



## Reduce pathogenic bacteria through seagrass protection

To help policy makers and leaders make informed decisions about managing seagrasses, this policy brief reports how protected seagrasses can reduce bacteria pathogenic to humans and marine life by up to 50 per cent.

### GUIDELINES

- 1 **Allocate more seagrass ecosystems as no-take areas and restore seagrass habitats that have been badly degraded.**
- 2 **Integrate seagrass treatment systems with aquaculture.**

### The global loss of seagrass meadows is estimated at seven per cent each year since 1990.

Seagrass meadows reduce bacteria pathogenic to humans and marine life by up to 50 per cent, a study in Indonesia completed as part of the Capturing Coral Reef & Related Ecosystem Services project (CCRES) and reported in *Science* magazine (Vol 334, Issue 6326, 2017) has found.

These findings highlight the importance of seagrass ecosystems to the health of people and marine organisms, including coral reefs, fisheries (wild and farmed) and seaweed in coastal areas worldwide, the authors of the report say. Not only could seagrasses help with improving water quality in ever more populated coastal zones (it is estimated that one billion people will inhabit low-lying coastal zones by 2060) they could also play a key role in sustaining the rapid increase of aquaculture in the face of global food shortages.

Removing human pathogens from water is essential for human health. Plants, with their natural biocides, play a vital role — one that can offer significant economic benefits. Although seagrasses are known to produce natural antibiotics, they have not been evaluated for their ability to remove pathogens from the ocean, or for their ability to mitigate disease there.

### TARGET OUTCOME

Marine ecosystems that incorporate healthy seagrass meadows that reduce bacteria to help improve human and marine life health in Indonesia.

### AIM

This policy brief aims to demonstrate that there is evidence that protecting seagrass meadows can reduce bacteria pathogenic to humans and marine life by up to 50 per cent.

**Seagrass meadows play a critical role in keeping marine ecosystems healthy by reducing pathogenic bacteria.**

Photo: M. Hein





**CCRES researchers Dr Joleah Lamb and Dr Syafyudin Yusuf surveyed reef corals and found that levels of disease were reduced 50 per cent when adjacent to seagrass meadows.**

Photo: C. Couch

## EVIDENCE

Working off four islands in South Sulawesi CCRES researchers, including researchers from Cornell University, Ithaca, USA, and Hasanuddin University, Makassar, Indonesia, sought to assess the influence of seagrass on marine microbial pathogens and disease. They found the presence of the bacteria *Enterococcus* to exceed recommended human health level by 10-fold. However, levels of the bacteria were reduced three-fold in the presence of seagrass.

Further studies revealed that the abundance of marine fish and invertebrate pathogens was 50 per cent lower when seagrass was present. And, field surveys of over 8,000 reef-building corals adjacent to seagrass meadows showed two-fold reductions in disease compared to corals without seagrass neighbours.

Previously the significant roles of seagrasses, especially in the context of reducing pathogens that endanger both people and nearby ecosystems, was not understood. The findings reveal why protecting the quality and quantity of seagrass ecosystems should be an integral part of coastal ecosystem management in most coastal areas

of Indonesia, and likely elsewhere in southeast Asia, especially those adjacent to Marine Protected Areas (MPAs) or tourism areas.

The findings also demonstrate the potential role seagrass ecosystems could play in sustaining a fast-growing source of the world's food, aquaculture — an industry that is highly susceptible to disease outbreaks from bacterial infections. Integrating seagrass treatment systems with aquaculture could lower the economic and environmental costs accompanying routine use of vaccines, pesticides and therapeutics for treatment of marine disease outbreaks.

## SCIENTIFIC REFERENCE

Lamb JB, van de Water JAJM, Bourne DG, Altier C, Hein MY, Fiorenza EA, Abu N, Jompa J, Harvell CD (2017) Seagrass ecosystems reduce exposure to bacterial pathogens of humans, fishes, and invertebrates. *Science* (Vol 344, Issue 6326).

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## CAPTURING CORAL REEF AND RELATED ECOSYSTEM SERVICES

The Capturing Coral Reef and Related Ecosystem Services (CCRES) Project is a regional technical support project that seeks to unlock new, sustainable income streams for coastal communities in the East Asia-Pacific region. CCRES is developing knowledge products to inform the design of global, regional and national projects, plans and policies, and technical models and planning tools to help with the preparation of community-based coastal resource management plans.

