Diseases of marine organisms

H11

Diseases are increasingly being reported from a range of marine organisms. In part this is due to the larger number of researchers and observers in the water, but it may also be related to changes in water quality and other human impacts. This sheet gives a brief introduction to the topic and advises the MPA manager on how to deal with suspected cases of disease.

During the last two decades, the potential for severe impacts to coral reef populations and communities from the effects of various diseases has been recognised. Diseases have been described affecting corals, fish, coralline algae, and sea urchins, sometimes with wide-ranging effects. Disease is defined as any impairment in an organism's vital functions, systems, or organs. A pathogen is an agent that causes disease, which can be biotic, such as a virus or bacterium, or abiotic, such as a toxic chemical or above-normal water temperature. Often, biotic and abiotic disease agents are closely related. For example, some cases of coral bleaching are caused by newly discovered species of bacteria when water temperatures are elevated. Diseases are also classified as infectious, spreading from one host to another like influenza, or non-infectious, like a genetic defect. To recognise disease, it is important to look for signs of change(s) that indicate abnormal structure or function (metabolism, morphology, behaviour), morbidity, or death in organisms; it is not necessary to identify the pathogen causing the changes (this can be very difficult).

TURTLES

Green, loggerhead, hawksbill and olive ridley turtles can develop fibropapillomatosis disease (FP) which is characterised by irregular, often large, cauliflower-like tumours, primarily on soft tissues.These spread over the body, both internally and externally, and often cause death by interfering with essential bodily processes. First described in Atlantic green turtles in the 1930s, FP has become widespread especially in green turtles. FP is believed to be caused by herpesviruses interacting with tumour-promoting biotoxins. It has reached epidemic proportions in Florida, Hawaii and parts of Australia, and is possibly linked with pollution. FP has been reported from the WIO, but has yet to be confirmed through clinical analysis of tissue samples. Another poorly understood disease, coccidiosis, killed many green turtles in Florida in 2002.

CORALS

Coral diseases were largely unknown until the 1970s, but have become a catastrophic problem for coral reefs in the western Atlantic. Direct and indirect mortality as a result of disease has modified the composition and structure of reefs in several parts of the Caribbean Sea by removing common and locally abundant species. For example, white-band disease killed some of the important acroporid reef-building corals. Pathogens have been identified in two coral diseases: aspergillosis of Caribbean gorgonians is caused by a fungus; and, a white plague type II is caused by a bacterium. More than 100 hard and soft coral species in 54 countries, mainly in the Caribbean, have been affected by possible diseases. Diseases have been reported from other regions, including the WIO, but have been much less well studied. One example is black-band disease that is known to affect many species in the Indo-Pacific and Red Sea, as well as in the Caribbean. Bleaching can be an important sign of disease, indicating that the mutually beneficial relationship between the host coral and its zooxanthellae is impaired. Causes of bleaching include pathogenic bacteria, protozoans, and exposure to abiotic stressors. Note that coral bleaching caused by elevated water temperature during El Niño events (e.g. in 1998) is not a coral disease.

Loss of tissue from the skeleton of corals can result from abiotic stressors and pathogenic microorganisms. Physical damage similarly removes tissue and must be ruled out when investigating disease. The CD on Caribbean coral diseases (see Sources) provides information on damage from coral predators. Butterfly fish, parrotfish, and snails (e.g. *Drupella*) can leave marks on coral colonies that look similar to disease-related tissue loss. Human contact can also result in lesions on corals that might be confused with disease. Skeletal damage is one distinguishing characteristic; for example where parrot fish have been feeding there will be clear bite marks.

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Astreopora colony with pale patches resulting from death of polyps due to an unidentified pathogen.

SEAGRASSES

Diseases can have an impact on seagrass beds, as seen in the wasting disease that devastated eelgrass beds in the 1930s, and the more recent seagrass die-off in tropical waters in Florida Bay in the late 1990s. The latter was caused by a bloom of the slime mould *Labyrinthula* sp. perhaps triggered by sedimentation and pollution. Seagrass die-offs have also been reported in eastern and western Australia, with a large die-off in Queensland in 1996.

To date, no comprehensive study has been conducted on diseases in the WIO. A common fish disease, ciguatera,

which is communicable to humans, is widespread in the Pacific Ocean, and does occur in the WIO. It is caused by dinoflagellates living in blue green algae, and probably occurs naturally, but may be triggered by elevated sedimentation and loss of water quality through human impacts.

KEY POINTS FOR THE MPA

There are no known cures for most of the diseases of wild marine organisms, but it is important to understand if changes seen are due to disease or other sources. If disease is suspected:

- **Keep records, particularly as part of the monitoring programme (e.g. ReefCheck protocol).**
- **Clearly describe the changes from normal function or behaviour seen; size, shape, colour, and distribution of lesions; which species are affected; dates and times.**
- **Look around for possible hidden predators (e.g. fish, snails, COTS) or abiotic factors (e.g. increased water temperature or turbidity, decreased salinity, algal blooms, chemical spills).**
- **Try and get the disease identified (because several laboratory procedures are often needed to do this, you might contact the local fisheries agency or a veterinary pathologist at an aquarium).**

Sources of Further Information

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UNEP/WCMC Field Guide to Western Atlantic Coral Diseases and other causes of coral mortality. CD-ROM. (has descriptions and photos of diseased corals, with identification keys). **www.trinity.unep-wcmc.org/scripts**

Global Database on Coral Diseases. Marine and Coastal Programme, UNEP-WCMC: **info@unep-wcmc.org; www.unep-wcmc.org**

For information on turtle diseases: **www.turtles.org** and **www.turtletrax.org**

CASE STUDY

Coral disease in Kenya and Tanzania

A fungal disease caused mortalities of *Montipora* spp., *Astreopora* spp., *Echinopora* spp. and other hard coral species on reefs along 600km of coastline in Kenya and Tanga, Tanzania, in March 2002. *Montipora* was nearly eliminated from Kenyan reefs. *Acropora* spp., *Platygyra* spp., *Goniopora* spp., and massive *Porites* spp. were also affected; however, *Porites* spp. and *Goniopora* spp. rarely died and often recovered, whereas death for most other species occurred within two weeks. In *Echinopora* spp. and *Montipora* spp., a dull ashy tissue color and brittle skeletons characterized the early stages of this event with a mucus layer forming on the tissue surface. The mucus then disappeared and the surfaces were covered in a white calcareous dust. *Astreopora* spp. tissues became dull and pale without mucus, and eventually the skeleton became bare. Samples fixed in seawater-formalin were sent to two laboratories, but samples for microbiological studies could not be obtained from the field sites. Microscopy revealed fungi in the three genera that died. These were possibly secondary invaders that killed the corals already weakened by some another pathogen that could not be identified. This illustrates the difficulty in identifying diseases even when, as in this case, experts are called to assist (see reference McClanahan *et al*. in press).

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Echinopora colony showing clear signs of disease (pale patches) where the polyps have died. The dark portion is still living.