Vol. 11 • December 2015
Print ISSN 2244-4432 • Online ISSN 2984-7125
DOI:https://doi.org/10.59120/drj.v11i1.18

Sustainable tourism in an ecologically critical area: Implications to Dahican and its threatened marine megafauna

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ABSTRACT

The City of Mati, Davao Oriental is one of the few places that can boast of a wide variety of natural attractions ideal for promoting eco-tourism enterprises. Dahican Beach is unique because it is the habitat of several charismatic marine megafauna, namely: dugongs, whale sharks, dolphins, and three species of nesting marine turtles. Yet, very little is about the marine species that have made Dahican their home. In 2013, the Regional ICRM Center XI simultaneously conducted two studies in Dahican: one was the baseline study on the status of marine megafauna in Mayo Bay, and the other was a willingness-to-pay study for the feasibility of collecting environmental fees. Both projects have implications on the sustainability of these resources as well as that of future tourism endeavors. Around the same time, however, the operation of a personal watercraft (PWC) - popularly known as Jet Ski® had been observed in Dahican. Such an activity has and will result to a number of issues including but not limited to conflict with other beach recreationists, disruption in the conduct of RIC XI's research, and the potentially grave threat to the survival of marine organisms, especially the large marine vertebrates. To elucidate to the reader the possible threats of PWCs on the marine wildlife of Dahican, a literature review is provided.

Keyword: Sustainable tourism, ecologically critical area, Dahican, threatened marine megafauna, implications.

DISCUSSION

Tourism is one of the world's biggest and fastest growing industry. It is also the only major service sector where developing countries have recorded trade surpluses with developed countries[1]. To ensure the long-term benefits of tourism, the industry is pursuing a more sustainable approach; that is, tourism is concerned with achieving die triple bottom line of economic viability, environmental integrity, and social equity[1'2] Undoubtedly, tourism is a big income earner and the Philippines, in particular, is well positioned to gain much from tourism considering that our country is blessed with abundant and diverse natural resources. Ecotourism - which is nature-based tourism that supports environmental conservation3 specifically is one product niche that we can and should proactively pursue.

The beach of Dahican is a particularly rare jewel because of its sugary, white sand and the surfer waves during amihan season secured Mati City's place in the ecotourism map. Damcan Beach is so uniquely to make the most of opportunity: very rarely is a small area being the habitat of not just one but several charismatic marine megafaunas - dugongs, whale sharks, dolphins, and three species of nesting marine turtles. Yet, very little is known about the marine species that Dahican hosts. Perhaps, this is why Dahican has not been promoted

for its full potential? The place is popular enough through word of-mouth. In fact, Dahican may be Mati's most well-known (and well-loved) destination, especially among outsiders seeking the tranquility and unique experience this idyllic place can offer.

The Role of Research

The Regional Integrated Coastal Resource Management (ICRM) Center - (RIC XI) aims to provide scientific information that can be used as a tool for enhancing natural resource management. We are cognizant of the fact that management is founded on policy and legislative frameworks which, in tum, rely on accurate, and rigorous information. At present, we are conducting two simultaneous studies in Dahican funded by Ole Foreign Assisted Project (FASPO) of the Department of Environment and Natural Resources (DENR). One of these studies is to gather baseline status information on the dugongs, whale sharks, cetaceans, and marine turtles in Mayo Bay; the other study is to elicit the willingness of tourists to pay environmental fees for the conservation of the marine resources. Clearly, both projects have implications on the sustainability of these resources as well as that of future tourism endeavors.

Admittedly, the role of RIC XI is tipped more towards natural resource conservation and management than identifying potential but they are, in fact, complementary. The baseline study we are conducting is primarily a recognition of the importance of the above-mentioned marine species. Their importance is detailed in the attached literature review but on the whole - being top predators of the ecosystem - they are indicators of the overall health of the marine environment. They ensure a well-balanced ecological interaction, ensuring that the products and services upon which the human population heavily depends will be maintained. Hence, these species need to be conserved and protected for their own value, making the conservation of Dahican imperative.

It may be recalled that several dugongs died 2 years ago from accidental gill net entrapments in Dahican, provoking public outcry that reached national level agencies. The prevalent concern was securing what could be one of the last few havens of dugongs in the Philippines. Various groups brought up the call for a more permanent protection of the Dahican area and safeguard the threatened biodiversity that has made it their home. The benefit of such a protection is two-fold: (l) it will assure the conservation of species and improve fisheries; and (2) enhance eco-tourism value.

Tourism and Conservation: Harmony or Conflict?

It is thereby encouraging to note that the local government has taken a step towards this direction with the signing of Resolution No. 275 Series of 2011, "A Resolution Declaring the Eastern Part of Mayo Bay Going to Dahican Stretch vis-a-vis to Bobon and Lawigan as Environmentally Critical Areas" in recognition of its being a habitat to threatened marine wildlife and for its ecotourism potentials.

However, this is but a first step. The resolution needs to be reinforced by legislated guidelines on how to ensure the "protection, preservation, conservation and management of natural resources" in this environmentally critical area. Without which, Dahican will remain vulnerable to unscrupulous economic pursuits and unregulated shoreline activities that in no way promote sustainable tourism development.

It needs to be pointed out that tourism itself can be detrimental to the environment. For one, infrastructures and facilities constructed to cater tourism cause pollution and habitat alteration; for another, an influx of imprudent tourists to a small natural area can cause undue stress a fragile ecosystem. These underscore the fact that ecotourism cannot be allowed to launch without the appropriate policy guidelines to steer it in the right course. In areas such as Dahican, the very first step in maintaining coastal integrity is to minimize disturbance, especially as dugongs, cetaceans, whale sharks and turtles are all vulnerable to noise, crowding and traffic.

Lately the operation of a personal watercraft - popularly known by the Kawasaki trademark of Jet Skis® - had been observed in Dahican. The reason for our concern is two-fold: (I) the PWC pose an immediate threat as it was reportedly operated near the shoreline frequented by other non-motorized water-based tourists, posing potential safety risk; and (2) the continuous operation of PWC in the area further threatens the marine organisms that we - from the Local Government Units (LGU), academe and to the community are trying to conserve in Dahican. The former is apparent and requires no greater elaboration while the latter is less appreciated, thus, the subject of the succeeding literature review.

The PWCs are very different from other motorized crafts operated in the area because of their speed (from zero to 50 kph in a few seconds), maneuverability4, and long stopping speed of 80 to 150m[5]. Large marine vertebrates and turtles are known to evade boats because of the latter's relatively direct course, slow movement, and inability to enter shallow waters. PWCs, on the other hand, have a high potential of harming the animals, obstructing natural route and subsequently causing them to seek other less disturbed areas but maybe with less food. Moreover, the high possibility of a vessel strike raises ethical issues on animal welfare. The US National Park Service proposed a ban against the use of PWCs in national parks due to the grave danger to aquatic wildlife and vegetation[4].

In order to make a complete, albeit concise situation of these animals, a short description regarding their importance and the threats to their survival is provided. Towards the end of this advocacy paper, a few recommendations are also outlined.

Vulnerability of Dugongs to Personal Watercrafts

Dugong (Scientific Name: Dugong dugon; Local Name: dugong or sea cow) has been documented as a regular visitor in the coastal waters of Dahican. Though

this documentation is yet to be seen in print, accounts of fisherfolks and the dead dugongs recovered in the early part of 2011 proved the existence of dugongs in the area. Further, dugong feeding trails were documented in the seagrass's meadows of Dahican during research conducted on March 2013, strengthening support to their presence in the area. Dugong has been listed as "vulnerable to extinction at a global scale" by The World Conservation Union (IUCN). This threat to their population stemmed largely from their dependence on their seagrass food which thrives only in the shallow part of the reef or the coastal area. The shallow site preference of seagrasses is due largely to their need for sunlight as being photosynthetic. The frequency of dugongs in the coastal waters exposes them to human activities. Among these human activities, in the case of the Dahican coastal area, is the operation of personal water crafts (PWCs), otherwise known as Jet Ski®, which at present has raised issues on their effects to marine organisms in the area. This document, thus, discusses the likely negative effects of such vessels to dugong, in particular, in the area.

Dugongs communicate through chirps, whistles, barks, and other sounds that echo underwater[6]. Their communication can be easily disrupted by a passing PWC via (*Conducted by Dr. Miguel Fortes of UP-MSI and Dr- Hiroshi Mukai of Kyoto Univ. Japan under the Seagrass-Mangrove Bio shield Project in collaboration with RICM*) the sound of the Jet Ski® or by creating wave disturbance in the seawater. Unlike fishing boats that pass through in the area Jet Skis® can likely cause major disruptions in dugong's communication as they just stay in the same area going back and forth. The disruption in seawater may also affect the delay in hearing the coming vessel so that they may have not enough time to dock underwater, and thus, their collision to the vessel.

The disturbance created by PWC can drive away dugongs from the area. This is critical if the dugongs are feeding because feeding disruptions can starve them. Aside from physical weakness, starving can also affect their reproductive activities - delaying their breeding. Further, the constant water movement created by PWC can stir up the seabed and can directly smother the small and delicate seagrasses.

The sediment stir-up can also cause turbidity to the water column, decreasing light penetration in the water column, *Halophila ovalis*, one preferred seagrass species, appears to be particularly sensitive to light reduction, with the duration and frequency of light-deprivation events primary factors affecting its survival in environments that experience transient light deprivation.

Vulnerability of Dolphins to Personal Watercrafts

Dolphins, being highly social animals, carry out their day-to-day activities such as feeding and foraging, resting, and socializing in groups called pods. Much like a human family, pods are integral for an individual dolphin's survival and well-being. They constantly communicate with other members of the pod in order to stay together. Studies have shown that dolphins are reliant on sound for

communication and monitoring of their surrounddings[7] Dolphins communicate using whistles and clicks, sounds which may be "masked" (covered or cancelled out) by natural and man-made noises in the water so that they are unable to hear other pod members. Scientists have been studying the effects of noise boats on dolphins, mainly by quantifying changes in their behavior when exposed to different conditions.

Effects of Personal Watercrafts on Dolphins

Noise from jet-propulsion water vehicles

All motors being equal (speed, sea conditions, water quality), a jet-propulsion water vehicle produces less noise than boats. However, being less noisy, they are detected by dolphins only when they are close. The animals, upon seeing the vehicle too close to them, interprets the craft's "behavior" as predatory and thus express strong avoidance behavior by diving down, abandoning their activity, or even leaving the site[8, 9].

Collisions with dolphins

A PWC's speed and maneuverability plus man's natural curiosity makes it more likely that operators will inadvertently get too close to dolphins. Interrupting the animals' normal activities, resulting to stress. Pods that have calves (young dolphins) are more susceptible to this kind of stress, causing pods to leave a site temporarily or for good. The high speed, unpredictability, sudden appearance and erratic movement of PWCs are important factors for high risk of collision with dolphins' behaviors in whale watching[9,10] animals will avoid such vehicles, when possible, inexperienced juveniles may miscalculate their proximity (or even attempt to play with a novelty) and are more susceptible to get injured or cause injury.

Stress and dolphins

Dolphins manifest stress mainly by frying to get away from the object. Their immediate response to perceived threats is to leave what they are doing and any one of the following: come closer together, rapidly swim away, dive deep down, or stay underwater longer. Pods with one or more calves are more susceptible to stressful situations as young ones cannot swim as fast as adults plus, they need to come up for air in shorter intervals. Whereas shallow areas such as bays may be utilized as resting places, they could also be more stressful because one avenue of escape (diving down) is closed to them.

Long term studies showed that dolphins may relocate to different sites which may be less suitable. Food may not be as abundant or good, or there may be more threats so that their rest is affected. In the long run, individuals' health may deteriorate so that they may be more susceptible to parasites and diseases.

Vulnerability of Whale Share to Personal Watercrafts

The whale shark, Rhincodon typus, is the world's largest living species of fish[11]. Globally distributed and inhabiting tropical and off-shore and close to land, it is known to travel large distances and form seasonal aggregations in areas rich in its choice of prey (e.g., bolinao, small squid, krill, and plankton). It is this dependency on food pulses located in coastal areas that has opened doors for the scientific community to conduct studies on this "enigmatic" animal, and for the industry to use this iconic species as an economic resource.

However, past and current threats on the survival of whale sharks - including bycatch and poaching, habitat destruction md displacement, unregulated tourism, vessel collision, and pollution, to name a few - and a general gap in knowledge on the basic natural history of these slow growing and late maturing animals have all contributed to its' predisposition to extinction in the wild. Consequently, the whale shark is now listed under Appendix II of the Convention on International Trade in Endangered Species (CITES) and on Appendix II of the Convention on Migratory Species of Wild Animals (CMS), as well as classified as vulnerable in the Red List of Threatened Animals by the World Conservation Union (IUCN).

Whale Sharks in the Philippines

Situated just above the equatorial belt, the Philippines is important area for whale sharks. It is one of the few places in the world where they are present all year round. It is also one of the 4 places in the world where an adult female has been recorded — a special distinction, as most sightings from the various aggregation sites are composed of juvenile male R typus with few females or adults[11]. Moreover, the archipelago is now a protected refuge between countries that are still catching or abundantly poaching them; the Philippines, particularly the coastal waters of Visayas and Mindanao, including those of Samal Island in Davao and Sitio Tagdodo in Mati[12], was a whale shark hunting hotspot for a century until the enactment of FAO 193 in 1998 banning the harvest and trade of this species. Presently, with more than 600 individuals identified, the country could host the largest population of whale sharks in South East Asia.

Whale Sharks and Tourism

The discovery of the aggregation in Donsol, Sorsogon led to the establishment of a tourism scheme as an alternative source of income for the local people in the area. As there was no guideline for interaction then, Donsol the 1995 Code of Conduct of Western Australia's Department of Conservation and Land Management[13] that includes prohibitions such as attempting to touch or ride on a whale shark, undertaking flash photography, using motorized propulsion aids (e.g. scooters, jet-skis) and restricting the normal movement or behavior of shark (i.e. blocking the shark's path) However, non-compliance by tourists and tour operators alike was observed, which, according to Quiros[13], is largely

due to varying interpretations of the rules and lack of regulation enforcement. The massive influx of foreign and local guests overwhelmed the tourism council, especially since its members were trained in neither the hospitality industry nor management[15]. Although they sought to put up a community-based tourism initiative, with only the minimum groundwork in place, the noble intention to manage the industry in a sustainable manner unfortunately backfired. The famous tourist spot saw a decline in whale shark sightings in the past few years leaving tourists disappointed and displeased (Snow, pers. comm).

IUCN states that the sensitive nature of whale sharks, its' aggregation at specific times of the year, slow maturation rate and migratory behavior all make them susceptible to anthropogenic impacts[16]. Literature suggests that these vertebrates exhibit avoidance behavior (i.e., fist swimming, changing direction, diving) in response to proximity and behavior of swimmers and vessels in the water[13,17]. These short-term negative impacts may contribute to long-term adverse effects such as disruption of feeding behavior, displace displacement from important feeding areas, stress, injury, and moltality[18]. Literature on the relatively well-researched marine mammal tourism industry records similar detrimental effects as well[7, 8, 19]. While the whale sharks are made susceptible to vessel collisions because of their surface swimming habits[11], most frequently observed in response to feeding opportunities in areas near the coast (e.g. Dahican in Mayo Bay), their advantage with regards to avoidance of human interaction is that unlike mammalian and reptilian megafauna (e.g. dolphins, turtles, dugongs), whale sharks can actively avoid surface waters in terms of their metabolic requirement for oxygen should they be unduly disturbed by tourism activities[18].

It may be argued that whale sharks are less vulnerable to vehicular collision at sea than other megafauna because of their strong avoidance instinct and fast swimming capabilities. Personal watercrafts (PWC), however, pose a graver threat to whale sharks than do other motorized watercrafts: the inefficient two-stroke engine of most PWCs releases 30% of its gasoline/fuel mixture unburned into the water and atmosphere[5], thereby emitting roughly eight times more pollution than a two-stroke outboard motorboat[20]. In fact, a mere two hours of Jet Ski operation releases three gallons of gas and oil into the water. The most vulnerable to these pollutants are the zooplanktons that float just below the surface water — and whale sharks subsist on these organisms, which are very susceptible to the acute toxic effects of even low hydrocarbon (from oils and gas) levels[20].

The confluence of species vulnerability and increased tourism volume could be an indicator of an ecological and economic problem[21]. In a study on tourist satisfaction on the whale shark tourism industry in Holbox, Mexico, it was cited that a wildlife tourism site may collapse in the event of uncontrolled growth because of the disappearance of the targeted species as a result of excessive environmental impacts, and reduced visitation as a result of poor visitor experience

owing to crowding, environmental impacts, and marketing approach[21]. Granting that these undesirable consequences may not be immediate, a precautionary approach to tourism would be the sensible course of action[16].

Vulnerability of Marine Turtles to Personal Watercrafts

Of the seven classified species of marine turtles in the whole world, five are found in the Philippines, namely: *Chelonia mydas, Dermochelys coriacea, Caretta caretta, Eretmochelys imbricata and Lepido chelys olivacea*. They subsist primarily on jellyfishes, seaweeds, and small fishes and inhabit sea grass pastures. Turtles typically grow up to 2 to 3 meters in length and can weigh anywhere from 40 to 180 kg depending on the species. Marine turtles are highly migratory and the females only come ashore to lay their eggs. It is the turtle's distinctive behavior to return to the area where they were hatched to lay their eggs in turn. They can recognize the exact place of their birth because as hatchlings, they imprint on the earth's magnetic field of their home beach; this is why it is strictly prohibited to disturb a hatchling's slow, laborious way towards the sea guided only by orienting themselves to light horizon because they would then fail to imprint[23].

Marine turtles play an important role in maintaining the marine and coastal environment[23,24]. For example, feed on sponges thereby helping to promote the growth of corals, the rugosity of which provides an important reef fish with a variety of habitats and protection. Green sea turtle on the other hand grazes on seagrasses and promote new plant growth for other organisms while leatherback turtles keep the jellyfish population in check. Their presence in a given area is indicative of the health of that area. Their importance makes their conservation imperative but due to various stresses, they are now highly endangered. This is why, in the Philippines, their protection is stipulated by formal regulations and by one law in particular, the Republic Act 9147, or the Wildlife Act of 2001.

Their strong affinity to their place of hatching is only one of the factors that makes them vulnerable. Each marine turtle population is also genetically isolated and distinct and so it cannot be replenished by other populations of the same species should that population be threatened[23,24]. And although marine turtles produce thousands of eggs during their lifetime, natural predators and the harsh conditions at sea ensures only a 1% survival rate. This is further decimated by the anthropogenic threats, which, by far, is the most alarming. The adults are hunted for their meat and for their shells, which makes exotic ornaments. Fishing methods such as trawls, gill nets, abandoned nets and by catch have also lessened their population. Marine turtles are also vulnerable to pollution such as marine debris and pollution. Poaching of turtle eggs, intentional captivity, beach lightings, beach infrastructure and sand mining also compound the threats the marine turtles' survival.

The speed and maneuverability of personal watercrafts pose a more direct threat to marine turtles. Because marine turtles have to surface to breath area, a fast-moving motorized craft in the vicinity would be difficult to avoid especially

as the PWC's high frequency noise does not give a warning of their approach. Records have shown that PWCs have killed numerous surface dwelling and air-breathing marine vertebrates, including marine turtles, usually by blunt impact trauma. Numerous studies have ruled that where turtles make their zones" must be employed.24

CONCLUSION AND RECOMMENDATIONS

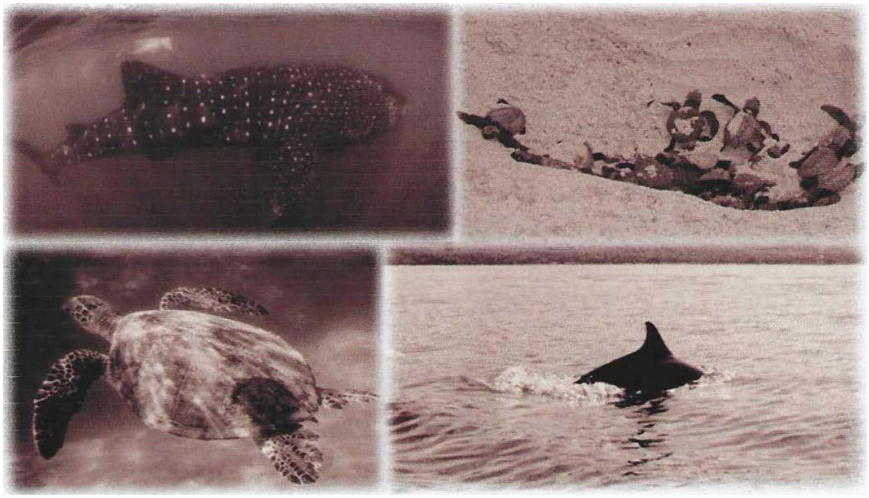
PWCs, admittedly, are one of the thrill crafts that may attract tourists to a given resort; in the special case of Dahican, however, alternatives need to be sought. It is but one of the examples wherein balance must be found between tourism and environment and between immediate income and sustained economic benefits. But this observation should decide it for us: without its marine wildlife, Dahican will cease to be a unique place for ecotourism. We could lose the very value that makes Dahican - and Mati by association - so attractive.

In view of these and at the behest of the City Administrator, Engr. Joel Capalit during the meeting last September 26, 2013 at the Mati City Hall, RIC XI wishes to make the following recommendations:

1. Fast track the declaration of Mayo Bay, specifically the portion of Dahican, as a marine protected area, which was already initiated by the DENR through the Integrated Coastal Resource Management Project and as a next logical step to its declaration as an environmentally critical area;
2. In the absence of formal protection at this time, it is suggested that an ad hoc committee be created to define guidelines on the use of Dahican, it being an environmentally critical area, to immediately address the operation of personal watercraft in the area. The formulation of guidelines should adhere to the principle of the precautionary approach and lend itself to future iterations as better information are made available and formal protection is established;
3. Consider a marine spatial planning approach to delineate the various zones - and define their specific uses - along the coastal areas of Mayo Bay and Pujada Bay; and
4. For the LGU and other concerned agencies to initiate a dialogue with resort owners and other stakeholders in Dahican to harmonize conservation and tourism goals for the area.

Disclaimer

The authors of this advocacy are researchers for the Regional ICRMP Center (RICH) and LaMaVe. The views expressed in this are those of the authors and not necessarily represent the views of the Davao Oriental State College of Science and Technology, the Department of Natural Resources, PhysaIus/LaMave.



Threatened Marine Megafauna in Dahican, City of Mati, Davao Oriental.

LITERATURE CITED

United Nations Environment Programme (UNEP) and World Trade Organization (WTO). Making Tourism More Sustainable: A Guide for Policy Makers. France and Spain: United Nations Environment Programme and World Trade Organization; **2005**. p 222.

World Bank. Sustainable Tourism and Cultural Heritage: A Review of Development Assistance md its Potential to Promote Sustainability. Washington, DC: World Bank; **1999**. p 67.

Neto, F. A New Approach to Sustainable Tourism Development: Moving Beyond Environmental Protection. DESA Discussion Paper No. 29. Discussion Paper of the United Nations Department of Economic and Social Affairs. New York: United Nations; **2003**. p 16.

D'Antuono K. The National Park Services' Proposed Ban: A New Approach to Personal

Watercrafts Use in the National Parks. 27 B.C. Envtl. L. Rev [Online]. **2000**; 243: (2):243-278.

Davenport J, Davenport JL. The impact of tourism and personal leisure transport on coastal environments: A review. Estuar Coast Shelf S [Online]. **2006**; 67: 280-292.

Marsh H, Penrose H, Eros C, Hughes J. Dugong Status Report and Action Plans for Countries and Territories. UK: United Nations Environment Progamme World Conservation Monitoring Centre; **2002**. p 162.

Taubitz, E. 2007. Potential effect of whale watching engine noise on the vocal behavior of bottlenose dolphins (*Tursiops truncatus*) in Bocas del Toro, Panama and Manzanillo, Costa Rica. Diploma Thesis, Universitat Rostock, Rostock, Germany, **200**7, p 69.

Roussel E. Disturbance to Mediterranean cetaceans caused by noise. In: G. Notarbartolo di Sciara (Ed.), Cetaceans of the Mediterranean and Black Seas: state of knowledge and conservation strategies. A report to the ACCOBAMS Secretariat, Monaco, February 2002. Section 13, p 18.

Koschinski S. **2008**. Possible Impact of Personal (PWC) on Porpoises (*Phocoena phocoena*) and Harbor Seals (*Phoca vitulina*). Literature study commissioned by the Society for the Conservation of Marine Mammals (Gesellschaft zum Schutz der Meeressäugetiere e. V., GSM), Quickborn, Germany; **2008**. p 13.

Martinez E, Stockin KA. Blunt Trauma Observed in a Common Dolphin *Delphinus* sp. Likely Caused by a Vessel Collision in the Hauraki Gulf, New Zealand. *Pac Conservat Biol* [Online]. **2013**; 19 (1): 19-27.

Rowat D, Brooks KS. A review of the biology, fisheries and conservation of the whale *Rhincodon typus. J Fish Biol* [Online]. 2012; 80: 1019-1056.

A1ava MNR, Dolumbal'o ERZ, Yaptinchay AA, Trono RB. **1997**. Fishery and trade of whale sharks and manta rays in the Bohol Sea, Philippines. In Elasmobranch Biodiversity, Conservation and Management (Fowler, S. L., Reed, T. M. & Dipper, F. A., eds.). Proceedings of the International Seminar and Workshop, Sabah, Malaysia; **2015**, p. 132-148.

Quiros AL. Tourist compliance to a code of conduct and the resulting effects on whale shark (*Rhincodon typus*) behavior in Donsol, Philippines. *Fish Res* [Online]. **2007**; 84: 102-108.

Catlin J, Jones R. Whale shark tourism at Ningaloo Marine Park: A longitudinal study of wildlife tourism. *Tourism Manage* [Online]. **2010**; 31:386-394.

Pine R. 2007. Donsol Whale Shark Tourism Coastal Resource Management: A Case Study on the Philippines. Quezon City, Philippines: WWF-Phi1ippines•, **2007**. p 41.

Quiros AL. Whale shark "ecotourism" in the Philippines and Belize: evaluating conservation and community benefits. *Tropical Resources Bulletin* [Online]. **2005.** 24:42-48

Pierce SJ, Mendez-Jimenez A, Rosero-Caicedo M, Monadjem A. Developing a code of conduct for whale shark interactions in Mozambique. Aquatic Conserv: *Mar Freshw Ecosyst* [Online]. **2010**; 20 (7): p 8.

Mau R. Managing for conservation and recreation: The Ningaloo whale shark experience. *Journal of Ecotourism* [Online]. **2008**; 7:213-225

Scarpaci C, Parsons ECM, Luck M. **2008**. Recent advances in whale watching research: **2006-2007**. *Tourism in Marine Environments* [Online]. 2008; 5(1):55-66.

California Environmental Protection Agency (CEPA). Fact Sheet e New Regulations for Gasoline Marine Engines. http://www.arb.ca.gov/msprog/offroad/recmarine/documents/facts.pdf (Accessed February 2, 2013)

Ziegler J, Dearden P, Rollin R. But are tourists satisfied? Importance-performance analysis of the whale shark tourism industry on Isla Holbox, Mexico. *Tourism Manage* [Online]. **2011**; 30: 1-10.

Bagarinao TU. **2011**. The Sea Turtles Capture by Coastal Fisheries in the Northeastern Sulu Sea, Philippines: Documentation, Care and Release. *Herpetol Conserv Bio* [Online]. **2011**; 6 (3): 353-363.

Plotkin PT (ed.). National Marine Fisheries Service and U. S. Fish and Wildlife Service Status Reviews for Sea Turtles Listed under the Endangered Species Act of 1973. Silver Spring, Maryland: *National Marine Fisheries Service*; **1995**. p 139.

Choi GY, Ecken KL. Manual of Best Practices for Safeguarding Sea Turtle Nesting Beaches. Wider Caribbean Sea Turtle Conservation Network Technical Report No. 9. Ballwin, Missouri: WIDECAST; **2009**. p 86.