL ($ 1,275,774)

There is also another point at 900 meters, which can be used by experienced paragliders in the winter.

In terms of safety, if there is good weather and the pilot is experienced the risks are considered to be minimal. A pilot is only allowed to do four jumps in a day, to ensure that they do not start to lose concentration. A view was expressed that buckling should be monitored to avoid accidents.

Based on 59,000 jumps a year and an average price of 160 TL per jump, the value of paragliding is estimated at 9,440,000 TL per year ($ 4,908,800). This is a gross value as it does not deduct the costs associated with this activity. Based on discussions with the Chamber of Commerce and Industry, 57,000 jumps were taken in 2011, generating a revenue of 1,200,000 TL ($ 624,000) in 2011, with an overall profit of 300,000 TL ($ 156,000).

Diving: In 2011, licences were given to 11 operators, who work under an association. There are 3 locations for diving in Göcek and 8 in Fethiye. There were estimated 20,000 dives in 2011 at £40 a dive. Dive tourism is estimated at £800,000 a year (2,270,700 TL, $ 1,266,450) (personal communication Saffet Dündar). In April 2012 an old coastguard ship of 42m is to be sunk to 24 meters in the Afkule Monastry zone of Fethiye to serve as an artificial reef attracting fish. The site will be suitable for amatuer divers.

Windsurfing: There are some windsurfing clubs managed by the municipality.

Sailing: There is one sailing club under the Göcek Yacht club.

Site rentals

In Table 7, the 17 site rentals of GDPNA, plus income where applicable, are provided. At Belceğiz-Kumburnu Lagoon in Ölüdeniz, literally translated as 'dead sea', there is a small entrance charge to use the lagoon beach and only non-motorised watersports are allowed. Unlike other site rentals which are focused on renting out beaches, Babadağ offers paragliding managed by Fethiye Chamber of Commerce and Industry.

Table 7. Rent incomes of Fethiye-Göcek SEPA

District Name	Rental Site/Operation Name	Fee 2011 (TL)
Fethiye	Kumburnu (%30)	1,483,089.83
Fethiye	Belceğiz (%30)	354,086.71
Fethiye	İnlice	14,153
Fethiye	Gemile Bay	12,084
Fethiye	Göcek Public Beach	8,056
Fethiye	Çalış Kargı Yanıklar Beach (%30)	111,018.21
Fethiye	Aksazlar (%30)	4,931.75
Fethiye	Kuleli (%30)	7,430.14
Fethiye	Küçük Samanlı (%30)	5,117.40
Fethiye	Büçük Samanlı (%30)	5,267.67
Fethiye	Kalemya Bay	52,600
Fethiye	Babadağ	500,000
Fethiye	Göcek MAPA Buoy	-----
Dalaman	Sarsala	44,201
Dalaman	Boynuzbükü	8,106
Fethiye	Atapark Hotel Pontoon	9,000
Fethiye	Mehmet Selçuk Pontoon	7,000
TOTAL		2,626,142

Source: TVKGM 2012

In addition to the above-listed yearly rental fees, GDPNA is in the process of levying user fees on operators of bars, hotels and others that make use of the coastal stretches in the SEPA. In Fethiye-Göcek SEPA, nine such agreements await implementation whose annual revenues were expected to bring an additional 213,800 TL to the GDPNA in 2011.

Table 8 provides a summary of the value of recreational activities in the SEPA.

Table 8. Valuation of marine related recreational activities

Activity	Value /year $	Comment
Marinas in Göcek	10,500,000	While this does not account for costs, it is an underestimate in the sense that it excludes income from restaurants, markets, secondary technical support services provided to yachts, which are high revenue generating operations
Fethiye Municipality run harbour	156,000	Accounts for only one of the three Marinas in Fethiye
Ölüdeniz Kumburnu Beach	2,800,000	Derived from the sale of sun loungers, entrance fees and sale of food and drink. Gross value, does not net out costs of running the site
Belceğiz public beach	386,860	Gross value
Kıdrak Nature Park	78,000	Gross value
Paragliding in Babadağ	624,000	Based on discussions with Fethiye Chamber of Commerce & Industry, 57,000 jumps were taken in 2011, generating a revenue of 1,200,000 TL ($ 624,000) in 2011, with an overall profit of 300,000 TL ($ 156,000).
Boat Tours – Fethiye	4,620,000	Gross value
Boat Tours – Göcek	1,275,774	Gross value
Scuba Diving	1,266,450	Gross value
Windsurfing	-	Not estimated
TOTAL	21,707,084	

Summary of Valuation

The total annual value of the ecosystem services in Fethiye-Göcek SEPA is estimated to be around $ 210 million per year (Table 9).

The cultural services of tourism and recreation account for around 95% of the total value. Given that the value-transfer method has been used for determining the tourism value at the site, the estimate for tourism of $ 198 million per year clearly could be refined. Site specific evidence of tourist expenditures and willingness to pay is required, along with a better understanding of the number of visitors (both overnight and day visitors).

Regulating services are valued at $ 8,780,200 per year. The seagrass communities provide a carbon sequestration benefit worth around $ 944,000 per year and an erosion protection service valued at around $ 460,000 a year, while the coasts in Fethiye-Göcek SEPA help assimilate waste, a service valued at over $ 8 million annually. However, valuation of these services is based on value transfer estimates as scientific studies on the provision of these services at the site are unavailable.

Marine ecosystems are also important in terms of employment and local livelihoods. The economy of the peninsulas is based on the service sector. While no official statistics exist, around 10,000 people are estimated to be directly involved in the tourism sector (hotels, agencies and restaurants) in Fethiye. The economy in Göcek is totally dependent on tourism.

The valuation of the fisheries in Fethiye-Göcek SEPA has not been based on sound scientific evidence. No former studies were available on the fish stocks and the fishing sector in general for the concerned bays. Thus the estimated value of the fisheries is not based on sustianble harvest levels.

While no official statistics exist, around 10,000 people are estimated to be directly involved in the tourism sector (hotels, agencies and restaurants).

Note 1/ There may be some double counting here with the expenditure of overnight visitors, which includes expenditure on non-specialised tours, however thees tours are also popular with day visitors whose expenditure is not captured in the overnight visitors expenditure calculations.

Table 9. Summary of valuation results for Fethiye-Göcek SEPA

Service	Value/ year ($)	Valuation approach	Comment
Fish	380,000	Market prices	This is not based on a sustainable harvest rate, which is unknown. Only includes fish registered in Fethiye district and does not reflect the production levels. It is likely to exclude fish sold directly to restaurants and individual customers and recreational fishing and may also be based on an under-reporting of fish catch. This is a gross value – costs have not been deducted
Carbon sequestration	944,384	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 $ 11.2 / tCO_2eq
Erosion protection	460,200	Benefits transfer	Mangos et al. (2010). Based on 160,000 Euro per meter of coastline, 27 km of Posidonia beds in Fethiye-Göcek and 12% of the area at risk.
Waste treatment	8,320,000	Benefits transfer	Based on Mangos et al. (2010) estimate for Turkey of 229 million Euros apportioned to the study site based on length of its coastline (235km).
Tourism / Recreation	177,784,517 (expenditure) 21,707,084 (recreation)1	Market prices	Based on a conservative estimate of tourist numbers (2,207,940 overnight visitors per year) and average tourism expenditures (based on other Turkish MCPAs in Bann & Başak 2011a 2011b) and the annual revenue estimates of the marine recreational activities conducted in the area
TOTAL	209,996,185		

9

Opportunities to increase revenue flows from Fethiye-Göcek SEPA

10

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

A key component of the GDPNA-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 Fethiye-Göcek SEPA include (in addition to fish) carbon sequestration, disturbance regulation, waste assimilation and tourism and recreation benefits.

It should be noted that other components of the GDPNA-GEF-UNDP project are focused on the identification of feasible income generating options for the site and the development of a business plan for Fethiye-Göcek SEPA. Therefore this section only provides an overview of the opportunities for financing based on 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 10. 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 central budget allocations from the Turkish Ministry of Environment and Urbanisation. In addition, revenue from fishing is important to local communities in the area.

Table 10. 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 Fethiye-Göcek 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.

Finance mechanisms

5.1.1. Fiscal instruments

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

Market-based charges

5.1.2. Tourism related revenues and charges

Tourism and recreational revenues could be increased at the site through a combination of improved management and better marketing of tourism and recreational activities (discussed further in Section 6) and the identification of new revenue generating opportunities. Possible revenue generating activities include the promotion of rural/ecological agriculture, nature- based tourism options in the SEPA[14], scuba diving and sailing that can expand the limited tourism season in the SEPA.

5.1.3. User fees

Fees for anchoring in the bays could be considered. In other Mediterranean countries such as Croatia and Italy, boats from the region are not obligated to pay a fee, but boats from elsewhere are subject to an overnight visitor fee. If a fee were taken from local boats, this could be an annual fee and would need to be developed collaboratively with actors. More research is needed to determine the feasibility of introducing such a fee, and a suitable rate.

Article C of the Local Environmental Commission Decision No 177 dated 24/06/2009 states that waste generators are obliged to pay a waste transfer fee to the licenced waste acceptance units, and those that transfer the waste are required to to pay a disposal fee to the disposal units. However no fees are currently in operation. Further, the Mayor of Göcek supports the introduction of fines to protect the marine environment, on which the town depends. The minimum fine per boat is suggested at 9,500 TL/boat.

5.1.4. Marine Carbon Markets

Due to the fact that they store large amounts of carbon and are threaten by conversion and pollution, seagrasses 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+)[15].

[14] Fethiye Chamber of Commerce & Industry was working on the development of nature trails within the SEPA during the time of field interviews and TÜDAV has conducted a study on this potential around Ölüdeniz (see section 6).

[15] 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.

Global markets aimed at reducing greenhouse gas (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 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 5 details a scheme for mitigating Posidonia loss and disturbance at Göcek-Dalaman SEPA.

Box 5. Mitigating carbon loss[16]

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 reduce/stop the degradation of at least 30 m^2 of Posidonia meadows, therefore for all 50 mooring sites 1,500m^2 of sea grasses may have been protected (assuming all sites are surrounded by the seagrass). This will contribute to a minimum of 124.5 kg C fixation per annum. GDPNA is willing to increase the number of these sites both in Göcek-Dalaman coves and the other sites where high marine traffic is observed. In 2010 the system is doubled and reached to 100 mooring sites.

The effectiveness of the system is however weak in terms of monitoring and enforcement. Most boats are reportedly not using the buoys because they are inconvenient (personal communication TURMEPA). The buoys should be lit and indicated on maps.

5.1.5. 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 finance 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.

5.1.6. 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.

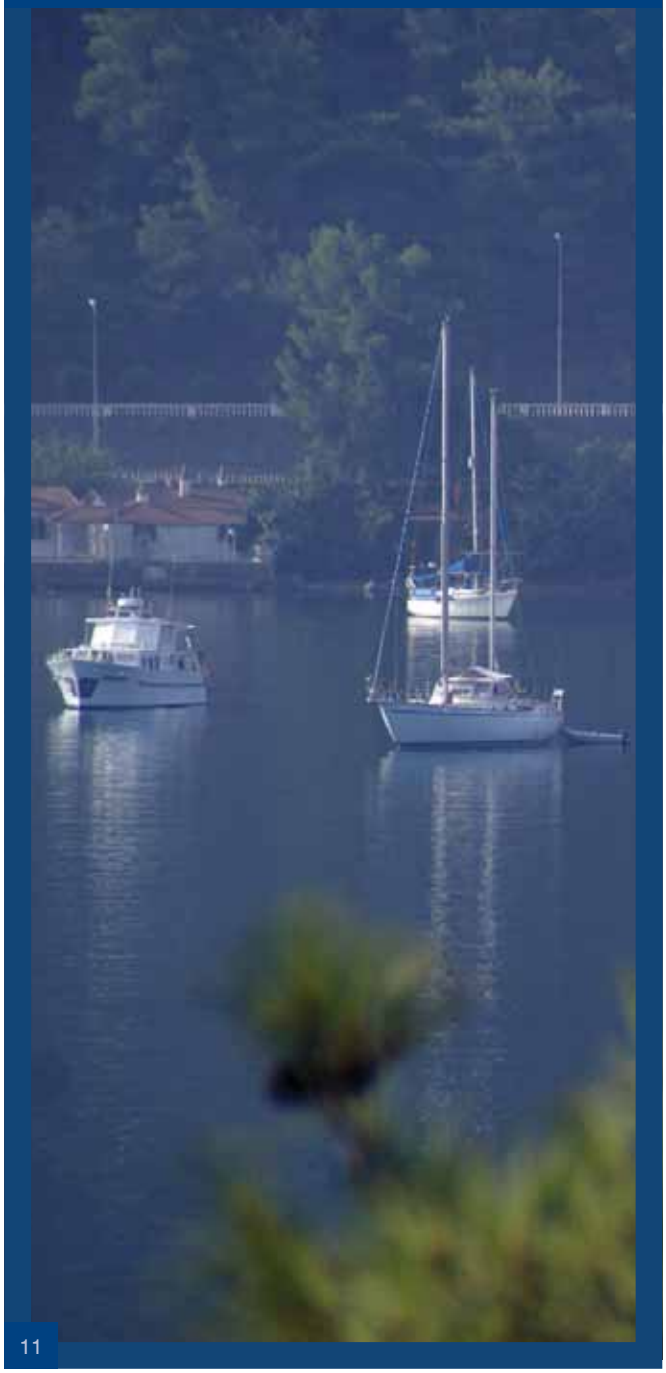
Payment systems for biodiversity compensation include: biodiversity offsets, mitigation banking, conservation banking, habitat credit trading, fish habitat compensation, BioBanking, complementary remediation, conservation certificates. Some are based on compliance with regulation while others are done 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.

[16] Personal communication, Harun Güçlüsoy

Conclusions and Recommendation



11

Conclusions

The Fethiye-Göcek region is an exceptional marine area having numerous calm bays for safe sailing and yachting opportunities (ODTÜ, 2007), which are internationally recognised. To a large extent the economy of Fethiye-Göcek's SEPA is dependent on the marine environment. Fethiye-Göcek SEPA's biodiversity supports a range of ecosystems services that contribute to the economic welfare of a range of beneficiaries and support local communities and Turkey's GDP. The total annual value of Fethiye-Göcek SEPA is estimated to be around $ 210 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, 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. In terms of amenity value, there are a number of new high-end developments in Göcek and Fethiye with a sea view, which are assumed to generate a premium. However, this has not been investigated in this study.

The cultural services of tourism and recreation account for around 95% of the total value. Given that the value-transfer method has been used for determining the tourism value at the site, the estimate for tourism of $ 199 million per year clearly could be refined. Site specific evidence of tourist expenditures and willingness to pay is required, along with a better understanding of the number of visitors (both overnight and day visitors).

Regulating services are valued at $ 8,780,200 per year. However, valuation of these services is based on value transfer estimates as scientific studies on the provision of these services at the site are unavailable.

Marine ecosystems are also important in terms of employment and local livelihoods. The economy of the SEPA is based on the service sector (along with agriculture). While no official statistics exist, around 10,000 people are estimated to be directly involved in the tourism sector (hotels, agencies and restaurants) in Fethiye alone. Göcek is totally dependent on tourism.

Despite their economic, cultural and economic importance the quality and quantity of Fethiye-Göcek SEPA's ecosystem services are threatened by a range of pressures including marine pollution, infrastructure and housing development and illegal fishing activities. Tourism at the site, valued at nearly $ 200 million a year, is threatened by marine pollution. Some mitigation efforts have been initiated by the MoEU, GDPNA and relevant public authorities to manage pollution generated by boats and yachts in the region, notably the Blue Card system. However, this pilot system needs improving through better moinitoring and enforcement, awareness raising and application to international boats.

Of note is the fact that Kumburnu Beach in Ölüdeniz is one of the few marine protected areas in Turkey charging an entrance fee, generating between 5.5-6 million TL ($ 2.8 – 3.1 million) per annum. This demonstrates that significant revenues can be generated by entrance fees and other charges, while facilitating sustainable resource use by choking of demand.

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 fisheries of the SEPA have not been studied. Even though fishing is not a key means of employment and source of livelihood in the region, a stock assessment is urgently needed especially in light of the illegal speargun and trawler fishing activities conducted at the site.
- 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.

Refining the valuation of the site's regulating services

- Good economic valuation is underpinned by good scientific evidence. This is 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 Fethiye-Göcek SEPA'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 as well as the region's historical and architectural heritage. A number of opportunities exist for developing the tourism experience in Fethiye-Göcek SEPA's, and hence contributing to the maximization of the long term revenues from tourism and recreation at the site. These include:

- A study of the site's tourism carrying capacity is needed to understand the limits to tourism development in the area. While a carrying capacity of the boats using Göcek Bays has been conducted by ODTÜ in 2007, other parts of the SEPA (Fethiye and its bays) also need to be studied in this respect, along with a terrestrial capacity assesment for all parts of the SEPA.
- A comprehensive study of the economic impact of marine tourism could be undertaken, to understand the many sectors that benefit from marine tourism and the multiplier effects to the economy. A site specific expenditure study and/

or willingness pay study is also recommended given the high tourism value.

- Upmarket rather than mass tourism should be promoted, that is revenues should be increased through improving quality rather than capacity. However hotels in Fethiye need to be renovated before they can increase prices.
- 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 image / brand and improve the quality of the tourism offered. Visitor centres could be used to raise awareness, while community workshops could be organised to disseminate information on the important and services provided by marine environment and engage the wider community in marine conservation measures
- Control and monitoring of pollution (especially sewage waters) is a challenge that requires collaboration between a number of authorities if tourism revenues are to be sustained. In Fethiye-Göcek SEPA the Blue Chip Card system is a good start, which should be upscaled to other areas. In addition (Koc, C.,2012) makes the following recommendations to control the sedimentation of Fethiye Gulf, which threatens marine biodiversity and tourism at the site:
  * Dumping domestic waste to discharge canals and water courses that reach the Gulf should be prevented by finalising sewerage systems for settlement areas.
  * Domestic solid waste should be moved away from the settlement areas.
  * Chrome processing plants should be supervised in terms of waste treatment or relocated.
  * Erosion control studies in the upper basin should be promoted, timber harvesting in the upper basin should be prevented and new afforestation areas established.
- Diversification of the tourism experience: There is a need to develop a wider range of activities that facilitates tourism throughout the year. For instance, a study by TÜDAV indicated that there is great potential for eco-tourism activities especially around Ölüdeniz (TÜDAV, 2012). Besides the existing paragliding activities, hiking, mountain biking, orienteering, birdwatching, explorations around the endemic flora and fauna of the region (such as the butterflies) could be promoted (TÜDAV, 2012). The area has are strong archealogical heritage that should be promoted and footpaths along the Lycian way need further development. Kayaköy town could be developed into a brand based on boutique hotels. In Göcek there are only 4 months of real yacht tourism and during the winter it is very quiet, with very limited income generating opportunities for inhabitants. This is a key issue for the town and alternatives to yacht tourism need to be developed. Sailing could be promoted throughout the year and opportunities for paragliding explored. Winters are said to be very pleasant with average temperatures of 18° C. Terrestrial tourism could be promoted in Winter, such as hiking, and watersports teams could use the area as a trianing venue. Secondary homes could also be rented off peak
- Use and conservation principles have been introduced as part of a study by GDPNA (see Annex 2), but these are not being taken seriously. All actors need to be more committed to conservation of the marine environment and play a part – marinas, municipalitity, coastguard, harbour head, residents, restaurants and shops. Communities need to take ownership of where they live given that they depend on the sea for their livelihood.
- Information on the use and regulations of PA should be provided on sea charts, so that visting boats are better informed. All foreign boats should also be provided with information on the area at customs, regarding the buoy system and managment system for waste water.

Time series analysis and Socio-economic studies

- Valuation studies should be carried out in at regular intervals in Fethiye-Göcek SEPA's 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.
- The site has not been subject to a thorough socio-economic analysis since 2001. A socio-economic study specific to Fethiye-Göcek SEPA's 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.

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ANNEX 1 – INTERVIEWS DURING FIELD VISIT (24-27 MARCH 2012)

Interviewees	Name	Title
Fethiye Tourism, Promotion, Education, Culture and Environment Foundation (FETAV)	Dilek Dinçer	Director
Fethiye Fisheries Coop.	Ramazan Pehlivan	Head
Fethiye Port Authority	Galip Avcı	Port head
MELSA	İbrahim Akoğlu	Director
Fethiye Chamber of Sea Commerce	Fatma Şumur	Department chief
Fethiye Commerce and Industry Chamber	Akif Arıcan	Chairman
Fethiye Municipality	Okan Arıkan	Harbor staff
Fethiye District Tourism Directorate	Saffet Dündar	Staff
Göcek Blue Voyage Transportation Cooperative	Necdet Sarı	Director
S.S. Göcek First Marine Transportation Cooperative	Ali İhsan Kaya	Assistant Director
Turkish Marine Conservation Association (TURMEPA)	Nazif Türk	Staff
Göcek Municipality	Recep Şatır	Major
D-Marina Göcek	Onur Ungan	Manager

ANNEX 2 – GÖCEK GULF & GÖCEK-DALAMAN BAYS CONSERVATION AND USE PRINCIPLES

Aim

Article 1- The aim of these principles is to conserve Fethiye-Göcek Special Environmental Protection Area's biodiversity and environmental values and determine Göcek Gulf and Göcek-Dalaman Bays Conservation and Use Principles for the purpose of prevention of its pollution.

Scope

Article 2- These conservation and use principles are in effect in the Göcek Gulf and Göcek-Dalaman Bays which is marked in the annexed map under Fethiye-Göcek Special Environmental Protection Area.

Basis

Article 3- These conservation and use principles was prepared based on the 2872 numbered law and the Decree in the power of the Law numbered 383.

Definitions:

Article 4- In the implementation of these principles;

Ministry: Ministry of Environment and Forestry,

Agency: Environmental Protection Agency for Special Areas,

Off-shore: waiting at off-shore/cast off,

Wastewater: it refers all of black water, bilge water, ballast water and sludge.

Ballast water: Ballast water which is not considered as dirty ballast

Moorings: It refers moorings in the coastal sides of bays in case of there is no existing wharfs, bunds, eyebolts etc.

Anchorage: Anchoring operation in order to keep ships safe in the sea

Ship: It refers all kind of boat that move via shipping system other than oar in the water whatever the name, tonality and purpose of use

Göcek Gulf and Göcek-Dalaman Bays: Islands and natural places have link with the mainland in Fethiye-Göcek Special Environmental Protection Area, of which the boundaries and coordinates are given in annexed map

Grey water: All types of bath, kitchen and sink water which is not mixed with black water

Daily tour boat: Ships that have certificate of seaworthiness, take and leave on certain points daily passengers for sport, recreation and tourism purposes

Solid waste: Domestic and operational solid waste generated by ships in the framework of MARPOL 73/78 ANNEX-V

Dirty ballast: When it is disposed from ships into the water; it causes to appear petroleum, petroleum derivatives or oil traces over water or adjacent to coast lines, colour changes over or under water and suspended solid materials/emulsion

Sewage: Generally, black water and grey water

Bilge water: The section in which leakage water and oily waste water collected originated from sub thanks of ships machines or auxiliary machines, cofferdams and lockers

Sludge: The mud of oil and deposit sediments coming from fuel tanks and machinery compartments of ships or cargo tanks of fuel tankers

Black Water: All kinds of sewage water generated by human or animal body

Merchant Ship: All kind of ships used for commercial activities

Marina: It refers coastal structures having a certificate of tourism, providing secure mooring facilities and access to each yacht by walk, having adequate depth of water, providing yachts with technical and social infrastructure, management, support, maintenance and repair services, protected from wind and sea effects, having obtained "operation license" from Under secretariat of Maritime Affairs.

Resting Points for Yachts: It refers resting areas for yachts that can be reached by sea demarcated in 1/25000 scaled Environmental Master Plan of Fethiye Göcek Special Environmental Protection Area

Principles

Article 5- General principles in respect of conservation and prevention of pollution of Göcek Gulf and Göcek-Dalaman Bays are as follow:

a. It is compulsory to follow these principles identified for conservation of biodiversity and environmental values and prevention of its pollution in Fethiye-Göcek Special Environmental Protection Area
b. In accordance with the Environmental Law, in Göcek Gulf and Göcek-Dalaman Bays, the cost for prevention, limiting, removal of pollution and rehabilitation of environment are paid by polluters and the parties causing for pollution. The fines are collected according to the Law numbered 6183 and called "Public Revenue Collection Procedure" from the polluters in order to prevent pollution
c. Ships not having storage tank for wastewater cannot stay overnight in the "Restricted Areas for Use" in Göcek Gulf and Göcek-Dalaman Bays
d. Ships coming to Göcek Gulf and Göcek-Dalaman Bays have to moor to the mooring points (marina, wharfs, eyebolt etc.). Except for "Restricted Areas for Use" it is allowed mooring only to eyebolts in terrestrial areas
e. In Göcek Gulf and Göcek-Dalaman Bays it is forbidden to airplay from ships, according to the "Regulation of Noise Pollution". Social activities in ships can be held in the southern part of Katrancı Island.
f. In Göcek Gulf and Göcek-Dalaman Bays it forbidden to make barbecue on open deck in bays and in stopovers of ships areas
g. Ships coming to Göcek Gulf and Göcek - Dalaman Bays have to deliver their sewage, oily wastes, sludge, bilge water, dirty ballast water and also their wastes to the waste collection facility in Göcek Gulf and/or waste collection ship. In any case, it is forbidden to discharge into sea.
h. Ships coming to Göcek Gulf and Göcek–Dalaman Bays have to bear necessary documents and/or chip cards according to Regulation of Waste Collection and Control" of the Ministry of Environment and Forestry.
i. In Göcek Gulf and Göcek–Dalaman Bays, it is compulsory to follow notices regulating fish hunting with the amateur and commercial purpose, in accordance with the Fishery Products Law numbered 1380.

Areas closed for diving

Article 6- In Göcek Gulf and Göcek–Dalaman Bays, the following places situated in urban and archaeological sites are closed for diving

360 36′ 00″ latitude; 280 50′ 30″ longitude
360 42′ 00″ latitude; 280 54′ 00″ longitude
360 40′ 30″ latitude; 280 57′ 00″ longitude
360 35′ 12″ latitude; 280 51′ 42″ longitude
360 35′ 12″ latitude; 280 50′ 30″ longitude

Closed Zones for Ships:

Article 7- Closed zones for ships are given as below.

In Hamam bay

360 38′ 28.3″ latitude; 280 51′ 15.9″ longitude (HAMAM),

360 38′ 26.5″ latitude; 280 51′ 20.7″ longitude (HAMAM1)

the area between line composed of above points and the coast is closed for all kinds of ships

The areas restricted for use

Article 8- The areas restricted for use in Göcek Gulf and Göcek-Dalaman Bays

A) In Göcek Gulf, merchant ships cannot navigate between 08:00-23:00 and enter into Göcek and Dalaman Bays by no manner of means.

B) In Göcek–Dalaman Bays, mooring of ships and water crafts are forbidden out of the areas and mooring points which determined by Port Authority defined according to the conservation and use principles

In this context;

In Göcek Gulf (Including northern part of Göcek Island) and

360 44′ 3.2″ latitude; 280 55′ 42.3″ longitude (OSMANAGA)

360 44′ 5.8″ latitude; 280 57′ 9.4″ longitude (GCKADAKZ)

the area between line composed of above points and the coast, it is forbidden anchoring of ships and water crafts out of the anchoring areas defined by Göcek Port Legislation.

C) Fort he purpose of conservation of sea meadows in Göcek Gulf and Göcek - Dalaman bays;

a. Göcek Island

360 44'12.6" latitude 280 56'20.1" longitude
360 44'14.7" latitude 280 56'10.6" longitude
360 43'25.7" latitude 280 56'00.1" longitude
the area between line composed of above points and the coast and
360 43'40.3" latitude 280 56'57.1" longitude
360 43'52.4" latitude 280 56'46.3" longitude
the area between line composed of above points and the coast

b. Kış Limanı Bay

360 40'39.2" latitude 280 54'43.4" longitude
360 40'44.4" latitude 280 54'43.5" longitude
the area between line composed of above points and the coast

c. Kurşunlu Bay

360 38'16.4" latitude 280 51'-59.3" longitude
360 38'00.2" latitude 280 52'-21.3" longitude
the area between line composed of above points and the coast

d. Sarsala Bay

360 39'56.5" latitude 28051'32.5" longitude
360 39'33.0" latitude 280 51'28.1" longitude
the area between line composed of above points and the coast

e. Sıralıbük Bay

360 40'47.7" latitude 280 51'55.5" longitude
360 40'27.9" latitude 280 51'57.1" longitude

It is forbidden achoring in the area between line composed of above points and the coast. However existing wharfs, bunds, moors and eyebolts can be used for anchoring.

f. Yassıca Islands and Zeytinli Island

36042'44.0" latitude 280 55'57.1" longitude
360 42'32.9" latitude 280 55'46.9" longitude
360 42'00.2" latitude 280 55'28.3" longitude
360 41'34.9" latitude 280 55'34.4" longitude
360 41'51.6" latitude 280 55'58.9" longitude
360 42'39.8" latitude 280 56'07.7" longitude

It is forbidden achoring in the area which coordinast are given above. Mooring is allowed between moors and eyebolts. However, In Yassıca Island's Dil Burnu;

36042'39.6" latitude 280 56'03.2" longitude,
36042'38.4" latitude 280 56'01.9" longitude
36042'37.5" latitude 280 56'01.1" longitude,
36042'35.7" latitude 280 56'01.0" longitude

In above coordinated areas daily tour boats between 10:00 and 20:00 can moor to moors and eyebolts and other ships except daily tour boats can moor between 20:00 and 10:00

Rules to benefit from Göcek Gulf and Göcek-Dalaman Bays

Article 9- The rules to benefit from Göcek Gulf and Göcek-Dalaman Bays are as follows:

a. In the bays of Göcek and Dalaman, ships as much as the number of moorings can be located.
b. In the bays of Göcek and Dalaman, it is forbidden to tie ships to trees. Ships are tied to wharfs, bunds, eyebolts and moor-buoys wherever they exist. If there is no moors in the water, ships can only moor in mooring points in the terrestrial areas.
c. In Göcek - Dalaman Bays, daily tour boats can enter into Resting Points for Yachts, the Göcek Gulf, the southern part of Göcek Island, Zeytinli Island and Domuz Island, the western part of Yassıca Island, bays of Sarsala, Taşyaka, Boynuzbükü, Atbükü, Günlüklü, Kargılı, Kille, Merdivenli, Kurşunlu, Uzunali and Tersane Island Yaz Limanı bays between 10.00 and 20.00 hours. It is forbidden that Daily tour boats enter into Göcek-Dalaman Bays except for bays where there exist coastal structures and bays mentioned at this article. However entrance of Daily tour boats into the Resting Points for Yachts is always allowed.
d. It is compulsory that solid wastes are disposed to containers located in Kille Bay, yacht breakpoints and Sarsala Bays are waste disposal points. Solid wastes cannot be disposed anywhere apart these points.
e) Ships can be moored in a bay for maximum 3 days at once in Göcek - Dalaman Bays. Their maximum stay in all bays can not exceed 11 days. After this time they have to leave their place.

e. Within Göcek Gulf and Göcek – Dalaman bays, maximum speed limit is 6 miles for any kind of ships except except ships taking pilot service
f. In Göcek Dalaman Bays within the framework of" Regulation on Sportive Activities for Tourism Purposes" water sport activities can be done by having necessary permissions from relevant institutions

Preventing of Göcek Gulf and Göcek-Dalaman Bays' use apart from the purpose

Article 10- For preventin of use of bays within Göcek-Dalaman Bays apart from the purpose,

a. Within Göcek Gulf and Göcek-Dalaman Bays, it is strictly forbidden transfer of petrol and other harmful substances from ship to ship except for needs of navigation, life, goods and environmental security and solid wastes collection activities
b. Ship and water crafts except which have registered as yacht (private, merchant and other), excursion snip, boat, mooring boat, amateur fishing boat, waste collection ship, patrol boat, fireboat, diving boat, guide boat, search and rescue boat, sunken remove ships, scum collection plant, scientific research/analysis boat are forbidden to enter into Göcek Gulf and Göcek-Dalaman if there is no emergincies.
c. Entering into aforesaid areas for any activity necessarily of forbidden ship and water crafts is amenable to temporary private permission to be got from Port Authority.
d. Entrance of forbidden ships and water crafts in case of emergency situation into said areas are subject to having necessary temporary permission from Göcek Port Authority

Control in Göcek Gulf and Göcek-Dalaman Bays

Article 11- Authority for controlling and coordination of implementation of theses conservation and use principles is belong to Muğla Provincial Governorship

Control of implementation of these conservation and use principles is conducted by a commission composed of Environmental Protection Agency for Special Areas, Undersecretariat of Maritime Affairs, Directorate of İzmir Region, Göcek Port Authority, Muğla Environment and Forestry Directorate, Turkish Coast Guard Command, IMEAK the Chamber of Sea Commerce, Muğla Provincial Governorship and representatives of other relevant institutions regarded as necessary.

Penal Sanctions

Article 12- When not obeyed to conservation and use principles, relevant legislative rules are executed according to administrative and penal fines

Other Provisions

Article 13- In accordance with Harbors Law, Port Authority is entitled to put temporary orders in line with the restriction in the Göcek Gulf and Göcek-Dalaman Bays in order to provide security of navigation, life, goods and environmental values. In case of a permanent arrangement is demanded by Port Authority, the opinion of the Agency is taken.

Execution

Article 14- The Ministry, Agency and Muğla Provincial Governorship execute these conservation and use principles.

Enforcement

Article 15- These conservation and use principles put into force on the date of 04th May 2010.

Ministry of Environment and Urbanization
General Directorate for Protection of Natural Assets (GDPNA)
Alparslan Türkeş Cad. 31. Sok. No.10 06510 Beştepe/Yenimahalle/Ankara
Tel: +90 312 222 12 34 Fax: +90 312 222 26 61
http://www.csb.gov.tr/gm/tabiat

United Nations Development Programme (UNDP)
Birlik Mahallesi 415. Cadde No. 11 06610 Çankaya/Ankara
Tel: +90 312 454 1100 Fax: +90 312 496 1463
www.undp.org.tr
Empowered Lives. Resilient Nations.