Environ Geol (2008) 55:681–686
DOI 10.1007/s00254-007-1018-x

ORIGINAL ARTICLE

Evaluation of ecotourism potential in the northern coastline of the Persian Gulf

Jafar Nouri · Afshin Danehkar · Rozita Sharifipour

Received: 15 July 2007 / Accepted: 21 August 2007 / Published online: 12 September 2007

Abstract This research has identified areas located in the northern coastline of the Persian Gulf in the south of Iran, as strategic and ecological sites, based on tourism potential assessing criteria. To this end coastal limits were identified by satellite imagery in terms of shorelines and the maximum extent of water approach into the land and taking into consideration the characteristics of the nearby coastal villages. The studied region was then compared to similar international criteria and experiences. The original criteria were then divided into three main and four sub criteria. The Kangan region was found to have a potential for tourism industry according to the mentioned criteria. Naiband Gulf with a score of 20 was ranked first followed by Asalouyeh with a score of 18 and finally Taheri and Kangan Ports with scores of 16 and 15, respectively. With a high tourism industry potential in the studied region the necessity of ecotourism quality enhancement and environmental management planning for the northern shoreline of the Persian Gulf becomes of vital importance.

J. Nouri (✉)
Department of Environmental Health Engineering,
School of Public Health,
Medical Sciences/University of Tehran, Tehran, Iran
e-mail: jnouri@tums.ac.ir

A. Danehkar
Department of Fisheries and Environmental Sciences,
Faculty of Natural Resources,
University of Tehran, Karadj, Iran

R. Sharifipour
Department of Environmental Management,
Graduate School of Environment and Energy,
Science and Research Campus, IAU, Tehran, Iran

Keywords Sustainable tourism · Ecology criteria · Coastal area · Bushehr · Persian Gulf

Introduction

Parallel to the concept of sustainable development, many studies have highlighted sustainable tourism development, including: Nash and Butler (1990), Jarvilouma (1992), Cater (1993), Stewart and Sekartjakrarini (1994), Driml and Common (1996), Weaver (1991, 1993, 1999, 2005), Davenport and Davenport (2006) and Nouri and Malmasi (2004). Sixty three percent of European holiday takers prefer seaside areas (EC 1998). Worldwide the number of international arrivals has shown a steady increase from 25 million in 1950 to over 700 million in 2002, corresponding to an average annual growth rate of 6.6%. It is estimated that by 2020 there will be 350 million tourists visiting the Mediterranean coastal region alone (WTO 2004). This substantially underestimates the total extent of tourism, as it does not include long and short distance tourism within countries (Burger 2002). In the past few decades, there has been a substantial growth in coastal ecotourism, as tourists have demanded access to wildlife in as non-destructive fashion as possible. Whale and dolphin watching, coastal estuarine, lagoon bird watching and glass-bottom boat excursions have become increasingly popular. Dolphin populations attract considerable interest from both local residents and tourists alike. This interest can contribute significantly to local economies (Mciwem 2006).

Increasing demands of tourism creates problems in the natural environment, but, by establishing tourism parks and applying efficient management practices in these areas, the biodiversity of the natural environment should be able to protected, whilst attracting more tourists (Font and Tribe

Fig. 1 The position of the Kangan region in Bushehr province of Iran

1999). The coastal region contains diverse and unique resources as well as eco-systems that play an important role in biological and economic productivity, functioning as an ecotone; a transition protective area between the land and the sea (Clark 1983). Approximately 60% of the world's population lives within 60 km of the coast. This percentage is rapidly increasing due to the advantages coastal areas offer for a variety of activities such as tourism, fishing and sea transport activities (Sorensen and McCreary 1990). However, the co-existence of coastal eco-systems and human activities along the coastline inevitably results in a competition for resources and environmental degradation through the negative impact on the economic and social value of the coastal areas (Camhis and Coccossis 1982). Tourism is a major worldwide industry and is expected to be the single largest economic activity of the twenty-first century. A large number of tourists are attracted to coastal areas seeking sea air, beaches, sun, sea food and scenic views (Davenport and Davenport 2006), affecting coastal area's resources and eco-systems, directly and indirectly (e.g. loss of wetlands and dunes, coastal erosion, etc.). In this context, the waste generated from tourism is a major source of environmental pollution in many coastal communities (Madan and Rawat 2000). The dichotomy of pollution and tourism is the existence of strong mechanisms affecting, eventually, tourism itself as an activity, since environmental quality is an important prerequisite to attract tourists (Coccossis 1996). Considering, in particular, the marine coastal environment, one of the major related environmental problems is "eutrophication" resulting from nutrient (nitrogen and phosphorous) inflow into the sea due to domestic sewage, as well as, industrial and agricultural activities (Capobianco 1999). The impact of industrial activities on the coastal zone can occur both locally and remotely and are of extremely significance. The oil and gas industries are considered as the main sources of pollution and supply of pollutants into the sea coastal zone.

Iran's 2,250 km coastline along the Persian Gulf and the Sea of Oman (Pak and Farajzadeh 2007) possesses beautiful landscapes of Mangrove forests, dunes, coral reefs, creeks, as well as, a large variety of sea birds. It has a large potential for people that choose this area for recreation and leisure. However, their existence suffers from various types of problems. The development of the Persian Gulf coastal area, in the past decades, has been mainly based on its large oil and gas reserves.

Materials and methods

The Kangan region, with an area of 1,206 km^2, is located in the southern portion of the province of Bushehr. It lies between 27°, 14′ and 30°, 16′ north latitude and between 50°, 6′ and 52°, 58′ east longitude. It is bordered to the north by Daeer, to the east and west by the Jam region and to the south by the Persian Gulf (Fig. 1).

Based on the Interior Ministry's 2005 administrative divisions, the Kangan region consists of two central districts and Asalouyeh, four rural areas (Kangan, Taheri, Asalouyeh and Naiband) and four municipalities.

Topographically, the highest elevation is found in the eastern part of this region. Kachour mountain, with an altitude of 1,603 m, divides the Kangan and Jam region. The boundaries of the region under study were approved by the Planning and Management Organization in 2004 and were determined on the basis of the Integrated Coastal Zone Management (ICZM) plan of 2005. Based on this study, the region includes some shoreline whose limits are determined by the extent of sea approach into land, referred to as the set back line (Fig. 2). The set back line is that part of the coastal land that becomes covered by seawater during stormy and windy conditions and is therefore, unstable. Sandy hills and vegetation can be found in this area and can be identified by satellite images (ETM).

The sea borders of this region were determined to coincide with water depths of 10 m, whilst the outer limits of the coastal villages were determined to be the upper borders of this region.

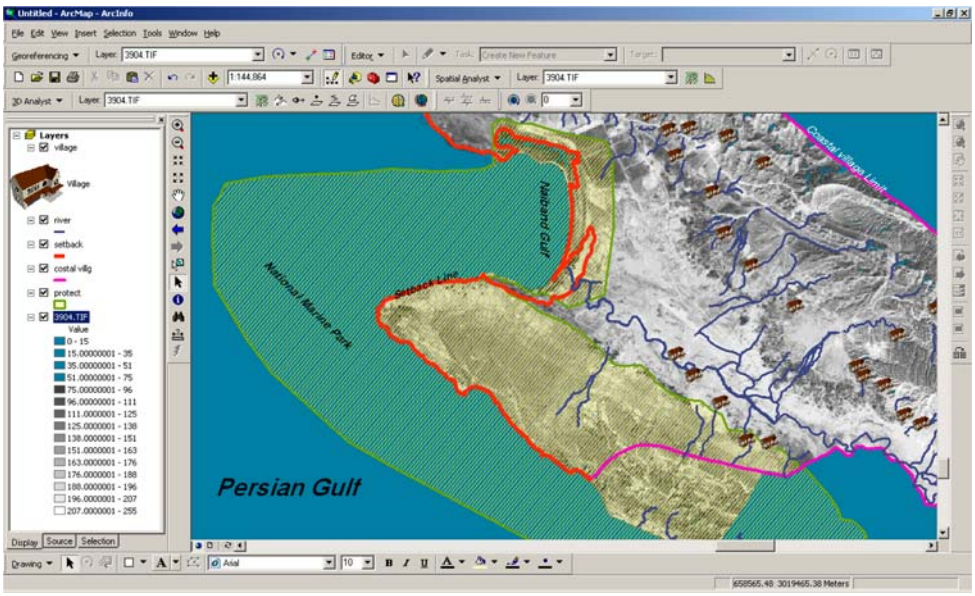

Fig. 2 The borders of the studied region on the satellite image

Criteria for prioritizing the shore of the Kangan region were selected with respect to the related criteria used throughout the world and to their correspondence with regional conditions and quantification of any given criterion. Therefore, three main criteria were defined, of which, two represent tourism development potential, whilst the third reflects limitation of development potential, and for the prioritization of the coastal villages of Kangan (Table 1) four sub-criteria were chosen, of which 50% consisted of ecological factors and 50% humanistic factors. Then, according to a weighted scoring method (WSM) each criterion was given a quantitative value. This method allows quantitative comparison of neighboring similar regions and has been used in Iran by department of environment, used five main groups of numerical criteria in a project to protect wetlands, in this project; each main criterion was categorized and divided into several sub criteria. Sub criteria scores ranged from 0 to 5 and main criteria scores from 0 to 25. FAO also used numerical criteria ranging from 0 to 15 for each criterion in an informational model that was offered for evaluation of generic erosion quantity (FAO 1996).

Results

In this research criterion scoring was carried out in five categories: each criterion received a numerical value within its variation range and presence in the region at three to four determined levels. Prepared criteria varied in scores between 5 and 30 and the required score range was thus determined for prioritization of the different regions.

Protection antecedents of a region are a strong reinforcement for desired management of the region and quality enhancement of its ecological values. Moreover the presence of each protected region reflects its high value which itself is an important factor for attracting tourists. This criterion was evaluated at national and international levels with a maximum score of 5 (Table 2).

Table 1 The main and sub-criteria for prioritization of suitable regions for tourism development

No.	Main criteria	Sub-criteria	Min. scores	Max. scores	Criterion type	Percentage of total scores (%)
1	Protection antecedent (opportunity)	–	1	5	Ecological	50
2	Recreation (opportunity)	Recreation resource	1	5		
3		Aesthetics	1	5		
4		Tourism facilities	1	5	Humanistic	50
5		Historical and cultural reminiscence	0	5		
6	Risk factors (limitation)	–	1	5		
Sum	3	4	5	30	–	100

Table 2 Scoring of parameters related to protection antecedent criterion

Criteria	Characteristic	Score
Protection antecedent	The region has a national and international character	5
	The region has one of the national protection characters	4[a]
	The region has just international character	3
	The region lacks any protection character	1

[a] In Iran national protected areas have the legal support of the Department of Environment. Therefore, national protected areas are more important than international protected areas

Recreation criteria received a maximum score of 20, of which the ecological group received 10 and the human criteria group 10. This criterion was then tabulated into five sections: recreational assets, tourism facilities, substructures, aesthetic principals and historical artifacts (Tables 3, 4, 5, 6). The importance of each criterion was then scored on the basis of its variability.

Recreational assets:

(1) Water: sea, lake, river, wetland, creek, estuary
(2) Forest
(3) Wildlife: hunting, zoo's, habitat's, feeding or egg laying areas
(4) Shore

Tourism facilities:

(1) Roads
(2) Electricity power grids
(3) Water supply pipelines
(4) Communications
(5) Hospitals, clinics
(6) Docks and ports
(7) Settlements

Aesthetic principles:

Aesthetic criteria were classified on the basis of influencing factors respecting natural factors of the region which have different effects at various times of the day and year.

Historical artifacts criteria were classified on the basis of number of these reminiscences in the region.

Risk factor criteria were considered as shore region limitation for tourism development. An increase of risk factor decreases uniformity values, originality, fertility, potential bio-diversity and animal life. The higher these factors the lower the scores will be for shore tourism regions. Therefore, scoring of these criteria was carried out by risk factor diversity, which affects the higher risk factors intensity (Table 7).

Table 3 Scoring parameters related to recreational criteria importance

Criteria	Characteristic	Score
Recreational importance	High: shore has more than three recreational assets	5
	Medium: shore has two–three recreational assets	3
	Low: shore has just one recreational asset	1

Table 4 Scoring parameters related to tourism facilities criteria

Criteria	Characteristic	Score
Tourism facilities	Shore has five–seven tourism facilities	5
	Shore has three–four tourism facilities	3
	Shore has less than three tourism facilities	1

Table 5 Scoring parameters related to aesthetic criteria

Criteria	Characteristic	Score
Aesthetic	Shore has valuable landscape	5
	Shore has moderate landscape	3
	Shore has low landscape	1

Table 6 Scoring parameters related to historical artifacts criteria

Criteria	Characteristic	Score
Historical artifacts	The region lacks any historical artifacts	0
	The region has one historical artifact	1
	The region has one–three historical artifacts	3
	The region has more than three historical artifacts	5

Table 7 Scoring parameters related to risk factors

Criteria	Characteristic	Score
Risk factors	Coastal area has more than two risk factors	1
	Coastal area has one–two risk factors	3
	Coastal area has not any risk factors	5

The coastal area is subjected to industrial development and contamination risks, the spread of petroleum materials, the risk of agricultural contamination such as toxin residues and organic matters and residential contaminants and waste disposal.

The studied region was divided into four shore parts on the basis of village borders: The Kangan portion's opportunities for tourism development had five villages with electrical supply, roads, fisheries, commercial ports, nearness to the Bardestan creeks, marine bird habitats, mangrove forests and sandy mud shores. Limitations for tourism development were lack of water supply pipelines, communications, hospitals and clinics, cultural and historical construction, nearness to the Kave methanol plant at the Daeer Port and agricultural and residential pollution.

The Taheri portion opportunities include 16 villages, of which, four have water supply pipelines, eight have electrical supply powerlines, three have hospitals and clinics, and two have communication centers. There are roads, the Tombak and Taheri creeks, marine bird habitats, coral reefs, sea grass, marine algae and fisheries ports.

Limitations on the other hand include lack of suitable tourist infrastructures in most of the villages, agricultural and residential contamination and nearness to Asalouyeh's petrochemical refinery complex.

The Asalouyeh portion opportunities include 13 villages, of which, five have water supply systems, seven have electrical supply power lines, four have hospitals or clinics and three have communication centers. The shore type is sandy beaches and there are marine bird habitats, sea grass, marine algae, mangrove forests, fisheries, commercial ports, the Pardis hotel apartments, Bidkhou creek, marine mammals such as dolphin, turtle habitats or egg laying sites, coral reefs and the Naiband national marine park.

Limitations include a military base, refinery complex, petrochemical complex, an oil port terminal, oil and gas contamination, agricultural and residential pollution.

Opportunities in the Naiband Gulf portion include 22 villages, of which, 14 have water supply piping, 13 have electrical power supply lines, 7 have hospitals or clinics, 8 have communication centers. In addition there is an airport and the Haleh and Basatin creeks. The shore types are rocky, sandy and muddy; there are marine mammals such as dolphins, turtle habitats or egg laying sites, coral reefs and the National Marine Park.

Limitations include a military base, oil refinery and petrochemical complexes, oil port terminal, oil and gas contamination and agricultural and residential pollution.

Discussion and conclusion

Image processing of either aerial photographs or geographic international systems represents a valuable technique as it combines a great impartiality of interpretation with a rapid time of analysis while at the same time allowing vast areas to be examined. These characteristics contribute to increasing the precision of interpretation (Kelly 1980; Pasqualini et al. 1997). Also, image processing has been successfully used to identify a number of elements causing forest decline, tourism facilities such as roads, settlements and some risk factor such as industrial, waste input. The studied units had different scores. Naiband Gulf, with a score of 20, showed maximum tourism potential, followed by Asalouyeh, with a score of 18. Taheri port and Kangan had scores of 16 and 15, respectively (Table 8).

Naiband Gulf is the most beautiful coastal zone on all of the Persian Gulf shoreline. The remaining traces from historical Naiband port on Naiband cape indicate the old historical antecedent of the region. This port was an important center for fishing and pearl trading in the Persian Gulf in the Ale-Bouyeh period. Naiband National Marine Park, with an extent of 22,500 ha, is located on the southern coast of Naiband Gulf on a high cape. It has been a protected area since 1978 and a national marine park since 2004. This region hosts an incomparable collection of plants and animals, and it's various rocky, sandy and coral reef habitats constitute an attractive ecosystem. However, because of nearness to the South Pars project and Asalouyeh airport, it is under threat of degradation. The next region, with a score of 18, is Asalouyeh, which, despite having a valuable ecosystem, is downgraded as a potential site for ecotourism because of its many oil and gas projects. Some of the potential damage arising from these projects that could decrease tourism development potential in the absence of principled management will be:

Table 8 Prioritize of coastal villages of Kangan region with purpose of tourism development

Criteria	Unit 1 Kangan	Unit 2 Taheri	Unit 3 Asalouyeh	Unit 4 Naiband
Protection antecedents	1	1	5	5
Recreation resources	5	5	5	5
Aesthetics	3	3	3	5
Tourism facilities	3	3	3	3
Historical artifacts	0	1	1	1
Risk factors	3	3	1	1
Sum	15	16	18	20

1. Degradation of Naiband National Marine Park and mangrove forests.
2. Loss of fauna, such as turtles, dolphins, birds and other marine animals.
3. Increasing waste production and, as a result, hygienic and environmental problems.
4. Increasing air pollution, with its undesirable effects on the health of individuals.
5. Increasing coastal water pollution, with its negative impacts on the residents of the region and reduction of tourism development potential.

Where environment is particularly vulnerable or valuable, access might be prohibited at least to sanctuary areas that are large enough to be biologically meaningful and sustainable. Environmental impact assessment is a major development tool that has long been expected to deliver a more rational approach to development (US NEPA 1969), including that of coastal tourism. Unfortunately, as pointed out for Iran by Pak and Farajzadeh (2007) in one of their seminar reviews, the scientific quality of coastal tourism related EIA exercises is extraordinarily low, even in developed countries, largely because they are rarely subject to effective peer review and severely constrained by time and funding.

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