Cost of Degradation of Coral reefs and Fisheries Caused by Tourism Development, Egypt's Red Sea A case study of Hurghada – Safaga Area

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BACKGROUND

The Red Sea has a number of unique marine habitats, including coral reefs, mangroves, and sea grass beds. They provide key resources for coastal populations providing food, shoreline protection and stabilization as well as economic benefits from tourism.

The coral reefs of the Red Sea are among the most spectacular in the world. Most are situated along the coast and surrounding offshore islands. The coral reefs extend about 800 km along the red sea and 700 km surrounding the islands. The area between Hurgada and Safaga (the study area) is dominated by long stretches of fringing reefs broken by the occasional sharm, marsa or bay. The length of the coral reefs in the study area is estimated at 105 km. The width of the areas covered by reefs is varied between 25-100 m. with an average of 62.5 m. Accordingly the total area of reefs of the study area is estimated at about 6.6 million square meter (without islands).

Coral reefs sustain valuable fish species .These include : groupers, snappers, and emperors, which now bring high prices that most are used in the local tourism targeted restaurants. Valuable pelagic or migratory species such as mackerel and tuna also partly depend on reefs as often feed on small reef-bases fish and in some cases to spawning area. The bait for pelagic fishes usually comes from reef area. Numerous other products are found on reefs, including aquarium fishes, mother-of-pearl and others.

Coral reefs play major role in protecting shoreline from erosion. Even though the average tidal in Egypt is only 25 cm, coral reefs play a major role in protecting Egypt's Red sea shore from erosive powers of storms and wave action. Under normal conditions reefs are self-repairing, natural breakwaters. However, if reefs become severely degraded, their ability to recover is markedly reduced and may have to be replaced using expensive engineering projects. It has been estimated that it costs about 12.5 million USD$ per kilometer to build an artificial barrier replacing a damaged reefs.[1]

The coral reefs, like agricultural lands are considered a natural capital. The total economic value (TEV)of this natural capital can be derived from the value of all goods and services provided by marine ecosystems. The TEV can

1- World Bank (2002) Arab Republic of Egypt, Cost Assessment of Environment Degradation Report 25/45, Rural Development. Water and Environment Dep. Middle East and North Africa Region,

be broken up to obtain the value of different components of the ecosystems use (i.e. tourism, fishery and shoreline protection).

The main advantage of calculating the TEV is to obtain a figure of the value of reefs ecosystems, which will highlight to stalk holders and policy makers the importance of the conservation of the reef ecosystem. Often, many people are not aware of just how much economic value of coral reef can derive as natural capital are often taken for granted.

According to global estimates ([2]), counting only the economic value of coral reef fisheries, tourism, and shoreline protection, the costs of destroying 1km of coral reefs ranges between US$137,000-1,200,000 over a 25-year period and the properly managed coral reefs can yield an average of 15 tones of fish and other seafood per square kilometer each year. This means that the total economic value of Egypt's Red Sea reefs is estimated at US$ 205.5 million to 1800 million, and can yield about 1400 tones of seafood.

However, it is worth to mention that estimates of TEV presented in this paper should be viewed as orders of magnitude. The accuracy of all estimates has been constrained by data availability and was subject to various assumptions and implication.

The challenge of economic evaluation is to put a monetary value to each of these different functions, goods and services. In standard economics, the market is used to obtain or drive these values. However, environmental goods are not traded in the market and hence, no market prices exist in general. Nevertheless, the estimates presented in this paper indicate the severity and magnitude of environmental degradation in the study area.

OBJECTIVE:
The objective of this paper is to provide an estimate of the cost of coral reefs and fisheries degradation caused by unregulated tourism development in the study area. Despite the difficulties Involved in assigning monetary values to these degradations, such estimates can be a powerful tool to raise awareness about environmental issues and facilitate progress toward sustainable tourism development. It is far easier for decision makers to incorporate and prioritize the environment when issues can be cast in clear economic terms. It is hoped that this paper will provide an instrument for policymakers to better integrate the environment into economic development decisions.

METHEDOLOGY:
Assessment the cost of degradation has been estimated through two steps:

(I) The quantification of the physical losses of natural capital (coral reefs habitats)as well as goods and services generated from the reefs ecosystem owing to unregulated tourism activities;

2-World Wildlife Fund for Nature. WWF-Fast Facts www.Panda.org

(ii) The monetary valuation of the physical losses.

Lake of information as well as the complexity of natural science makes it difficult to quantify all goods and services provided by reefs ecosystem. Therefore .only the following goods and services will be quantified here to obtain estimate of the cost of degradation: Natural Capital, Tourism, Fisheries, and Coastal protection

RESULT AND FINDING:

The coastal tourist industry in Egypt is booming, and large expanses have been developed into beach resorts. The most intensively developed areas on the Red Sea are Hurghada and Sharm el Sheikh. Significant tourist development has also taken place at Safaga and Quseir on the Red Sea coast, and the northern sector of the Gulf of Suez. It has been reported that areas such as Hurghada and Sharm el Sheikh have been developed and exploited beyond their ecological and social carrying capacities and are already showing signs of environmental degradation. Evidence of reef degradation due to tourism and other activities is clear. It is estimated that the Red Sea coast and the Gulf of Aqaba will attract over one million tourists during the next few years. Tourism development constitutes a serious threat to both the marine environment and the tourism industry itself, if not planned and developed on a sound environmental basis with the effective enforcement of environmental regulations.

The coastline south of Hurghada was quickly transformed into along coastal strip development consisting of individual tourist villages and resorts. The area between Hurghada and Safaga is apriority public and private development zone and is the most active in current development activities. Resort development is proceeding rapidly, treating the valuable coral reef resources. These mainly due to improper or irresponsible building design or construction practices and other problems related to infrastructure. Poor planning and practices result in excessive sedimentation and habitat destruction during construction and lack of adequate wastewater treatment after ward.

On Hurghada coast, sediments from coastal alteration activities have spread to extensive fringing reefs, down the coastline and to the adjacent islands and offshore reefs, where they are damaging corals and mangroves. Most tourism areas on the Egyptian coast of the Red Sea meet their fresh water requirements through the desalination of sea water or brackish groundwater. Tourist facilities have their own desalination plants; discharge their brine effluent into the sea which most likely has resulted in considerable local damage to marine life and key habitats in several locations along the Egyptian coast.

The impacts of diving and a variety of water sports activities have already caused considerable damage to coral reefs and other habitats in the area. The number of divers descending on Hurgada has increased steadily over the last 30 years, particularly over the last 5 years with over 600,000 divers per

year (Reliable statistics for divers numbers is not ready available). Access to diving areas has been open which has been result in significant reef deterioration, largely through boat anchoring. As far the reef close to Hurghada becomes more congested, the more experienced divers are seeking alternative sites that led to considerable decrease in diver's payments.

The main coastal stakeholders affected by tourism and reef recreational activities in particular are the artesian fishing communities. The main issues to be:

- Reduction in access to reef flat fisheries due to construction of beach front hotels and water-sport facilities. Actual access to the beach is denied and most hotels actively prevent fishing in front of the hotels. In both Hurghada and Safaga most of beach front are now barred to local fishermen.

- Displacement of fishing communities through hotel and water-sport development-new tourist activity sites are often designated and implemented without local consultation. Favorable hotel development sites (i.e. adjacent to reef flats, in bays or in headlands) are often productive fishing grounds, which increase the chance of conflict.

- Favored dive sites, often located in traditional fishing grounds, also become effectively barred to artisan fishermen. Furthermore, it was reported that fish catches are markedly lower in sites that are frequently dived.

- Traditional fishermen are increasingly leaving for more lucrative opportunities in the dive and hotel sector. They are frequently replaced by newcomers with less knowledge about the local ecology with unsustainable fishing practices. This had led to an increase in habitat destruction from nets damage. There is also an irreversible loss of knowledge of the traditional local fishing methods.

The frequent practice of dredging a reef flat and then cover it with sand to build hotels is major factor destroying the natural shoreline protection system especially when the hotels are built on areas that were naturally underwater.

CONCLUSIONS

The cost of coral reefs and fisheries degradation in the study area caused by unregulated tourism activities was varied between US$ 2626 to 2673 million per year. These include:

1-The Loss of natural capital

Available estimates indicate[3] that the replacement value of one square meter of coral reefs is US$ 3000. Based on an estimate of 4million square meters[4] of coral reef damaged as a result of tourism projects within the study area, the total value of the loss of the Natural capital is about 12 billion US dollars.

2- The loss of income from marine recreational activities

As far the reef close to Hurghada becomes more congested, the more experienced divers are seeking alternative sites that led to considerable decrease in diver's payments. According to available estimations of World Bank [5] the losses of income from marine recreational activities in Hurghada Area alone ranged between US$ 110 to 157 million.

3- The cost of shoreline protection:

According to published estimates.,[6] the cost to build an artificial barrier replacing a damaged reefs along the coast is estimated at 12.5 million US$ per km. Based on the fact that the length of the coast in the study area that has been affected by tourism developments and has been subject to dredging and land filling is estimated at 105 km. (north of Hurghada-Safaga) the cost of protection the coast would amount to 1313 million US dollars.

4-The cost of loss of fisheries resources

Based on the above mentioned estimates (one square kilometer yields 15 tones of sea food products and 4 million square meter of reefs were damaged), the losses of fish production was estimated at 60 tons with a value of US$ 0. 556 million at 2007 market prices.

2- World Bank (2002) Arab Republic of Egypt, Cost Assessment of Environment Degradation Report 25/45, Rural Development. Water and Environment Dep. Middle East and North Africa Region,

3- S .C.Jameson.M.S.A Ammar E.Saadalla, H.M.Mostafa, B.Reigle, A coral Damage Index and its Application to Diving Sites in the Egyptian Red Sea Coral Reef (1999) , PP. 333-339.

4- World Bank (2002) Arab Republic of Egypt, Cost Assessment of Environment Degradation Report 25/45, Previous Reference.

Recommendation.

1- Despite the difficulties Involved in assigning monetary values to environment degradations, such estimates can be a powerful tool to raise awareness about environmental issues and facilitate progress toward sustainable tourism development. It is far easier for decision makers to incorporate and prioritize the environment when issues can be cast in clear economic terms.

2- Since reefs directly, and indirectly, contribute to the economy of Egypt it is important that they are not degraded so they can function to their full ecological capacity, which in turn helps people through provision of services such as recreational activities, fisheries and shoreline protection.

3- In view of the future increase of tourists to the Red Sea, serious attention needs to be given to the management of recreational activities and environmental policies to ensure protection of the coral reefs and associated habitats.

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