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DUGONGS IN TRANG PROVINCE, THAILAND: RECOMMENDATIONS FOR CONSERVATION STRATEGY

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SUMMARY
Once commonly seen along tropical coasts from East Africa to Australia, dugongs (*Dugong dugon*) are currently considered rare over most of this range. The IUCN classifies the dugong as vulnerable on a global scale based on declines in occurrence and quality of habitat, and human exploitation. In Thailand, dugongs used to be seen regularly along both the Andaman and Gulf of Thailand coasts, but are now largely confined to islands off the Andaman coast. Trang province, along the Andaman coast in southern Thailand, is a primary feeding site for dugongs, and has the largest population group of dugongs remaining in Thailand. The seagrass beds and islands near Trang possibly house the largest group of dugongs remaining in Southeast Asia. Incidental catch and entanglement in fishing gears is the largest threat to dugongs. While most incidents of entanglement are not reported, the numbers of bycatch deaths that are reported place the dugong population of Trang in danger of extirpation. Based on the findings of a 2 year research project that included population and habitat assessment and interviews with local fishers, recommendations for dugong conservation include a marine protected area incorporating both community and management based suggestions. Community and education proposals center on the creation of a National Dugong and Seagrass conservation strategy that will bring together concerned stakeholders from government, NGO's, scientists, and the community to create conservation policy and planning. In order to be realistic, this strategy needs to be both top-down and bottom-up in its formation to balance both existing and potential uses, and conflicts between artisanal and commercial fishers. The strategy includes enforceable regulations and the development of educational materials, as well as the designation of community protected seagrass beds. Management based recommendations include government policy, support and structure to support a system of dugong sanctuaries along the Andaman coast. An integrated management plan is needed urgently, with the continued input of concerned scientists to monitor and increase knowledge of dugong behavior and distribution.

1. INTRODUCTION

Dugongs are one of four species in the Order Sirenia, and the only member of the Family *Dugongidae* (18). While the dugong was once commonly seen along tropical coasts from East Africa to Australia, they are currently considered rare over most of this range (19). The IUCN classifies the dugong as vulnerable on a global scale based on declines in occurrence and quality of habitat, and human exploitation (12). The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) has banned international trade in dugong products (16). Little is known regarding the status, distribution and conservation needs of dugongs in most of Southeast Asia. Research was undertaken in Thailand to address these deficiencies between 1999 and 2002. The purpose of this paper is to report the results of interviews undertaken with local communities regarding their experiences with and attitudes towards dugongs.

1.1 Dugongs in Thailand and Trang

In Thailand, dugongs used to be seen regularly along both the Andaman and Gulf of Thailand coasts, but are now largely confined to islands off the Andaman coast. Trang province, along the Andaman coast in southern Thailand, is a primary feeding site for dugongs, and has the largest population group of dugongs remaining in Thailand (13) (Figure 1). The seagrass beds and islands near Trang possibly house the largest group of dugongs remaining in Southeast Asia (13).

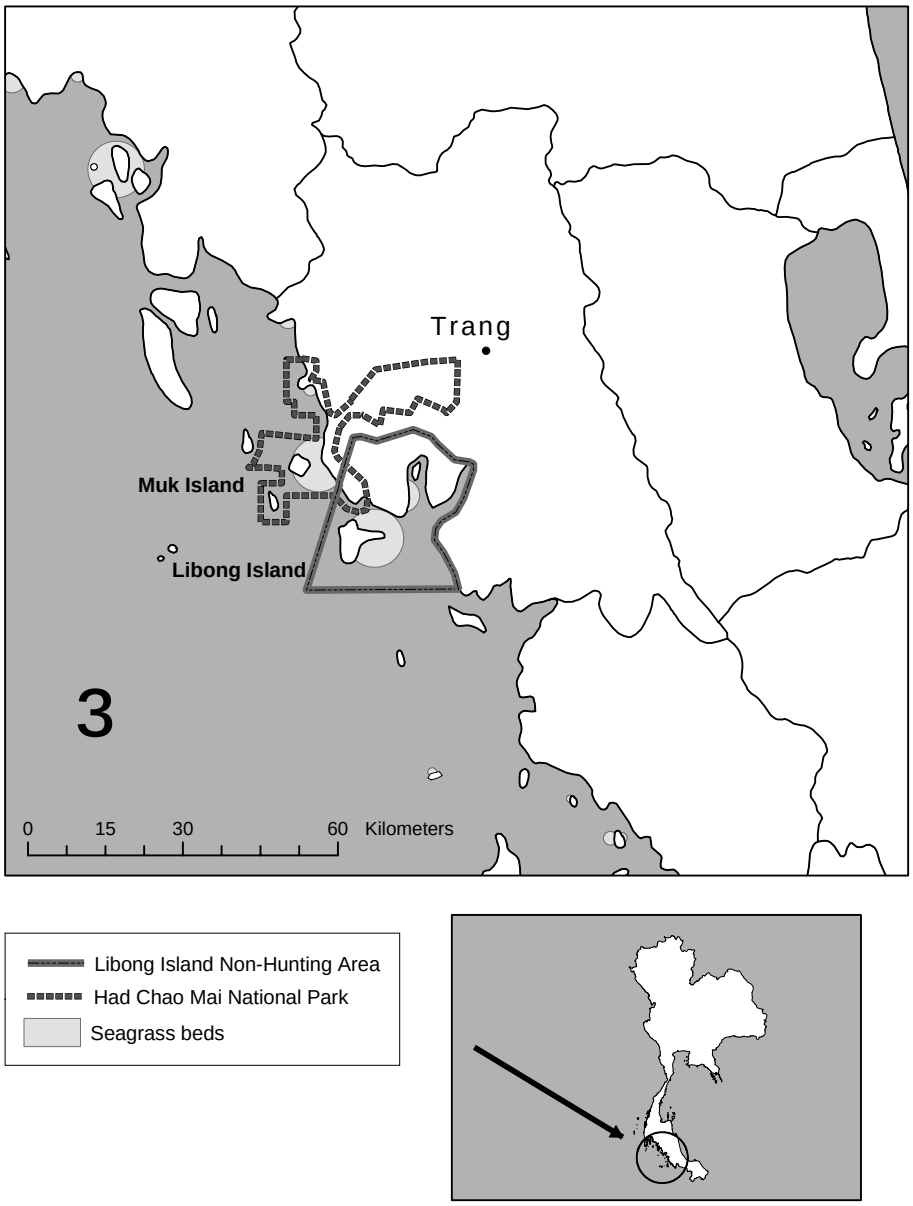

Figure 1. Map of Trang province, with boundaries of Had Chao Mai National Park, Libong Island Non-Hunting Area, and seagrass beds (dugong foraging areas).

Trang province is currently being advertised as the new, unspoiled area for tourists in southern Thailand. Advertising campaigns by the Tourism Authority of Thailand and Thai Airways are encouraging both national and international visitors to this area. The effects of increased and uncontrolled tourism will intensify boat traffic in this area which will be polluting to the nearshore waters, damaging shallow seagrass beds. This will, in all probability destroy the beds and drive away the dugongs feeding in coastal seagrass. The arrival of tourism and extra traffic has been shown to be harmful to the nearshore environment in areas without the infrastructure to support a sudden influx of tourists (8,15,1). In many of the coastal villages in Trang province, there are no sewage facilities, no centralized garbage disposal, and no running water.

Dugongs are legally protected in Thailand. By law, if dugongs are captured in fishing nets, or found stranded, they must be put back or if hurt, handed over to Department of Fisheries officials. Hunting of dugongs has been illegal since 1947 and is not currently a problem. There are three major threats to dugongs. The first is the incidental catch of dugongs in fishing nets. Both legal and illegal fishing practices such as dynamite and cyanide fishing, small mesh seines, gill nets, and push nets can either directly harm dugongs or damage seagrass beds. A major problem in Trang as well as the Andaman coast in general is the encroachment of large fishing trawlers and push netters into shallow coastal waters. These boats damage seagrass beds and catch dugongs incidentally. They are illegal within 3 km of the coast (Ministry of Agriculture & Co-operatives 1998, 1985), and have been the source of numerous, often violent conflicts with small-scale fishers in coastal villages.

Secondly, dugong body parts are commonly considered useful as amulets and medicine. It is a common belief all along the coast that various parts of a dugong are good for various ailments, as aphrodisiacs, and for protection. Trade in dugong tusks, and even tears, in certain areas is common and quite profitable. Small-scale fishers who find dugongs trapped or stranded are apt to be tempted by the money they can receive for selling tusks. They can use bones for medicine, the tusks and tears as an aphrodisiac, and eat or share the meat.

The third threat to dugong survival is the lack of knowledge about dugongs. For instance, dugongs have a specialized need for seagrass habitats as their only source of food. In Thailand, the locations and populations of dugongs are not sufficiently known to estimate the effects of habitat loss or modification, or incidental mortality, much less stochastic environmental events. The combination of specialized habitat needs and a low birth rate make the dugong especially vulnerable to anthropogenic disturbances. Dugongs, like other Sirenians, have a low reproductive potential (23).

1.2 Socio-economic-historical background

In order to put ecological concepts into a workable context for effective conservation planning, historical, political, and economic contexts surrounding the dugongs' endangerment need to be considered. Dugongs in Trang province, and their seagrass bed habitats, are affected by many of the same circumstances as the rural people who fish along the coast. The indigenous fishers who live along this coast are mostly Muslims, who migrated from islands in Northern Malaysia approximately 200 years ago (5). Until the 1960's, most fishing in Thailand was done by small-scale fishing methods. In 1961, a German aid program introduced powered fishing vessels, as well as the use of synthetic nets, trawls, and purse seines (5,6). Fish production increased significantly, the number of boats grew to over 20 000 by the 1980's, and fishing became a lucrative industry, attracting investors interested in quick profits (9,6).

At the same time, between the 1940's and the 1990's, the population of Southeast Asia doubled (6). A large percentage of these people migrated to the coast. In Thailand, as land grew less and less available to farmers, marine and coastal areas provided open access to fishing resources (25,6,9). Most of the fish are found in the shallow continental shelf, within 5 kilometers of the coast (6). Therefore, the large trawler fleets compete with increasing numbers of small-scale fishers for the diminishing fish resources,

and the small-scale fishers are losing. A small percentage of trawlers catch 92% of the total catch, while a large proportion (72%) of artisanal fishers catch 8% (24).

As a result, small-scale fishers have been unable to support themselves more than marginally, and have had little alternative but to continue fishing, sometimes using explosives and poisons, further endangering the systems they depend on. The condition of mangroves, seagrass, and coral reef areas along the Andaman coast has been degraded as a result of overfishing and destructive fishing methods. The growing population and increased development along the coast also causes degradation or destruction of these resources. As long as the government is not able to put a stop to this destruction of natural resources, the conflict between commercial and small-scale fishers will grow, as will the poverty of a growing number of people in coastal communities (9). Dugongs are caught in the middle of this conflict. They are trapped in the nets of illegal commercial gillnet and push net trawlers. Interview respondents report that they find these animals floating, sometimes with the head cut off so that tusks can be sold. If the commercial fishers reported the incidental catch, they would also have to admit to fishing within the 3-kilometer shoreline limit. Small-scale fishers who find dugongs trapped or stranded are apt to be tempted by the money they can receive for selling tusks. They can use bones for medicine, the tears as an aphrodisiac, and eat or share the meat. Reporting the incident is often at the expense of time spent fishing. There is also the risk of being fined. Anyone found with a dead dugong could face a 4 year jail term or a 40 000 baht ($1600 CDN) fine (Bangkok Post, April 29, 2000). Another reason these occurrences are not reported is the marginality of small-scale fishers. This marginality is not only economic, but also social, and it creates an atmosphere where these fishers have been powerless against those with political power (20).

Small-scale fishers have been forced by circumstance and desperation into an increased awareness of the nearshore environment and the critical and immediate need for conservation action. This situation is not unique in Thailand. Artisanal fishers throughout tropical oceans have been confronted with similar issues of marginalization, lack of political power, and poverty (20).

1.3 Interviews

From interviews with 145 villagers in fishing villages along the Andaman Coast, we gathered information about the history and movements of dugongs in various areas, as well as attitudes towards dugongs and the level of knowledge of local environmental issues (for further details, see 13). One of the largest problems for the dugong along the Andaman coast is certainly that of being caught in stationary nets, gill nets, and push-net trawlers. The threat of illegal push net and commercial trawling within a 3-kilometer coastal limit imperils not only dugongs and seagrass beds, but also village-based coastal fisheries. The villagers interviewed were aware and concerned about illegal fishing, especially as these fishing practices are destructive to their fishing beds and depleted fish in nearby waters. Only 16% of respondents replied negatively to the idea of establishing off-limits areas for conservation of dugongs and seagrass. Even though the most common comments attached to this question addressed concerns about loss of income, food, and space for fishing, others talked about the need for enforcement against illegal and destructive fishing, and agreed with the need to create such areas.

An accurate estimate of dugong mortalities caused by fishing cannot be made because many of these incidents are not reported. According to the interviews, only about 12% of dugong strandings that are found are reported to local authorities. Seventy-seven percent of the interview respondents felt that population numbers of dugongs were decreasing. Ninety-seven percent of the villagers interviewed felt dugong conservation was important. The most frequent comments made to a question querying their opinions about dugong conservation emphasize respondents wanting to be able to show the dugong to children and grandchildren, and reflect the importance of saving the dugong, especially because of the population decline.

The dugong is an important presence in the lives of the villagers, a significant part of their immediate surroundings. Most interview respondents have been aware of dugongs at least since childhood. The

livelihoods of these coastal fishers depend on their awareness of life in the near shore and ocean environment. Half of the interview respondents have personally seen dugongs within the past year. When a dugong is seen, alive or dead, the entire village hears about it. Half of the respondents in Trang knew stories or legends about the dugong, and 41% admitted to having knowledge of medicinal use for dugongs.

2.0 SUGGESTIONS FOR CONSERVATION

2.1 Community-based conservation and education

The designation of reserves to protect marine resources has increased considerably during recent decades. Some protected areas have been allocated and more suggested as a means to protect endangered species from human activities that threaten their survival (4). However, marine protected areas are dynamic and complicated, and lack of attention to considerations of management, the community, or local ecology has often limited their success as a factor in conservation-based management plans (3).

The issues brought forth in interviews with villagers in Trang province suggest that the underlying problem is not poor law enforcement, but economic instability, lack of alternative sources of income, poverty, and corruption (27). Recommending more and larger protected areas and stronger laws and further restrictions alone are narrow solutions to a problem that requires a more integrated approach. Within an integrated management approach the myriad issues surrounding dugong conservation may be approached more effectively. Such an approach emphasizes the necessity of the long-term cooperation and participation of local people. This integrated technique for coastal conservation has been advocated worldwide, mostly focusing on fishing and coral reef issues (11,21,27,7,2).

For Trang there is a need to create a regional Dugong and Seagrass conservation-based management strategy. This first step would entail the creation of an institutional framework in order to bring together concerned stakeholders from government, the scientific community, non-government organizations (NGOs), and community organizations in an Integrated Coastal Zone Management (ICZM) process. ICZM can be defined as:

> "… a continuous…and participatory process in which an integrated strategy is developed and … to achieve the conservation and sustained multiple use of the coastal zone while taking into account traditional cultural and historical perspectives and conflicting interests and uses." (26).

Under this framework, stakeholders can then work towards a regional dugong conservation policy and oversee the coordination and funding of ongoing research.

There are NGOs along the Andaman coast that are concerned with dugong and seagrass conservation issues, and have established close relationships with local villagers' and fishers' organizations. The involvement of these NGOs in the ICZM strategy is a crucial step towards the cooperation and participation of villagers in these conservation strategies. These NGO's could establish community protected seagrass beds, with the support of local and national officials. These areas will be conservation zones established by the community and protected by them from fishing boats and gear dangerous to dugongs.

The best chance for the dugong to survive in Thailand is for the local people to take responsibility for their protection. Their continued and improved awareness and education should be the priority for any conservation planning. This should include the development of educational materials on dugong and seagrass conservation both for primary and secondary level curricula, and as presentations in fishing villages along the coast. As part of this educational process, the scientific staff from the Marine Endangered Species Unit from the nearby Phuket Marine Biological Center (PMBC) should make periodic visits to villages to explain the importance of dugong and seagrass conservation. They should also emphasize the significance of the documentation of dugong strandings and incidental catch. The interviews suggest that in areas where there have been a larger presence of PMBC staff, there was a

higher awareness of the importance of rescuing and reporting stranded animals. Staff visits to these villages are important occasions, and the posters the staff handed out are carefully displayed.

In Australia, Marsh *et al.* (17) reported the successful creation of an 'Endangered Species Awareness Course' and a similar program should be created as an education program for commercial and local fishers, to teach them about relevant features of dugong conservation biology and management. The course would also teach methods to minimize incidental catch of dugongs and how to remove dugongs from nets. These workshops could be sponsored by Wildlife Fund Thailand or other NGO's, and held at local villages with instructors from PMBC or the Royal Forestry Department. This course should be made part of a requirement in a permitting or licensure process for fishing.

2.2 Management Recommendations

Management strategies should incorporate a system of dugong conservation areas or sanctuaries created along the Andaman coast that allows for increased overall protection, and possible population group intermixing, potentially resulting in increased genetic variation. Federal recognition of dugong and seagrass habitat needs to be considered for Trang. In order to be realistic, management strategies need to be both top-down in terms of setting a realistic structure for continued enforcement, and bottom-up in its formation to balance both existing and potential uses, and conflicts between artisanal and commercial fishers.

In Trang province, higher protective status than that of a National Park or Non-Hunting Zone, such as that of a Wildlife Sanctuary should be given to the seagrass beds in the area including and surrounding Libong Island Non-Hunting Zone and Had Chao Mai National Park (Figure 1). In a Wildlife Sanctuary hunting and collecting are forbidden, as well as any act that will potentially modify the environment. Recreational use is not specifically encouraged, but not specifically prohibited. There are currently no marine wildlife sanctuaries. (14).

Adequate protection for, and education about, seagrass and dugongs in this area is crucial at this time due to both the planned influx of tourists and the increasing conflict between commercial and artisanal fishers. In both the Non-Hunting zone and Had Chao Mai National Park as currently designated, all of the major seagrass areas and high-tide dugong feeding zones are theoretically protected (Figure 1). But without knowledge of dugong movement during low tides, and no knowledge of their home ranges, it is difficult to recommend specific additional areas to be added. To compensate for this uncertainly, a buffer zone should be negotiated with fishers and added to the current protected areas. Within the current areas, no fishing is allowed. In all areas, the buffer area could be zoned for restricted fishing activities as decided in consultation with local fishers.

It is essential that regulations be enforced within the areas specifically designated to protect dugongs, and within areas of restricted fishing. Both the Department of Fisheries (DOF) and the Royal Forestry Department (RFD) (who are in charge of Marine Parks) could publicly state that any fishing practices that could result in dugong mortality are not permitted (22). Boundaries of restricted areas should be clearly marked if possible, but at the least restated and widely publicized. As in Australia, net management strategies should be developed to reduce incidental catch of dugongs (28). Regulations could outline types of nets prohibited and places where they can be used, size of mesh, restrictions on the presence of fishers, and criteria as to allow or disallow drift or set nets in certain areas.

Interviews suggest that the DOF patrols Phang-nga Bay only 2 months a year. Patrols should be implemented 15 to 20 days a month. Village patrols should be created by, and have the support of, the DOF. DOF observers should be placed in rotation among villages to document illegal fishing as well as strandings and by-catch incidents.

Enforcement of the CITES convention on international trade and the Fisheries Act of 1947 concerning possession and trade of dugong body parts is also essential on the local level. Increased DOF

and MESU presence in villages, and the educational programs suggested could help to alleviate this problem.

3.0 CONCLUSION

It is critical that measures be begun quickly to reduce dugong mortality. Population surveys estimate that the present population of dugongs along the Andaman coast is approximately 200 animals, with a minimum population abundance estimate of 123 animals in Trang province (13). A small population is always in danger. The high levels of mortality, especially as reported in Trang province by in the interviews definitely place the dugong in danger of eventual extirpation from this coast. Destructive fishing and the use of dugong body parts as medicine and amulets are critically endangering the dugongs and their habitats along the Andaman coast. The most difficult challenge is that, in order to conserve the dugong along this coast, all stakeholders need to be willing to participate towards this goal. Fishing gear will have to change; fishing and seagrass destruction in critical habitat areas will have to stop. Illegal and destructive push-net trawlers will have to be prevented from fishing in near-shore areas. The amulet and medicinal trade will have to come to an end. Education is needed to instill a realization of the long-term benefits to such changes in the communities around dugong habitats, and these communities need to take some responsibility for protecting their local seagrass beds. Otherwise, the dugong along the Andaman coast will keep being caught in fishing nets, and their tusks will be taken, and their habitats destroyed, and eventually the population will slowly become locally extinct.

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