IDENTIFYING AND ADDRESSING SEA TURTLE CONSERVATION AND MANAGEMENT PRIORITIES

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INTRODUCTION

In order to establish and implement a successful marine turtle conservation and management programme, we must first identify the priorities of our programme. We need to make smart choices in setting priorities because we are limited by funding, personnel and time. Many turtle management programmes in the past have suffered because they were too localised. In defining our priorities we must have a broad perspective on the problems both geographically and temporally. We must look think regionally as well as locally. This workshop offers us a superb opportunity to identify and begin to solve problems at the regional level. We must also think long term. It is not enough to look at the problems sea turtles face today. We must look into the future and predict what problems turtle will face, and where possible, prevent these problems before they arise. We must also look into the past, and evaluate the status and health of our sea turtle populations in the light of any exploitation to which they have already been subjected.

To identify conservation and management priorities for out turtle populations, we need to conduct research to evaluate their biological status and also to identify the greatest threats to their continued survival.

EVALUATING THE BIOLOGICAL STATUS OF SEA TURTLE POPULATIONS.

Five species of sea turtle occur within our region - the green turtle (*Chelonia mydas*) , the hawksbill (*Eretmochelys imbricata*), the loggerhead (*Caretta caretta*), the leatherback (*Dermochelys coriacea*), and the olive ridley (*Lepidochelys olivacea*). Not every species occurs in each country. Some countries have nesting populations, some have feeding populations, and some have both. Individual turtles, however, usually forage far from where they nest. So, if a country has both nesting and feeding populations of a given species, the nesting and feeding animals are not from the same population (or stock).

To evaluate the status of a turtle population, we need to understand the biology of the animals and what impact people are having on them. For any given area, the major biological questions are the following:

- What turtle species occur?
- What life stages occur? (eggs, juveniles, subadults, foraging adults, breeding adults)
- During what months of the year do the turtles occur?
- What is the geographic distribution of turtles within an area?
- How many turtles occur?
- Where do the turtles go when they leave an area?

Methodologies to answer these biological questions are described in the following sections.

BIOLOGY OF NESTING ANIMALS

Turtle track counts: Regular beach surveys during which turtle tracks are examined and counted will tell us: what species occur, how many clutches are laid annually, and the seasonal and geographic nesting distribution.

Turtle tagging programmes: Placing tags on turtles will tell us how often turtles come to nest during the course of a nesting season; how many years pass between nesting seasons; the precision with which turtles return to the same nesting beach; and their rates of survival. It can tell us how many years turtles remain reproductively active. When a tagged turtle is captured at a distant locality and the tag is reported or returned, we learn about migrations and also about the extent of harvest or incidental capture by people.

Determination of egg and hatchling mortality: By counting eggs as they are laid, marking their location on the beach, and then excavating the nest at the end of the incubation period and examining its contents, one can determine the rates of mortality in the nests. In most situations, however, natural predators are not a serious threat to the turtle population. The most destructive predators are usually human egg collectors and the animals that are associated with humans - especially feral dogs, pigs and cats. To evaluate the extent of *predation by humans and feral animals*, it is often sufficient to examine footprints on the beach and determine whether they are associated with nests that have been dug up.

MIGRATION OF TURTLES WITHIN THE REGION

Tagging studies: Until recently, most of what we know about turtle migrations was determined by tagging animals on their nesting and foraging grounds and then waiting for the tags to be returned by fishermen who killed the animals at distant locations. Unfortunately, the information based on tag returns is limited.

Genetic studies: A more effective method of determining migratory patterns in sea turtles is by using genetic markers. Blood or tissue samples are collected from turtles at their nesting beaches and characteristics of the DNA from these samples are examined in the laboratory. Scientists have shown that turtles from different breeding populations can be separated according to differences in their DNA. Once a particular breeding population has been described in terms of these genetic characteristics, individuals from that breeding population can be recognised by their genetic characteristics when they are encountered on distant foraging grounds. Information derived in this manner is valuable for regional cooperation in managing shared turtle resources. At the present time, genetic analysis is costly (about USD 1,000 per sample). Approximately 20-30 samples are needed to characterise a breeding population; 60 or more samples are needed to assess the origins of a foraging population.

Satellite tracking: Satellite telemetry can be used to track the exact migratory pathways utilised by an individual animal. With this information we can protect important migratory corridors. Unfortunately because the procedure is expensive (costing more than USD 5,000 to track the movements of a single animal) information can be obtained from only a limited number of animals.

BIOLOGY OF FORAGING ANIMALS

Turtles spend most of their lives at their foraging habitats, yet we know relatively little about them during that time. More studies of foraging animals are needed. By tagging, weighing and measuring them, we can learn about their distribution, their growth rates, and the size of their populations. If hunters and poachers can catch turtles in open areas, there is no reason why scientists and resource managers cannot.

HUMAN IMPACTS ON TURTLE POPULATIONS

EVALUATION AND MITIGATION OF SPECIFIC PROBLEMS

Purposeful harvest: Throughout the western Indian Ocean region people have long been harvesting turtles for meat, eggs, shell, skin and oil. Ideally we would strive for a sustainable harvest of the resource. In fact, however, sustainability is very difficult to achieve, especially when there has already been a long history of overharvest, as has been the case in much of the region.

Turtles have a complicated life history. Most take from 25 to 50 years to reach sexual maturity, and thus in a healthy turtle population, there are 25 to 50 age classes of juvenile and subadult turtles in the process of growing into adult turtles. This can give a false impression that there is an "over-abundance" of turtles in the sea when, in fact, such large numbers of immature turtles are necessary to maintain the adult population. Because there are so many age classes in a turtle population it is possible to go on for several decades slaughtering every nesting female or harvesting every egg clutch laid before a serious decline in numbers of nesting turtles would be apparent. By the time a decline is noted, it is usually too late to save the population (see Mortimer, 1995* for more details).

Past levels of exploitation contribute to the present vulnerability of a population. In many situations, total protection may be the only way to save a turtle population from extinction, especially if there has been a long history of overexploitation. Some people argue for the continuation of "traditional harvests". Unfortunately, in most parts of the world, as the human population is rising, the turtle population is declining. In such situations a traditional harvest would not be sustainable.

Accidental harvest: Possibly the most serious threat facing turtle populations toady is the accidental harvest of turtles in fishing gear. Estimates indicate that worldwide, many thousands of turtles paper month are accidentally captured in trawls. The proper use of turtle excluder devices (TEDs) can eliminate much of this problem. Wide-mesh nets also entangle turtles - especially pelagic drift nets, shark nets and many types of gillnets. Turtles, especially leatherbacks, get snagged by longliners. Leatherbacks are also vulnerable to entanglement in the float lines of lobster pots and squid traps.

Reporting programmes and placement of observers on fishing vessels will identify the extent of the problem. Turtle mortality can then be minimised by placing restrictions on the type of gear that can be used, by mandating that TEDs be used in areas inhabited by turtles, and by establishing fishery exclusion zones and closed seasons in "turtle hot spots".

Habitat destruction: Turtle habitat is being destroyed when development occurs to close to the sea. Artificial light discourages females from nesting and disorientates hatchlings. Because erosion and accretion are natural processes occurring on all beaches, adequate set back lines are critical aspects of land use planning if property loss or construction of sea walls and jetties are to be avoided. Sand mining on nesting beaches should be prohibited.

The best way to ensure the long term protection of nesting habitat is to procure it and place it within a system of nature reserves or national parks. Assume that all privately owned coastal land will be developed - set aside turtle nesting sanctuaries now!

Important foraging habitats and migratory corridors need to be identified and protected.

Pollution: Pelagic drift lines are created when ocean currents meet and down-welling occurs. It is here that turtles spend their early years - nourished by an abundance of small prey items concentrated by the currents. Unfortunately, pollutants such as garbage, plastic bags and other debris, tar balls and oil also accumulate along these drift lines. We must stop such materials reaching the sea immediately - from the land, and from ships.

Disease: Epidemics caused by the translocation of exotic micro-organisms are devastating populations of marine organisms in many parts of the world. Turtles are subject to such diseases, among them the fibropapilloma epidemic which is spreading to turtle populations throughout the world.

Global warming: Sea level rise caused by global warming is a potential threat to nesting beaches.

MANIPULATIVE MANAGEMENT STRATEGIES

Hatcheries: Establishment of hatcheries is sometimes necessary - especially in situations where predation by humans or feral animals is intense. Ideally, eggs should be allowed to incubate in their natural nests.

Headstarting: Headstarting the practice of growing hatchlings in captivity for a period of months or years prior to releasing them into the sea, is *not recommended* as a management technique.

BROAD BASED STRATEGIES INVOLVING PEOPLE

Public education and awareness campaigns: These need to be focused at all levels of society including politicians and decision makers, the general public, school children, and enforcement personnel.

Community involvement: Enabling local communities to benefit from conservation is critical to gaining long term support for conservation programmes. The most effective involvement occurs when people benefit economically, for example in programmes associated with ecotourism.

* **Mortimer, J.A. 1995.** Teaching critical concepts for the conservation of sea turtles. *Marine Turtle Newsletter* 71:1-4.