LME LEARN

THE LARGE MARINE ECOSYSTEM APPROACH

An Engine for Achieving SDG 14

LME LEARN

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

UNDP

Empowered lives. Resilient nations.

gef

Table of Contents

For bibliographic purposes this publication may be cited as:
GEF LME:LEARN, 2017. *The Large Marine Ecosystem Approach: An Engine for Achieving SDG 14*. Paris, France.

2017

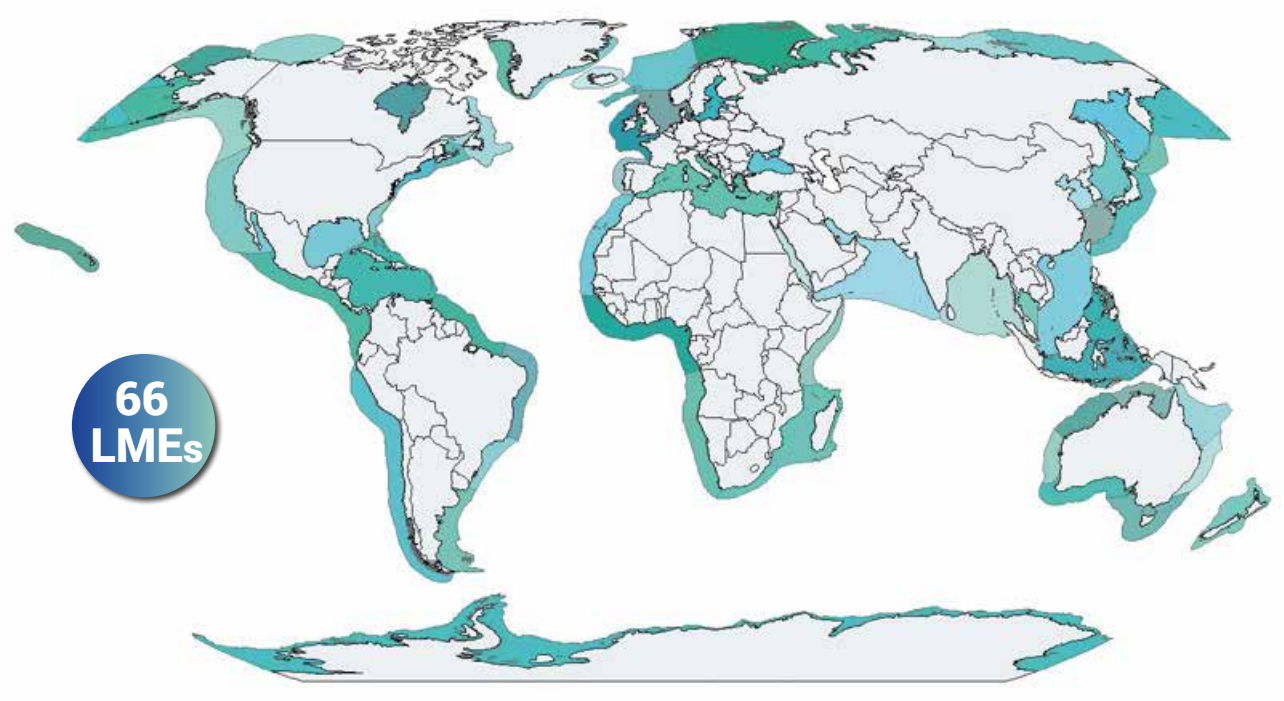
Lead author : Taylor Henshaw
Graphic design and typeset: Anna Mortreux

Acknowledgements : Special thanks to all LME:LEARN partners who provided review and other support.

Printed by UNESCO

Printed in France

marine.iwlearn.net



What Are Large Marine Ecosystems (LMEs)?

Many are transboundary in nature by virtue of interconnected currents and movement and migration of marine resources.

Characterized by their unique undersea topography, current, marine productivity and food chain interactions.

Relatively large areas of ocean space of about 200,000 km^2 or more, adjacent to the continents and extending out to the break in a continental shelf or the seaward extent of a current system.

Harbor biodiversity and provide important ecosystem services and tangible benefits, including livelihoods, food security, carbon sequestration and storage, marine transport and recreational opportunities.

Taken together, provide direct services approaching US$3 trillion annually, with a non-market value estimated at US$22 trillion each year.

LME Pressures and Risks

A combination of anthropogenic and natural pressures is impacting the health and productivity of LMEs, compromising the sustainability of LME ecosystem services.

These pressures are accelerating, and without concerted action their impacts could become irreversible.

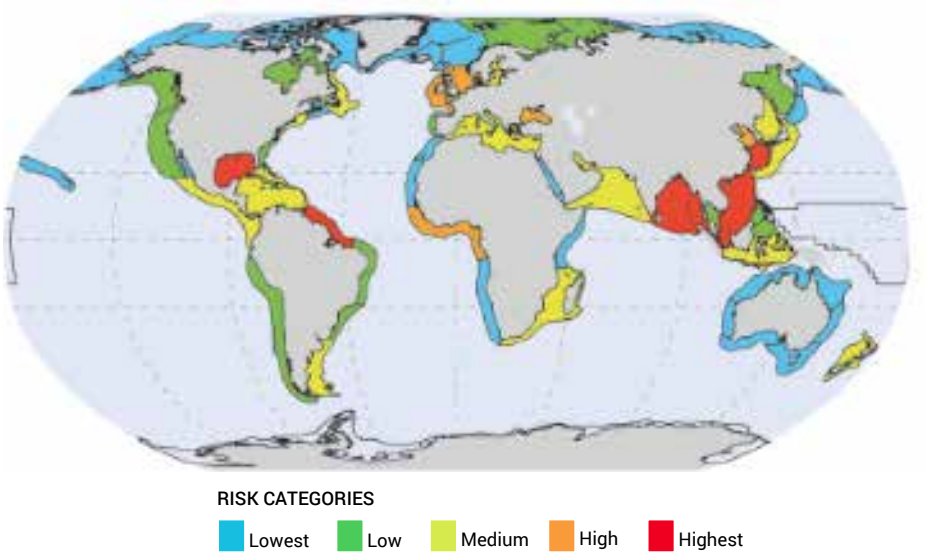
Nutrient Over-Enrichment and Hypoxia

Excess nutrients—such as nitrogen, phosphorus and silica—entering coastal waters from land-based sources can lead to coastal hypoxia, or "dead zones".

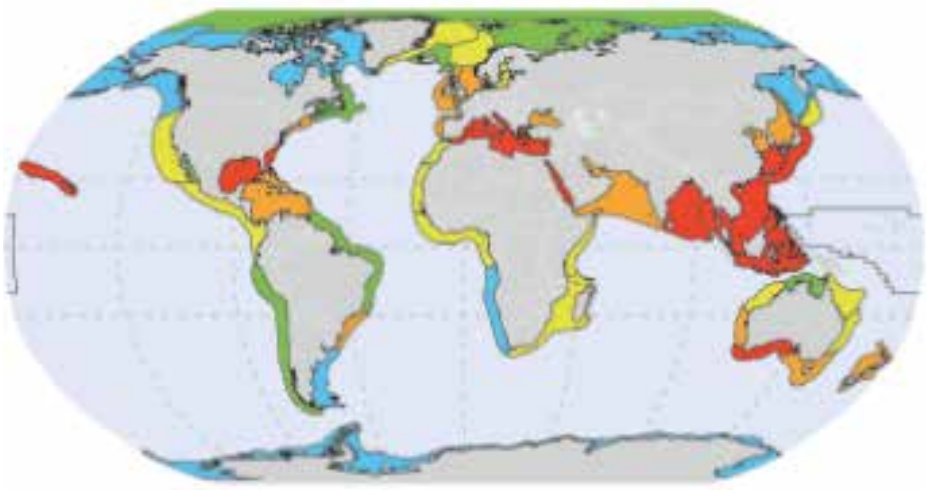
Nutrient enrichment stimulates excessive growth of algae and other plants. As algae dies, bacteria break it down and in the process consume all the dissolved oxygen in the area.

The lack of oxygen can impair or kill marine organisms, disrupt natural food chains and threaten human health and wellbeing.

The below map shows which LMEs are currently at risk of harmful algal blooms.



Marine Debris/Pollution



Floating plastic is now ubiquitous in LMEs.

Plastics impact marine ecosystems from the largest macro (marine mammals and bird ingestion) to the micro (plankton ingestion).

Within 25 years, the ocean plastic load could grow to one ton of plastic for every three tons of fish.

Plastics can cause major economic loss and pose a threat to navigation and human safety. The annual economic damage of marine debris is estimated at US$ 8 billion per year.

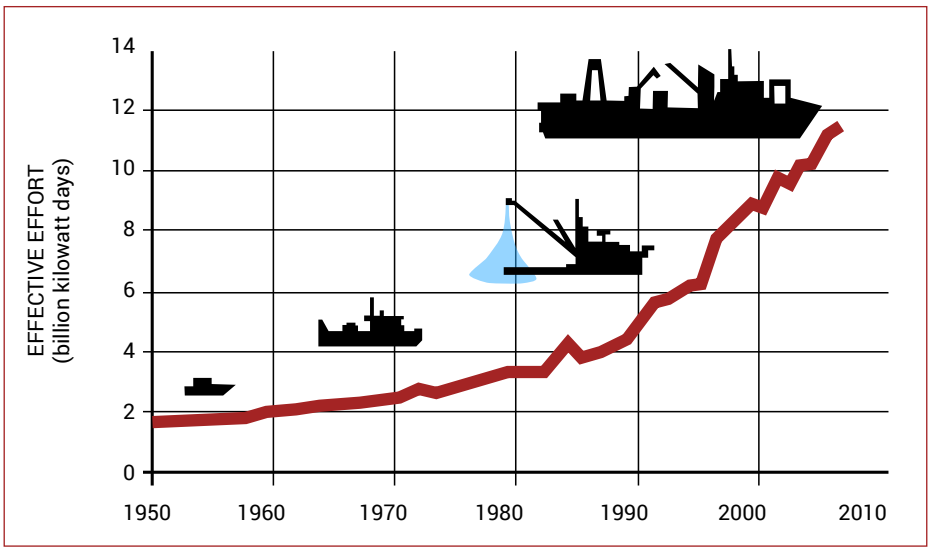
The above map shows current LME risk for plastic pieces of 5mm diameter and bigger.

Unsustainable Fishing Practices

LMEs contribute 90-95 percent of global marine fisheries catches.

Unsustainable fishing practices have resulted in close to 30 percent of fish stocks within LMEs being overexploited or collapsed.

The greatest increase in global LME effective fishing effort has been in the last decade. This reflects a change in fishing technology as well as the increase in size and activity of fishing fleets.

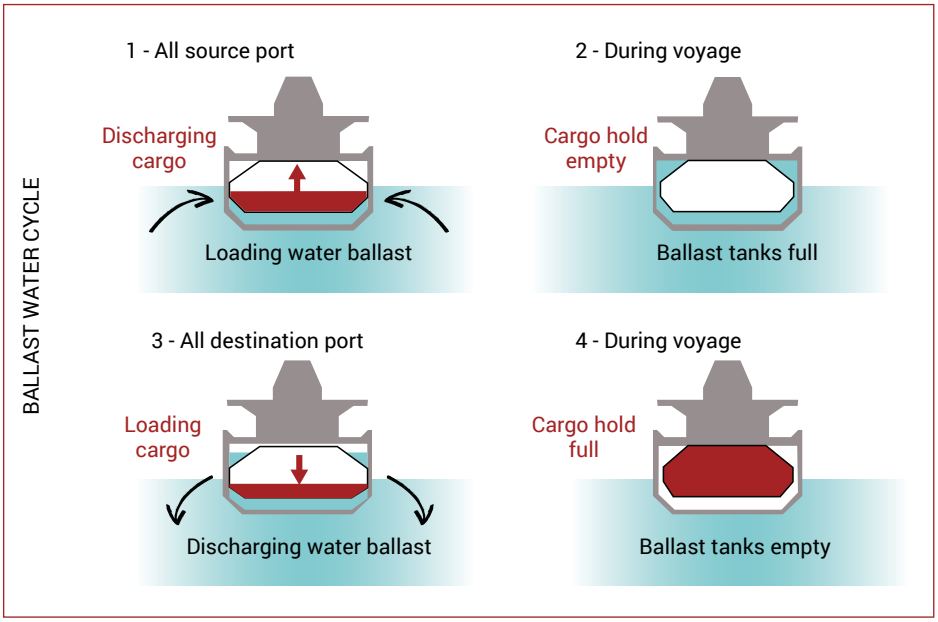


Invasive Species Introductions

Invasive aquatic species are organisms that cause ecological or economic harm in a new environment where they are not native. Once a given invasive species has established itself and disrupted the local marine or freshwater ecosystem, it is virtually impossible to eradicate.

They are capable of reducing biodiversity, competing with native organisms for limited resources, and altering habitats.

Invasive species are primarily transferred via ships' ballast water and hulls and mobile marine infrastructure.



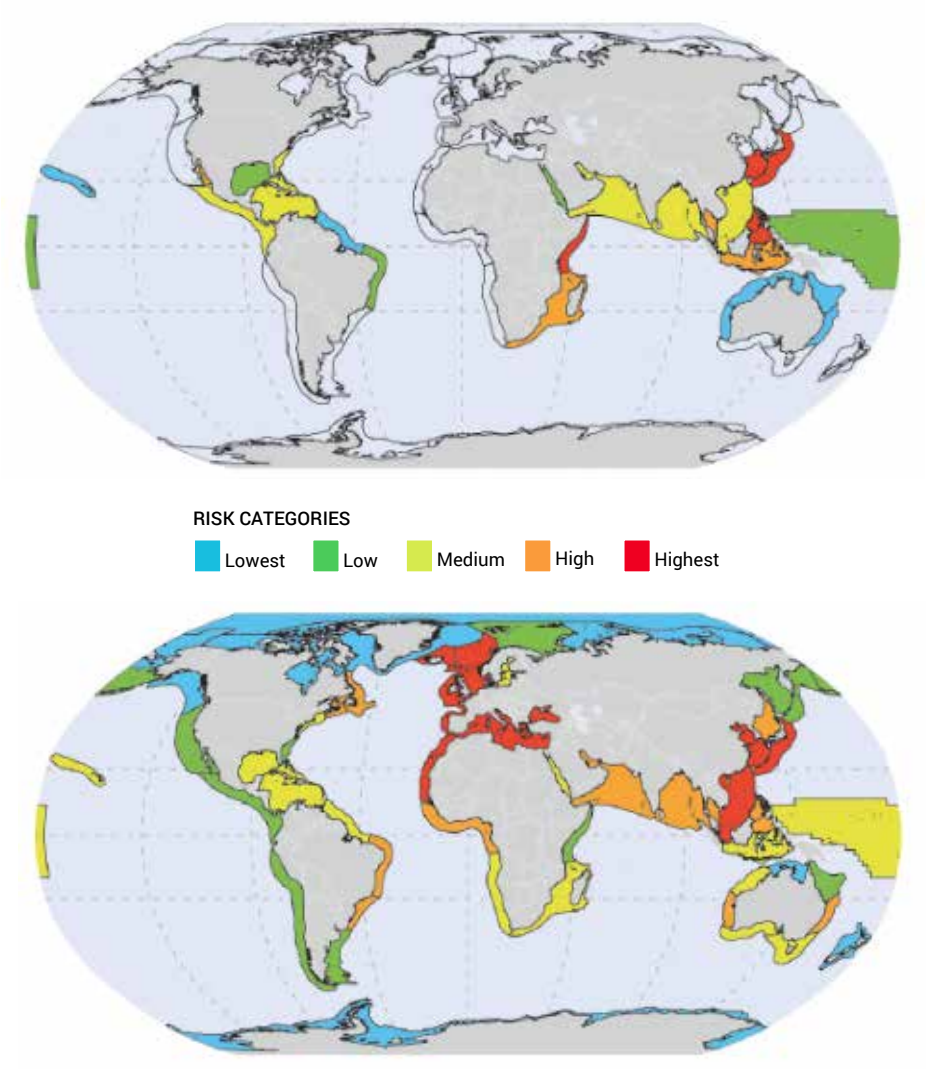
Ocean Acidification

About 25 to 30 percent of anthropogenic carbon dioxide from the combustion of fossil fuels over the last 200 years have dissolved in the ocean as carbonic acid.

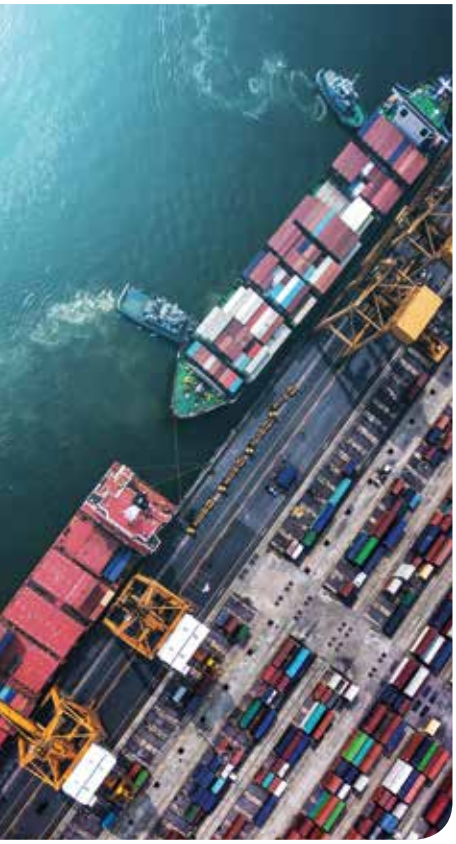
This has resulted in a change to ocean carbonate chemistry through lowering the average pH of the ocean, representing an increase in ocean acidity of about 30 percent.

This increased acidity reduces the availability of carbonate ions needed by numerous marine organisms (including coral reefs but also many keystone plankton species) that fix calcium carbonate for their shells or skeletons.

The map below shows reefs currently at risk from local and global threats, including ocean acidification.



Cumulative Human Impact



The GEF Transboundary Waters Assessment Programme's (TWAP) 2016 LME assessment is the first indicator-based global comparative baseline assessment of the 66 LMEs and the cumulative human impacts on these ecosystems (www.geftwap.org).

Human pressures affecting LMEs fall mainly into four categories: climate change; commercial fishing; land-based pollution; and commercial activity (such as shipping and tourism).

Pressures associated with climate change, most notably ocean acidification and sea surface temperature rise, are the top stressors for nearly every LME.

TWAP assigned one of five risk categories based on rank order of cumulative impact scores (based on the four categories) across all LMEs (map above).

The LME Modular Approach

Prompt and large scale action is needed to overcome the downward trend of losses of LME goods and services; to mitigate the degradation of LMEs in the face of the accelerating effects of climate change; and to achieve integrated adaptive ecosystem-based management (EBM) of LMEs.

EBM involves a paradigm shift from single species or single sector management to entire ecosystem management, and integrates a science to policy process. Operationalizing the EBM concept is the aim of the LME Approach. The LME Approach provides a five-module strategy for assessing and monitoring LMEs and for taking remedial actions toward the recovery and sustainability of degraded goods and services in LMEs. The modules are focused on the application of suites of indicators for measuring LME socioeconomics, productivity, governance, pollution & ecosystem health, and fish & fisheries, which are incorporated into a multi-country LME strategic planning process through development of a Transboundary Diagnostic Analysis (TDA) and a Strategic Action Programme (SAP).