

Full Length Research Paper

Eco-tourism necessity to preserve and maintain endangered species: A case study of mugger crocodile

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The geographical study of Iran and the feasibility study of tourism attractions in the country indicated that "eco-tourism" is an apt and unique, but neglected economic resource. Protection of habitation areas is one of the main bases of eco-tourism. In the present research, we investigated the role of eco-tourism to preserve and maintain an animal on the verge of extinction [the mugger crocodile (*Crocodylus palustris*)]. It is hoped that the Iranian and global environment authorities take the issue into consideration to strive for the preservation of this unique species. This research aims at the development and application of the endangered species in eco-tourism and is based upon deep interviews with the local environment authorities and fields visits. The results indicated that Bahukalat (Gando) protected area, which enjoys national and international attractions, such as the mugger crocodile (*C. palustris*), Oman sea coast and Gwadar Bay and regional attractions like Bahukalat river, specific customs, local foods and handicrafts, has major importance in regard to tourism development, specially eco-tourism.

Key words: Bahukalat (Gando) protected area, endangered species, the mugger crocodile, tourism, eco-tourism.

INTRODUCTION

The increasing population along with the concomitants of industrial life has deepened the human's yearning for the recreational resorts that have beautiful natural sceneries to remove the wariness of machine life and ameliorate the spirit. Living in jungles, the primitive man chased its prey in precipices and valleys and provided his/her needs there. Besides, in rain and storm, he was sheltered under trees or in caves without needing to wear anything. However, overtime he distanced from nature, gaining an easier life that sometimes led to destruction of the nature (Malekan, 1999: 98). The study is aimed to conserve and protect endangered species by developing and expanding eco-tourism in the area. This objective can be achieved by training local communities since they can either act as guiders for tourist or learn themselves how to treat the animals.

Theoretical framework

The term eco-tourism was first used in 1983 by Hector Larcson to define a trip to virgin areas with the purpose of surfing the nature, emphasizing the educational aspects of such a trip. Eco-tourism is a responsible environmental trip to relatively intact areas, aiming at enjoying the nature (and all the cultural phenomena that comes with it in the past and present). This leads to the empowerment of nature preservation and has little by-products, leading to the activation of the local communities which is socially and economically beneficial for them (Asgharzadeh, 2008: 90).

For the sake of sustainable development considerations, some lands on earth must remain intact as protected areas (Majnoonian, 1998: 18 - 76). Since the natural environment has limited ecological power for man's use and natural eco-systems are considered as environmental options for human, their preservation for the future generations is necessary (Bayat, 1988: 170).

Developing eco-tourism in this area is essential, because

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the area and its rare species, which Gando is the most important of them, is unknown for international tourists and even for domestic tourists of Iran. Therefore, developing eco-tourism and introducing natural potentials of the region can be the only factors proposing this forgotten area to the tourists. This may help to deploy protectional centers in the area and spend the incomes coming from eco-tourism to protect the region and its sustainable development (Safaei, 1991).

Few researches have been conducted about the effect of eco-tourism on the protected areas of Iran. From among the few researches, Asgharzadeh (2008) is the person that investigated the effect of eco-tourism on the Sisangan forest reserve in three zones: zones without pressure, zone with middle pressure and high pressure zones. This 570 acre forest reserve is located in 30 km East of Nowshahr.

METHODOLOGY

This research aims at the development and application of the endangered species in eco-tourism, and is based upon deep interviews with the local environment authorities and field visits. Data and results presented in this paper are gleaned from literature, studies and field work carried out during extensive surveys conducted in the Southern tip of Iran (Baluchistan) during the period 2010 and 2011.

Since the study is qualitative, the information to analyze the region, its native population and its area are necessary for the researchers. This information was collected by questionnaires that relate to the influenced area, and is analyzed based on field studies.

Mugger crocodile in the Bahukalat (Gando) protected area

The area under study (Bahukalat) is located in the South-eastern of Chabahar township in Sistan and Baluchistan province. The area is at longitude 61° 28' 12" E and latitude 25° 42' 0" N. The area is located in the South-eastern corner of Iran, alongside the borderlines of Iran and Pakistan. It composed of droughty and desert mountains which spread up to the Sarbaz river in Baluchistan. The area is the habitat of the Iranian peculiar marsh crocodile (Gando) which lives in shallow ponds along the river line. In droughty occasions, the animal borrows some meters and lives in it. If the Organization of Environment did not take timely protection measures, these crocodiles could be extinct. The specific conditions of the river, also, provides life requirements for a kind of fish called Gol-khor (scientifically called *Perio Phthalinuse*) which can live in shallow waters and muddy bed of river. Bahukalat area borders Pakistan to the East and Oman sea to the South. Because of proximity to Oman Sea, its altitude varies from 0 to 50 m as far to the Northern and Western heights. Bahukalat river, as the most important and watery river of the area, passes the area in the center from North to South. The river originates from the Sarbaz heights in the North and a river with the same name. After conjoining different effluents from East and West, the river passes through the center of Bahukalat and at the end yields to Oman sea at Gwadar bay. Most rural domiciles can be seen alongside the river line in the area (Typographical map and field study, 2010). The coast line of Oman sea, which is the Southern border of the area, is the winter quarter of aquatic birds and, also, is the main place for green turtle to lay eggs (Zendehdel and Hakimian, 2001).

Bahukalat (Gando) protected area consists of isolated small mountains. This protected area is the habitat mugger crocodile (*Crocodylus palustris*) which is peculiar to Iran and live in shallow ponds of river line. The area is a suitable habitat for mammals like hyena, jackal, Baluch squirrel, etc. Also, amphibians and aquatics, such as mugger crocodile (*C. palustris*), green turtle, carp fish, etc., and birds like francolin, Baluch noctivagant, purple sunbird, Baluch sparrow, desert eagle and many other birds which are indigenous to the Indian semi-continent can be seen. But the area's importance is due to its mugger crocodile (*C. palustris*). This crocodile stays behind the crocodiles that belonged to Mesozoic Age or about 225 to 265 million years ago. The animal bore no changes in its appearance over the past 65 million years. Mugger crocodile (*C. palustris*) has a flat snout with 19 teeth in upper and 15 in lower jaw. Its leg is very short with 5 fingers and long nails. Its color is brownish olive. The biggest one can be as long as 5 m. But, normally, its length is about 2 m and resides all over the Bahukalat plain and Sarbaz river (Ebrahimzadeh, 2006: 148). Sarbaz and Kaju rivers are the main habitat of the animal in Bahukalat area. Local people call it Gando. Gando is very shy, precautious and timid and can hardly be seen. It is smart and clever. So, as it feels any danger or if there is any bother presence, it dives into water and hides. But it must quickly come out to breathe. It searches for food at nights. Fish as well as birds and mammals around the river are the main nutriment of crocodiles (www.iranchto.ir).

Mugger or Marsh crocodile is a division of a large population. The mugger crocodile ranges from the Western of Pakistan to India and Bangladesh and includes Myanmar as well. It becomes more active in autumn, winter and at the beginning of spring and may remain so until Ordibehesht (May) if there is enough rainfall. In months when the weather is not hot, Gando swims over the ponds or sunbathes at the marshy riversides, but in summer when the temperature rises to 49°C in some areas, it sinks into the mud of the marsh. According to an old belief of the people of Baluchistan, Gando is considered as a sacred and lucky animal. They believe that if there is Gando, there is water. This belief plays a vital role in protecting Gando (Mostafazadeh and Abbasi, 2009: 28). If the Organization of Environment did not take timely protection measures, these crocodiles could be extinct.

Distribution of mugger crocodile (*C. palustris*)

The mugger crocodile (*C. palustris*) can be found in India, Bangladesh, Sri Lanka, Pakistan, Nepal, the Southern tip of Iran and probably in Indo-China and at one point, even in Southern Iraq (Figure 1). The mugger is the only crocodilian found in Iran and Pakistan. This crocodile is the most common and widespread of the three species of crocodiles in India, far out numbering of the much larger saltwater crocodile within the country (and most likely within neighboring countries) (Andrews, 1986).

In the 1980s, the largest population of wild crocodiles in Tamil Nadu, South India lived in the Amaravathi Reservoir, and in the Chinnar, Thennar and Pambar rivers that drain into it. Their total population here was estimated to be 60 adults and 37 sub-adults. The Amaravati Sagar crocodile farm, established in 1975, is the largest crocodile nursery in India. Eggs are collected from wild nests along the perimeter of the reservoir to be hatched and reared at the farm. There were up to 430 animals maintained in captivity at one time. Hundreds of adult crocodiles have been reintroduced from here into the wild. The estimated population in Pakistan is between 400 to 450 animals found in the coastal areas and rivers of Sindh and Baluchistan. The estimated number of animals in Sindh is 160, while in Baluchistan, the estimated number is 64, while only 24 were seen there, sources in the Sindh Wildlife Department said, requesting anonymity (Andrews, 1986).

On the Iranian Makran coast, above Chabahar are found around 200 mugger crocodiles. They are indigenous to the Sarbaz river,

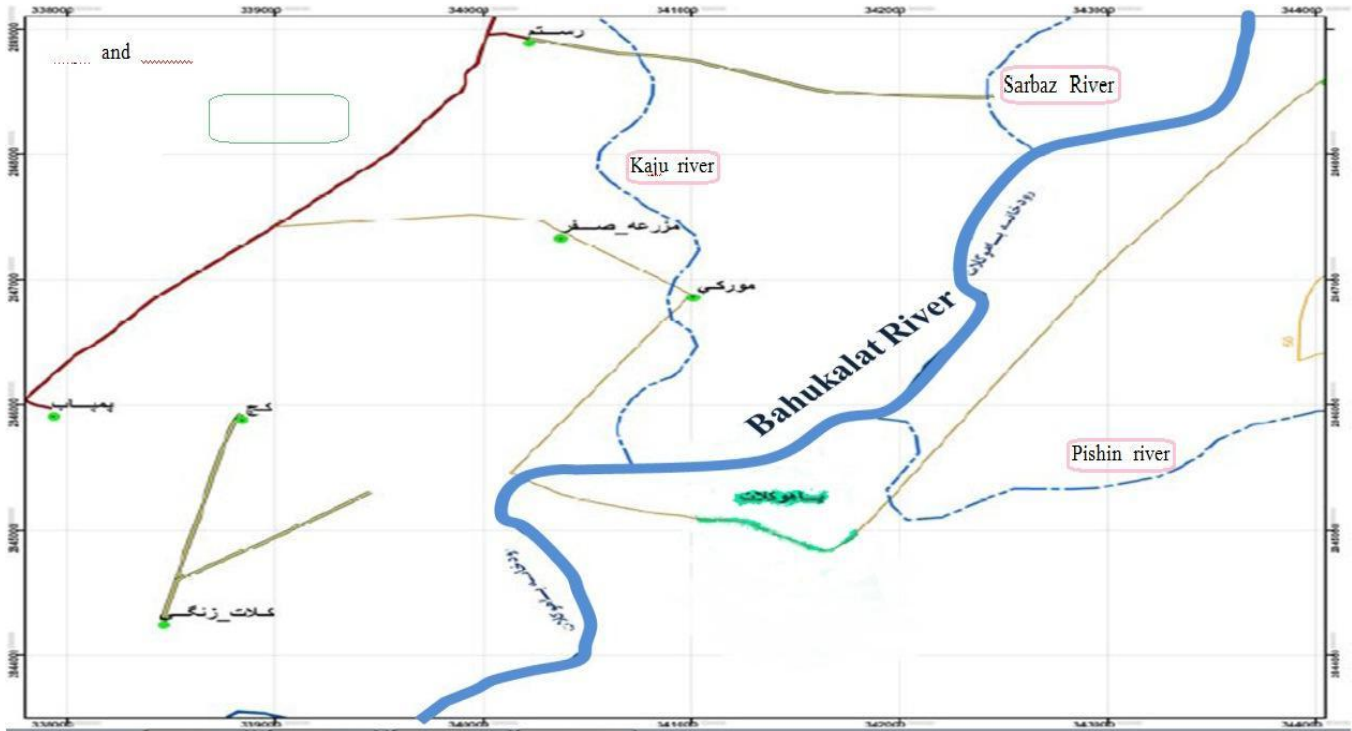


Figure 1. The Sarbaz River, Bahu Kalat River, Kaju river and Pishin river

bahukalat river, Kaju and Pishin river basins in Baluchistan province (Figure 2). Due to human activities and that long drought of the late 1990s and early 2000s, the mugger has been pushed to the brink of extinction over the past few years. Following several tropical cyclones, such as the Cyclone Gonu and Cyclone Yamyn in 2007 and Cyclone Phet in 2010, much of the habitat of the Iranian mugger crocodiles has been restored as the dry lakes and humuns have been flooded, once again. The animal is known as Gando in the local Iranian vernaculars.

Habitat, mainly a freshwater species, such as the mugger crocodile is found in lakes, rivers and marshes. Muggers prefer slow-moving, shallower bodies of water rather than, fast-flowing, deep areas. Also known to thrive in man-made reservoirs and irrigation canals. Although, it prefers freshwater, it has some tolerance to saltwater, therefore, is occasionally reported from saltwater lagoons. It is sympatric with the gharial (*Gavialis gangeticus*) in some areas of India and with the saltwater crocodile (*Crocodylus porosus*) in other areas, but separated by habitat most of the time. It is adapted to terrestrial life like its cousin, the Cuban crocodile, more than most crocodylians, but is ecologically most similar to the African Nile crocodile. It is known to be more mobile on land, can migrate considerable distances over land in search of a more suitable habitat. It can chase prey on land for short distances. They are also known to dig burrows as shelters during the dry seasons (Andrews, 1986).

Bahukalat river

This river is one of the most watery rivers of the province. It is the main factor for life and habitation in the Eastern area of Baluchistan. The river unifies all the waters of a vast area of eastern part of Iranshahr and Chabahar township and navigates to Oman sea. Bahukalat river navigates to Oman sea at Govatr bay,

90 km in the far East of Chabahar (Figure 3). The river is important for tourism purposes because of the habitation of the Iranian crocodile. In comparison with other aquatic ecosystems, bio-environmental conditions in this river enjoy lower constancy and stability, so, it can be said that aquatic habitat is mixed with land habitat. These remarks are true for shallow and temporary ponds along the rivers of the area. In this habitat, where sometimes animals live without water for months, the animals whose life is dependent on water have surprisingly adapted themselves to the environmental conditions.

RESULTS AND DISCUSSION

Measure of influenced area of Bahukalat (Gando) protected area

Determining the influenced area was done on two levels as operational and services (Ebrahimzadeh, 2006). The operational and attraction influenced tourism area (scope of the area), can be defined as: the area which citizens and tourists from different areas come for tourism activities. For demarcating and determining the influenced tourism area, 10 indicators were studied. A score and coefficient were assigned to each indicator according to its significance among all 10 indicators. The sum total of significance coefficients of all the indicators was 1. Regarding the significance of an indicator, certain value was specified. Score value of each indicator was 1 to 5 (karami and modiri, 2011: 68). Scoring line is as shown in

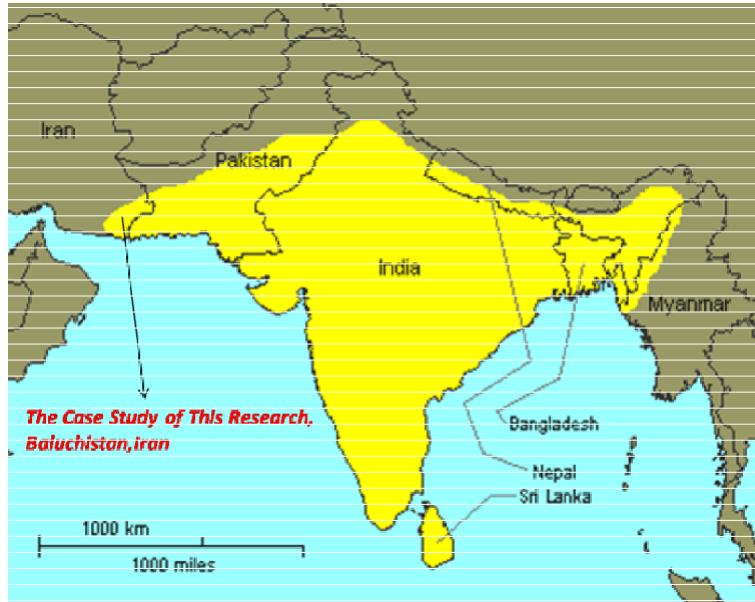


Figure 2. Distribution of mugger crocodile (*Crocodylus palustris*)



Figure 3. Landscape of Bahukalat River (in the Bahukalat (Gando) protected Area)

Table 1. Score value of each indicator.

Very high	5
High	4
Average	3
Low	2
Very low	1

Table 1. Scoring of the indicators was done by the expert and proficient group of the project. After receiving the scores of the expert and proficient party, the average

value of the scores was put on the final table on which the score product and significance coefficient of each indicator was the final point of the indicator. Then, the final score of an area was achieved by adding these points.

Accordingly, to determine the operational influenced area, 4 levels were studied as follow:

1. International level.
2. National level (according to the assessments earlier discussed, the area was categorized in this level).
3. Regional (Province) level
4. Local level.

It should be noted that the final score of an area could be

Table 2. Final score estimation and determination of the operational influenced area for Bahukalat (Gando) protected area.

Indicator	Score	Coefficient	Result
Degree of attraction and visual value	4	0.14	0.56
Peculiarity of presentable tourism and recreative product	5	0.12	0.6
Accessibility	4	0.1	0.4
Area at hand to participate and develop	3	0.11	0.33
Neighboring to the other attractions	3	0.1	0.3
Situation of the area in relation to the population and service centers	3	0.075	0.225
Current demand level	4	0.12	0.48
Situation of the spot in relation to the origin of the tourist	3	0.1	0.3
Enthusiasm of the local people and the degree of their tendency to cooperate in the area development	3	0.06	0.18
Degree of the facilities and equipments of the spot	2	0.075	0.15
Total scores	34	1	3.525

a number between 0 and 5. After carrying out the surveys, the final result for level specification of the areas is as follow:

1. International tourism area: is an area which, at least, met 80% of the final scores of the indicators (4 to 5).
2. National tourism area: is an area that met 60 to 80% of the final scores of the indicators (3 to 4).
3. Regional tourism area: is an area that met 40 to 60% of final scores of the indicators (2 to 3).
4. Local tourism area: is an area that met 20 to 40% of final scores of the indicators (1 to 2).

It goes without saying that any area that met lower than 20% of the final scores of the indicators, is not worthy of visiting, investing and turning into a tourism area. Regarding the aforementioned preface, the process of determining the operational influenced area of Bahukalat (Gando) protected area is as follows: the aforementioned subjects are the most important categories stated about the assessment of the influence of the region. They were achieved by using Delphi's method (inquiries among the researches, local people and authorities). Infact, they have been weighed and ranked based on their essentiality in the framework of the cooperative planning.

According to the scores and coefficients assigned to Bahukalat area, its final score was 3.525. Regarding the aforementioned score-based system of the classification of influenced areas, Bahukalat, in terms of its operational and attraction influenced area, was placed on the level of national tourism areas. In order to determine the influenced area of a destination, different models and theories have been proposed with regard to the geographical position, roads and the way of using services. Yet, servicing and serviceability of the destinations, is a criterion which may be in play in all such models.

Field-study is one of the common methods. Based observations and information about the area in question,

the reference point and the place of receiving various services are marked and, then, designated as the direct influenced tourism area. The direct influenced area of Bahukalat (Gando) protected area is Dashtyari district. According to the census conducted in 2007 (Table 3), the population of the district stood at about 57813. Bahukalat tourism area is located in the Central district of the city of Chabahar. Table 2 shows its demographic characteristics. Bahukalat village is the closest populated area to this tourism area. Rural services are centralized in this village (cite of Iran's Statistical Center, 2010).

Present tourism condition of Bahukalat (Gando) protected area

At present, tourists that visit Bahukalat tourism area, mostly come from the province, particularly the adjacent regions. Since it does not cost much to visit the area, the visitors can be from any social classes with low, median and high income. If the development and marketing activities in this area are duly considered, it can absorb the out-provincial tourists as well. Also, Bahukalat river, farms and orchards, can attract tourists interested in nature, to the area. Being the habitat of a scarce species of mugger crocodile (*C. palustris*), Bahukalat (Gando) protected area can pave the way for attracting researchers, zoologists and people interested in wildlife. On the other hand, as there is a relatively watery river in Bahukalat area, aquatic recreations, such as boating and fishing are feasible (observing bio-environmental circum-spections). Specific architecture, traditions and the life style of the residents of Bahukalat village can also be interesting and attractive to tourists who are interested in interacting with the host peoples and getting acquainted with other cultures.

According to the political division, Bahukalat is one of the villages of Chabahar township. Based on the local

Table 3. Demographic characteristics of the closest populated area coordinated with the influenced area of Bahukalat (Census conducted in 2007).

Township	District	Closest population center	Family	Population	Male population	Female population	Literate population	Male literate population	Female literate population	Illiterate population	Male illiterate population	Female illiterate population
Chabahar	Dashtyari	-	11,196	57,813	329,44	028,37	724,21	14,706	9,511	24,242	9,962	14,280
Chabahar	Dashtyari	Bahukalat village	198	1,016	488	528	416	255	161	446	145	301

Source: Cite of Iran's Statistic Center

resources, ceramic relics and ancient coins, the village has an ancient record. The 300 year antiquity of Anushiravan fort in Sangan, is an evidence of the village inveteracy (Zendehtdel et al, 2008: 159). Ancient cemeteries, historical forts, monumental mosque of the village, etc., are also the evidence of the antiquity of the area.

Conclusion

The study indicates that Bahukalat (Gando) protected area is special and unique for the tourists and researches, mostly because it is a living place of an endangered species of Iranian crocodile. The area is also fraught with monumental and natural attractions which give diversification to the area. Some of its attractions like mugger crocodile (*C. palustris*) and Oman sea coast are to be considered at international level and some others at provincial level. The existence of such a scarce species in the area grants much importance to it and improves its tourism

attraction capability. Bahukalat (Gando) protected area, monumental attractions, orchards, palm groves, Pishin dam, Gwadar Bay and Oman sea are among the most important attractions of the area. These potentials afford favorable opportunities to attract different tourists to the area, because of the broadness of the area and the dispersion of its attractions, there is no any base for official domicile and no recreation or resting places scattered in the area for the tourists. Therefore, the tourists use domicile center of Chabahar township.

In principle, the most important capabilities and bottlenecks of Bahukalat (Gando) protected area are as follow (Ebrahimzadeh, 2006):

1. Capabilities

- Existence of the scarce species of mugger crocodile (*C. palustris*).
- Existence of the various natural and cultural attractions possessing attractions operating at international and national level capability of attracting different group of tourists.

- Accessibility to a suitable paved road.
 - Accessibility to water transportation and the airport.
- ### 2. Bottlenecks
- Lack of recreation and domicile bases near or around the area.
 - Lack of public transportation system for the tourists.
 - Lack of organized eco-tourism agents in the area.
 - Not using native local people as tour guides

Considering the potentials of the area, disseminating and acculturating people with eco-tourism can act as a factor for the preservation of the rare animals of the area and the empowerment of locals to create necessary grounds to protect the different species of the habitat.

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