GEOGRAPHY BULLETIN

OCEANS 1
Value and Vulnerability

The Geography Teachers Association of NSW & ACT Inc.

Volume 53 No3 2021

IN THIS ISSUE:

About the UN Decade of Ocean Science

2021 ArcGIS StoryMaps Challenge for Restoring Our Ocean Competition

Visualising the Human Impact on our Ocean Economy

Why indigenous knowledge should be an essential part of how we govern the world's oceans

Mapping the World's Key Maritime Choke Points

Container: The box that changed the world

One Ocean, One Future –New Australian Maritime Museum exhibition

Skills Stimulus

Geographical Inquiry using posters – Focus on Oceans and Asia

Is Ocean Fishing Sustainable?

Oceans surrounding Asian countries at crisis point

PROJECTS • REPORTS • RESOURCES • ARTICLES • REVIEWS

EXECUTIVE 2021

GEOGRAPHY BULLETIN

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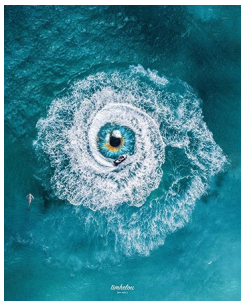

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The Geography Bulletin is a quarterly journal of The Geography Teachers' Association of NSW & ACT Inc. The 'Bulletin' embraces those natural and human phenomena which fashion the character of the Earth's surface. In addition to this it sees Geography as incorporating 'issues' which confront the discipline and its students. The Geography Bulletin is designed to serve teachers and students of Geography. The journal has a specific role in providing material to help meet the requirements of the Geography syllabuses. As an evolving journal the Geography Bulletin attempts to satisfy the requirements of a broad readership and in so doing improve its service to teachers. Those individuals wishing to contribute to the publication are directed to the 'Advice to contributors' at the back of this issue.

GEOGRAPHY BULLETIN

Volume 53, No 3, 2021
EDITOR: Lorraine Chaffer

EDITORIAL 2

About the UN Decade of Ocean Science 5

2021 ArcGIS StoryMaps Challenge For Restoring Our Ocean – Competition 11

Visualising the Human Impact on our Ocean Economy
Visual Capitalist (republication) 12

Why indigenous knowledge should be an essential part of how we govern the world's oceans
The Conversation (republication) 15

Mapping the World's Key Maritime Choke Points
Visual Capitalist (republication) 17

Container: The box that changed the world
Australian Maritime Museum (republication) 20

One Ocean, One Future –
New Australian Maritime Museum exhibition 24

Skills Stimulus 25

Geographical Inquiry using posters – Focus on Oceans and Asia 33

Is Ocean Fishing Sustainable?
Susan Bliss, Education consultant 40

Oceans surrounding Asian countries at crisis point
Susan Bliss, Education consultant 53

2021 Australian Geography Competition 60

ADVICE TO CONTRIBUTORS 64

Edition 4 is titled Oceans 2. It features a full case study Australia's Great Southern Reef.

This case study can be used for Stage 6 Ecosystems at Risk OR Stage 5 Environmental Change and Management.

EDITORIAL

EDITORIAL

Welcome to Volume 53, Issue 3, 2021. This edition has a focus on oceans given the start of the Decade of Ocean Science and the need to increase our oceans literacy by thinking of ways to incorporate, facts, stories, issues and solutions about oceans into our Geography curriculum and teaching practices.

The first articles draw attention to the need to value of our oceans and threats to those values. These articles include:

- An Introduction to *the Decade of Ocean Science*
- **Republished articles**. Two stories from **Visual Capitalist** *Visualising the Human Impact on our Ocean Economy* and *Mapping the World's Key Maritime Choke Points* focus on the value of our oceans for goods and services and importantly an issue affecting ocean trade. A blog post from the **Australian Maritime Museum** *Container: The box that changed the world* provides a deeper understanding about the growth of containerisation with obvious links to the issue of choke points in global ocean shipping routes. Lastly a story about the need to incorporate Indigenous practices into ocean management across the globe in *Why indigenous knowledge should be an essential part of how we govern the world's oceans* from **The Conversation.**

Two sets of skill and inquiry activities follow these republished articles:

- *Geographical Skills* activities based on stimulus material such as infographics, photographs, illustrations and text.
- *Geographical Inquiry: Using posters in the Geography classroom.*

Two articles by Dr Susan Bliss:

- *Is Ocean Fishing Sustainable?*
- *Oceans Surrounding Asian Countries at Crisis Point*

These articles are a summary of facts about the marine fishing industry globally and within Asia. This material is supported by student activities that can be found in Appendix 1 on the GTA website.

This edition ends with a report from the 2021 Australian Geography Competition and includes the International Geography Olympiad and 2021 Geography Big Week Out.

Lorraine Chaffer

Lorraine Chaffer,

Ocean related articles in past editions

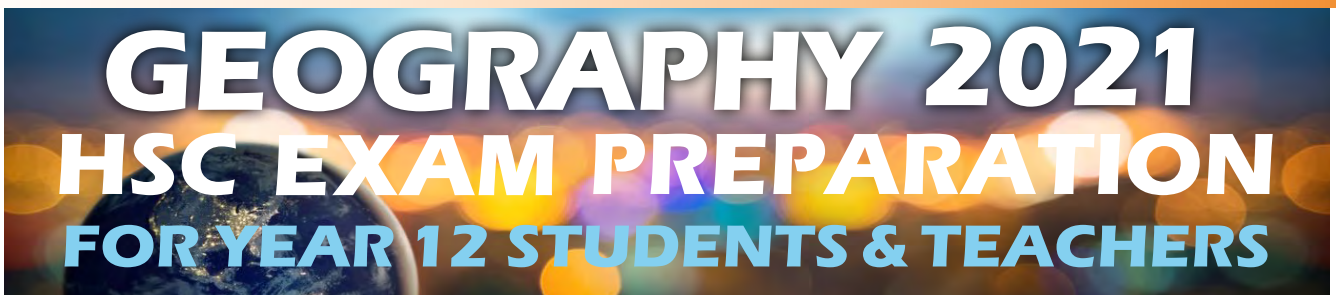
Ocean Atlas Web Dossier and PDF Volume 53, No 1, 2021

Sharks in hot soup Dr Susan Bliss Volume 49, No 1, 2017

Announcements

The Asia Education Teachers Association is now sharing all of its resources on their website https://aeta.org.au

AGTA Conference Rescheduled for October 2022



GTA NSW & ACT has traditionally organised revision lectures for HSC Geography students and their teachers. In 2021 schools will be offered a repeat of the Digital Package produced in 2020 (minor revisions made) with a 2021 Supplement of new and updated materials.

The package consists of pre-recorded videos and support materials. Teachers can use the materials with their HSC classes, irrespective of the number of enrolled students.

- Recommended for tutorial and in class revision / teacher led revision.
- Transfer key ideas from illustrative examples and case studies to your own studies*
- Not to be used for private tutoring purposes.
- Streamed directly from Vimeo and not downloadable.
- Support materials downloadable from a Google Drive Folder.

CONTENTS:

MAIN PACKAGE	2021 SUPPLEMENT
Ecosystems at Risk – EAR Part 1 & Part 2 using illustrative examples. Lorraine Chaffer	EAR: Know your case studies – through the lens of a study of the Great Barrier Reef. Matt Carroll
	HSC Question Drop EAR / EAR Matt Carroll
People and Economic Activity with a focus on Global Tourism. Dr Grant Kleeman	PEA: Investigating an Economic Enterprise – through the lens of a study of Tamburlaine winery Matt Carroll
People and Economic Activity – General syllabus overview and advice. Lorraine Chaffer	Economic Activity Update: Global Tourism in the age of COVID-19 Dr Grant Kleeman
Urban Places Karen Bowden	Section III – Hitting the band descriptors Alexandria Warnock
HSC Geographic Tools and Skills Sharon McLean	Effective use of fieldwork. Making your fieldwork count. Grace Larobina
	Know your fieldwork tools and skills cards Lorraine Chaffer
Student workbooks for: – EAR, PEA, Urban Places – Skills and tools.	Checklist: On the road to the Trail HSC Extended response templates Catherine Donnelly

ACCESS:

The package will be available from Friday 11 June until the end of the HSC Geography Exam. The teacher(s) who completes the registration will be provided with the download details once payment has been received.

COST:

Main Package plus 2021 Supplement –

- **$250** plus GST – **Members** (school or personal)
- **$350** plus GST – **Non-members**

2021 Supplement ONLY –

- **$60** plus GST – **Member schools**
- **$120** plus GST – **Non-members**

NOTE: the supplement is for those schools who were able to download the 2020 package to their school network for students to access independently; this feature is not offered in 2021.

BENEFIT:

Although created for students in Year 12, teachers new to teaching Stage 6 and currently teaching Year 11 could benefit from a good overview of the Year 12 topics and the advice from presenters covered in this package.

ORDER AND PAY HERE

GTA NSW & ACT is providing ONE TIME access to selected presentations recorded at the 2021 GTA Annual Conference to schools unable to attend due to factors unique to 2020–2021. Some recordings, particularly workshop sessions are condensed versions of the live events.

DETAILS

- Presentations in the package focus on the following Professional Teaching Standards
  - Standard 2: Know the content and how to teach it; and Standard 6. Undertake Professional Learning
  - classroom practice
  - deep learning about environmental processes, change and management
  - integrating geospatial technologies
  - identifying careers that draw on Geography
- Access is continuous until the end of Term 4, 2021
- Accessible at any time via a weblink with a passcode – not downloadable
- PPTs and support materials for each presentation as provided at the conference

HOW TO USE THE PACKAGE

- **Whole faculty /department/ team** viewing at team or staff meetings/ professional development days
- **Individual** viewing and discussion at team or faculty level
- For workshop sessions, stop and complete the activities as if you were at a conference.
- Elective PL Hours – reflection using the identified Teaching Standards https://etams.nesa.nsw.edu.au/help/how-to-log-teacher-identified-pd-index/

COST

- **Member schools – $330 per school** (inc. GST)
- **Non-member schools – $440 per school** (inc. GST)

Registration until 14 August 2021 to allow adequate time to make use of the materials in the package.

ORDER & PAY HERE

ACCESS THE INFORMATION FLYER OUTLINING THE PACKAGE CONTENT

THE UN DECADE OF OCEAN SCIENCE

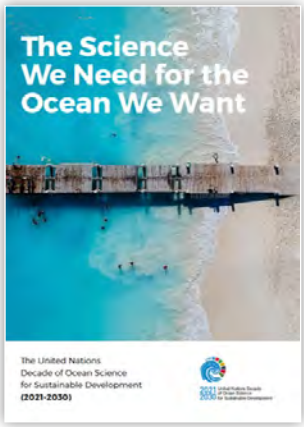
THE OCEAN WE WANT

Lorraine Chaffer

United Nations Decade of Ocean Science for Sustainable Development 2021 - 2030

United Nations Educational, Scientific and Cultural Organization · Intergovernmental Oceanographic Commission · 2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Sources: The UN Decade of Ocean Science for Sustainable Development: The science we need for the ocean we want https://www.oceandecade.org



The United Nations Decade of Ocean Science for Sustainable Development is dedicated to working with ocean scientists to achieve the Sustainable Development Goals at global, regional, and local scales. It is a framework to ensure that ocean science supports countries to achieve the 2030 Agenda for Sustainable Development by providing foundational knowledge and technologies to strengthen ocean management. The UN recognises huge gaps in our knowledge about the oceans and the inequality between nations in access to scientific technologies and therefore capacity to bring about change. 'While many countries benefit from sophisticated, cutting-edge scientific infrastructure, technology, and human capacity for science and innovation, the Global Ocean Science Report concluded that major disparities exist in the capacity around the world to undertake marine scientific research'.

"The ocean is our planet's largest ecosystem. It stabilizes climate, stores carbon, nurtures unimaginable biodiversity, and directly supports human well-being through food and energy resources, as well as by providing cultural and recreational services.

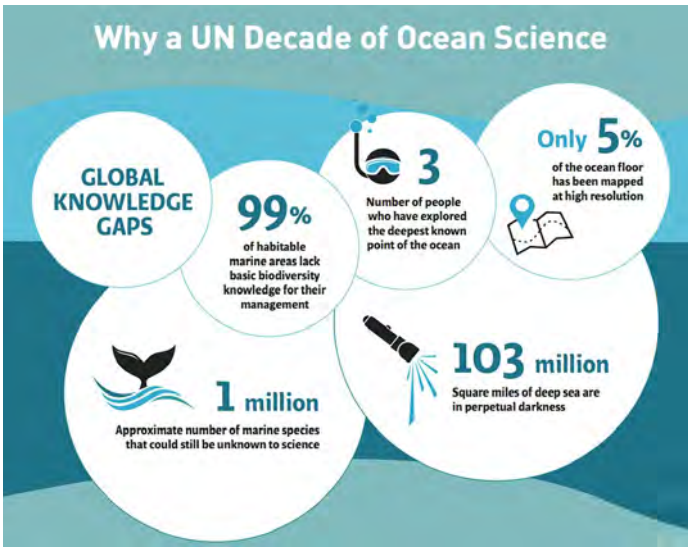
Unfortunately, despite improved management and conservation actions, the United Nations' First World Ocean Assessment found that much of the ocean is now seriously degraded. As the world population will reach an estimated 9 billion people by 2050, impacts on the ocean associated with human activities will increase."

Source The Science We Need For The Ocean We Want
https://soos.aq/images/soos/activities/UN%20Ocean%20Decade/Brochure-UNDECADEFOROCEAN.pdf

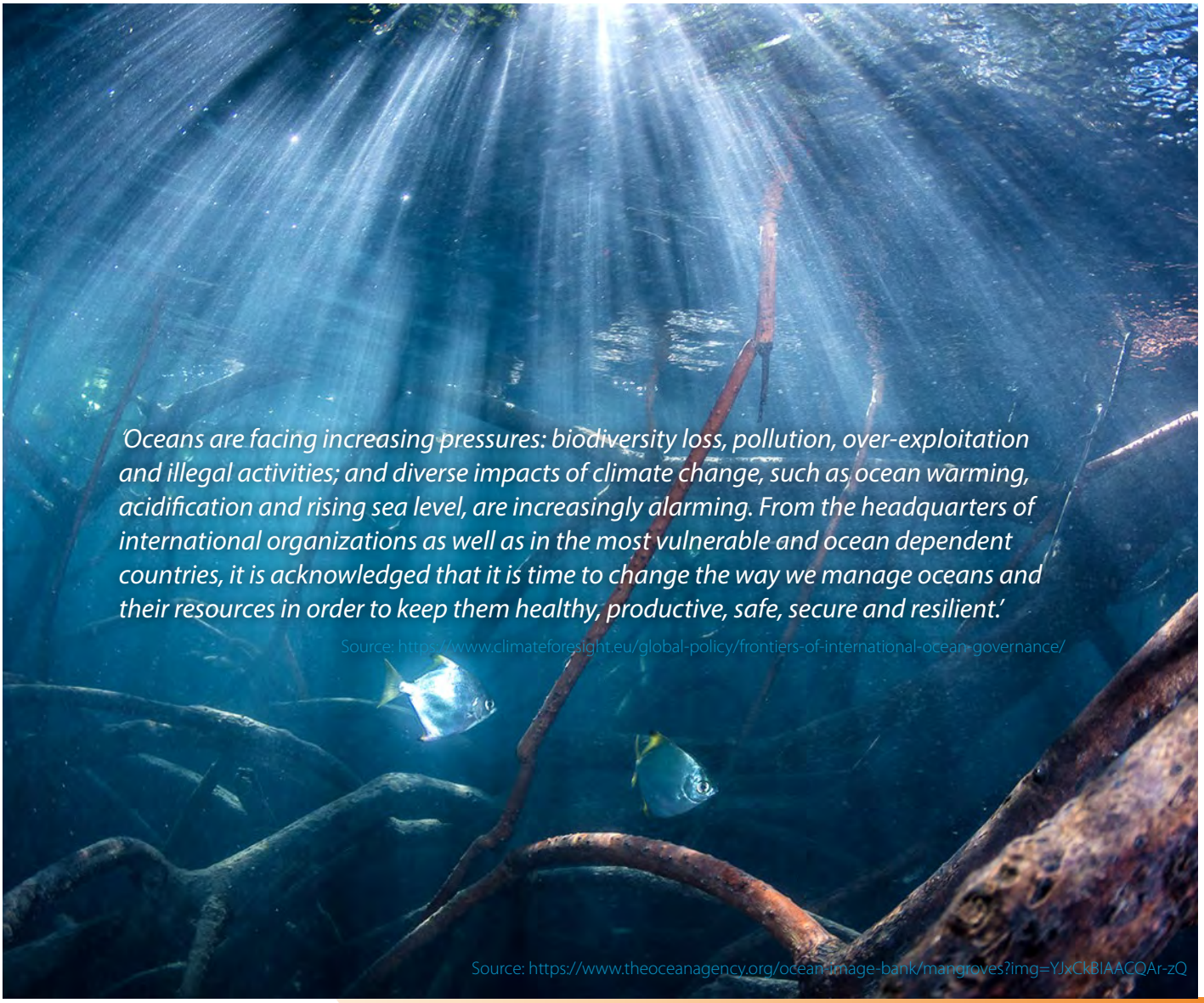
The Ocean Decade declaration underpins a vision to deliver the following outcomes:

1. A **clean ocean** – sources of pollution identified, reduced, removed.
2. A **healthy and resilient ocean** – marine ecosystems are understood, protected, restored, managed.
3. A **productive ocean** – sustainable food supply and ocean economy.
4. A **predicted ocean** – society understands and responds to ocean change.
5. A **safe ocean** – life and livelihoods are protected from ocean-related hazards.
6. An **accessible ocean** – open and equitable access to data, information, technology, innovation.
7. An **inspiring and engaging ocean** – society understands and values the ocean for human wellbeing and sustainable development.

Figure 1: Why a UN Decade of Ocean Science



Source: https://www.climateforesight.eu/global-policy/frontiers-of-international-ocean-governance/



'Oceans are facing increasing pressures: biodiversity loss, pollution, over-exploitation and illegal activities; and diverse impacts of climate change, such as ocean warming, acidification and rising sea level, are increasingly alarming. From the headquarters of international organizations as well as in the most vulnerable and ocean dependent countries, it is acknowledged that it is time to change the way we manage oceans and their resources in order to keep them healthy, productive, safe, secure and resilient.'

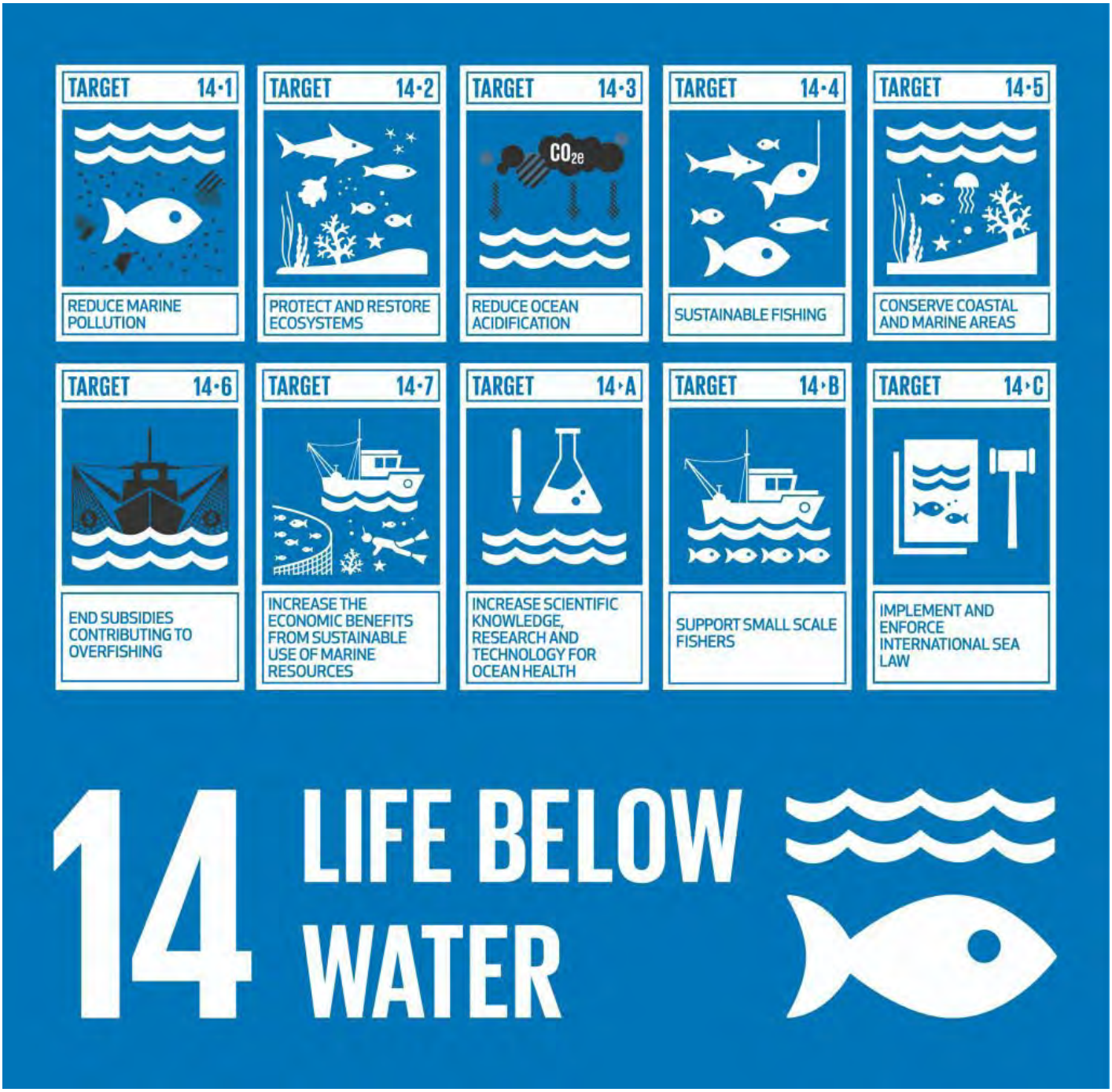
Source: https://www.climateforesight.eu/global-policy/frontiers-of-international-ocean-governance/

Source: https://www.theoceanagency.org/ocean-image-bank/mangroves?img=YJxCkBIAACQAr-zQ

SUSTAINABLE DEVELOPMENT GOAL 14

The targeted outcomes of the Decade of Ocean Science are directly linked to Sustainable Development Goal 14: Life Below Water. Conserve and sustainably use the oceans, seas and marine resources for sustainable development. There are 10 targets to meet SDG Goal 14 – these are shown in Figure 2. Without scientific data and knowledge to inform decision making, and without equity of access, opportunities to achieve the relevant goals and outcomes is limited.

Figure 2: SDG 14 Life Below Water



Source: https://www.guidisrl.it/en/world-wildlife-day-2019/

The connections between SDG 14 and the other SDGs magnify the importance of oceans to achieving global sustainability such as SDG1– No poverty; SDG2 – No Hunger; SDG3 – Good Health and Wellbeing; SDG12 – Responsible Production and consumption and SDG13– Climate Action.

Examples:

SDG2: '*End hunger, achieve food security and improved nutrition'* – seafood is an important source of protein and micronutrients and is indispensable for sustaining livelihoods particularly in poorer nations.

SDG10: '*Reduce inequality within and among countries'* – a sustainable and equitable blue economy would ensure access for small-scale fishers, the largest employment category in the ocean economy and among the lowest income groups in the world. This would benefit developing coastal and island populations, also in the global bottom 40% by income.

SDG12: '*Ensure sustainable consumption and production patterns'* for ocean resources, products and services eg fishing, shipping and tourism and land – based production and consumption affecting the ocean eg plastic litter.

SDG13: *'Take urgent action to combat climate change and its impacts'.* The interconnection between oceans and climate change is one of the most important for the future sustainability of oceans. Oceans and marine environments are climate regulators, but they are also directly impacted by climate change. To build resilience to climate change, restoring and protecting oceans and marine environments is essential.

https://soos.aq/images/soos/activities/UN%20Ocean%20Decade/Brochure-UNDECADEFOROCEAN.pdf

'Strengthening the resilience of ocean and coastal ecosystems by reducing pollution (14.1), restoring their health (14.2), tackling ocean acidification (14.3), managing fish stocks sustainably (14.4, 14.6) and protecting coastal and marine areas and biodiversity (14.5) helps strengthen the overall resilience and adaptive capacity of coastal systems to climate change (13.1)'

Source: https://wedocs.unep.org/bitstream/handle/20.500.11822/25919/2030Agenda_SDGs.pdf?sequence=1&isAllowed=y

OCEAN DECADE EXHIBITION

The Ocean Decade Exhibition is a collection of artworks from the global creative community created for the Ocean Decade. The purpose of the exhibition was

- transforming the image of ocean science and conservation
- raising awareness of the importance of the ocean
- inspire support for action

Artists have made their work available for free so they can be downloaded and used to create exhibitions, in schools, libraries, businesses, social media (or just about anywhere else). Below is a small selection of the posters and photo art in the exhibition.

LEFT: Aanish Peshave. Source: www.theoceanagency.org/exhibition

PHOTO ART

Photo art credits in order Tim El-Helou, Justin Peters, Tim El-Helou

POSTERS

Poster credits in order Marius Becker, Mayank Patel, Pravindhya Harshani

Class Activity: Create a classroom exhibition

Visit Ocean Agency Exhibition at https://www.theoceanagency.org/ocean-image-bank.

- Work in groups to select TWO pieces of photo art and two posters to exhibit
- Create an ORIGINAL piece of photo art OR poster, a document or an infographic to hang with your selected images with a message about The Ocean Decade to inspire other students' interest. Credit the artists where appropriate.
- Create a social media post for ONE of your selected images. Post with #OceanDecade

OCEAN LITERACY

While increasing scientific research and technology is essential for achieving the Ocean Decade outcomes and SDG 14, integrating ocean knowledge and concepts into syllabus topics can help bridge the knowledge gap at a student level.

There is a wealth of resources to support the integration of ocean literacy into classroom practice including contemporary documents, documentaries, television programs sand interactive websites.

Syllabus links – some examples:

- Landscapes and Landforms – marine and coastal landscapes, values and management including those of First Nations Peoples.
- Place and Liveability – oceans provide employment, resources and lifestyle options while influencing the environmental quality of places. All affect liveability.
- Interconnections – oceans as an asset that connect the world through resource exploitation (fishing, minerals, energy), tourism and trade (shipping routes)
- Sustainable Biomes – use of ocean biomes to produce food in coastal communities worldwide and for groups such as First Nations and Asian communities.
- Human Wellbeing – oceans can provide access to employment, income and resources and influence the wellbeing of different community groups.
- Environmental Change and Management – damaging marine and coastal environments, exploiting marine resources e.g., overfishing, marine pollution

READ

About the Decade https://www.oceandecade.org/about

The Decade of Ocean Science for Sustainable Development: The science we need for the ocean we want. Full website https://www.oceandecade.org

Ecos magazine: UN Ocean Decade 2021 http://digital.ecomagazine.com/publication/frame.php?i=707374&p=&pn=&ver=html5&view=issueBrowser

WWF The value of our oceans https://www.wwf.no/assets/attachments/47-wwf_studie_healthy_oceans.pdf

Transformations for a Sustainable Ocean Economy https://www.oceanpanel.org/ocean-action/files/transformations-sustainable-ocean-economy-eng.pdf

The Blue Planet: Supporting the UN Decade of Ocean Science for Sustainable Development https://geoblueplanet.org/supporting-the-un-decade-of-ocean-science-for-sustainable-development/

The Global Goals https://www.globalgoals.org/14-life-below-water

WATCH

Introduction to Decade of Ocean Science https://www.youtube.com/watch?v=YyiuLwhUpH4

One Planet One Ocean: Introduction https://www.youtube.com/watch?v=S-j9HPs5Ypk

Australia's Ocean Odyssey https://iview.abc.net.au/show/australia-s-ocean-odyssey-a-journey-down-the-east-australian-current

Netflix – Seaspiracy https://www.seaspiracy.org

BBC – Blue Planet 2 https://www.bbc.co.uk/programmes/p04tjbtx

INTERACT WITH

The Ocean Agency: A creative, conservation, not for profit, organisation. https://www.theoceanagency.org/about

The Ocean Agency / Google Ocean Education Resources https://www.theoceanagency.org/resources-edu

UN Ocean image bank https://www.theoceanagency.org/resources

Global Fishing watch https://globalfishingwatch.org/our-map/

Figure 3: Document and Documentary covers (UN, WWF, BBC and Netflix)

2021 ArcGIS STORYMAPS CHALLENGE

'A story can effect change, influence opinion, and create awareness. Use ArcGIS StoryMaps to integrate maps, data, and multimedia content with text to tell a narrative about the world's greatest challenges and inspire solutions'

Source. https://www.esri.com/en-us/arcgis/products/arcgis-storymaps/contest/overview

Esri and the National Geographic Society are co-hosting the **2021 ArcGIS StoryMaps Challenge For Restoring Our Ocean**. Students can join storytellers from around the world in a challenge to explore, protect and conserve our oceans. They are encouraged to submit an original story that raises awareness of threats facing our oceans and sustainable solutions to safeguard them for future generations.

The challenge is separated for high school and university students and will open on August 16, 2021. Entries must be built using the ArcGIS StoryMaps product. A website of resources has been created to support students with inspiring sample stories, maps, datasets and more.

Requirements

- Submissions globally through two tracks.
- **Track 1 is for school students aged 14–18. Entries submitted by a school or club as the applicant and proxy.**
- Track 2 is for students 18 years and older enrolled in higher education institutions or eligible people 18–24 years old.
- An applicant—one person or one group—may enter this challenge once.

Website: https://www.esri.com/en-us/arcgis/products/arcgis-storymaps/contest/overview

Supporting resources: https://myoceanstory-learngis.hub.arcgis.com

NOTE: Information sourced from Esri website for 2021 ArcGIS StoryMaps Challenge for Restoring our ocean and email to Esri members.

Source: Ocean image bank https://www.theoceanagency.org/ocean-image-bank/

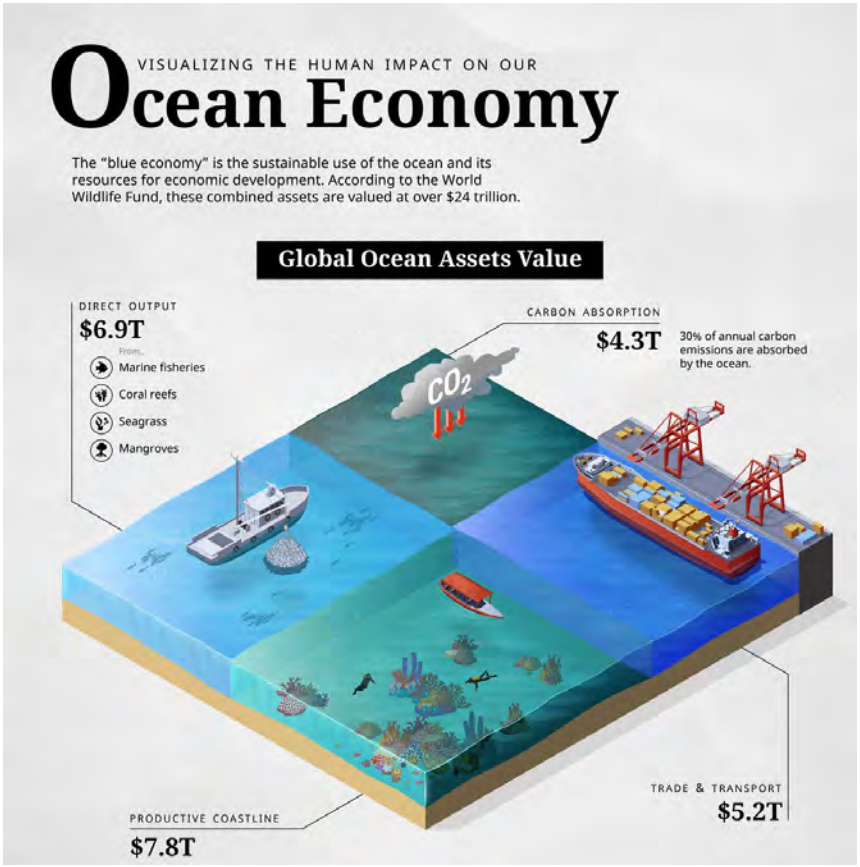
VISUALIZING THE HUMAN IMPACT ON OUR OCEAN ECONOMY

First published in Visual Capitalist June 5 2020

Author Iman Ghosh

Source: https://www.visualcapitalist.com/human-impact-ocean-economy/

When you think of economic output, it's likely the ocean isn't the first entity that comes to mind. But from facilitating international trade to regulating the climate, the "blue economy" contributes significant value in both tangible and intangible ways.



The sustainable use of the ocean and its resources for economic development and livelihoods have such far-reaching effects, that its protection is a significant goal of the United Nations, as well as for many other countries and organizations throughout the world.

However, these vital ocean assets are in danger of sinking quickly. Ahead of World Oceans Day on June 8, 2020, we look at the total value of assets that come from our ocean, and how various human activities are affecting these resources.

Global Ocean Asset Value

Economic value from all the oceans is measured both by their direct output, as well as any indirect impacts they produce.

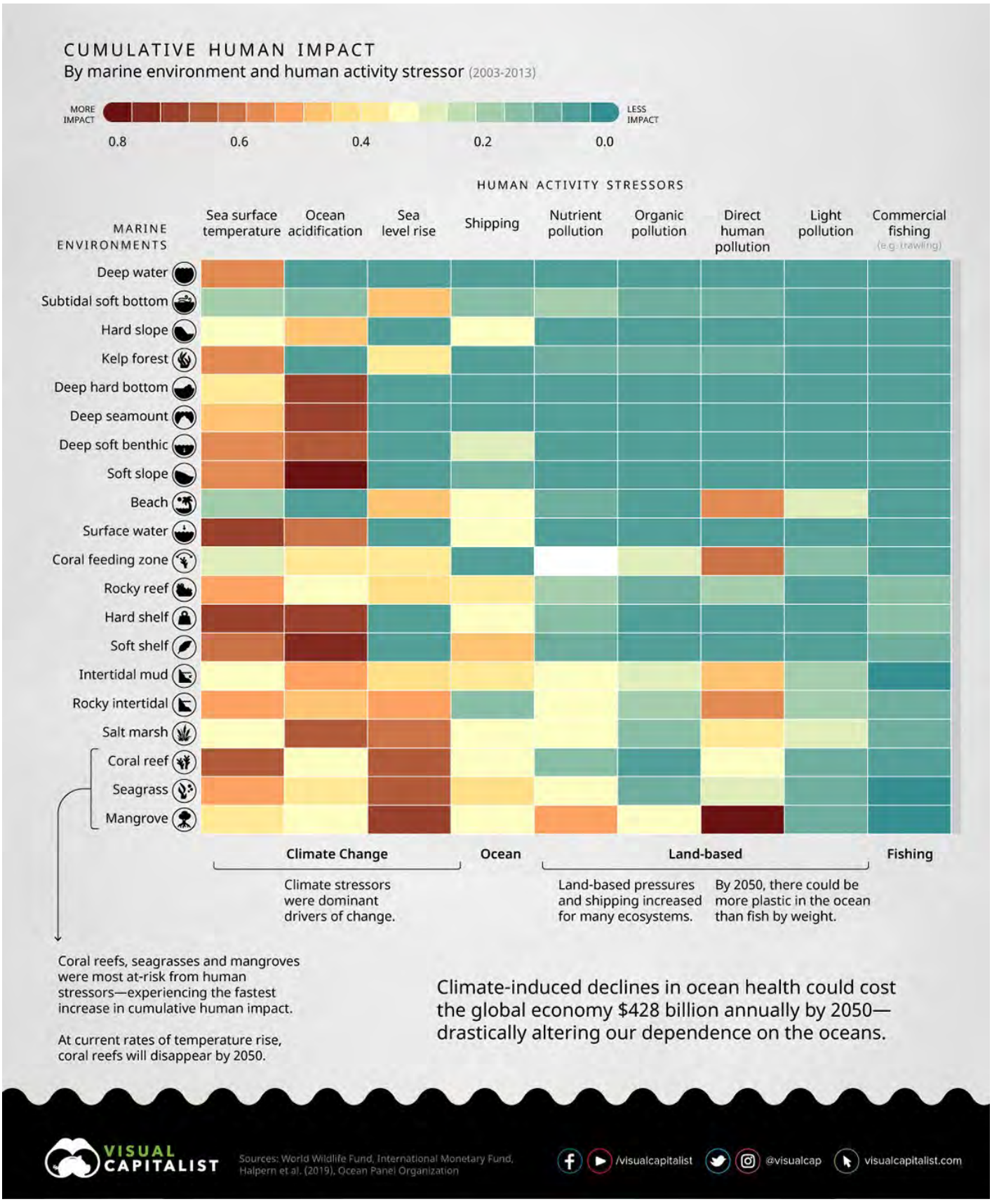
According to the World Wildlife Fund, these combined assets are valued at over **$24 trillion**. Here's how they break down:

- **Direct Output:** Marine fisheries, coral reefs, seagrass, and mangroves. Total value: $6.9T
  Examples of direct output: Fishing, agriculture
- **Trade and Transport:** Shipping lanes. Total value: $5.2T
- **Adjacent Assets:** Productive coastline, carbon absorption. Total value: $7.8T, and $4.3T respectively.
  Examples of services enabled: Tourism, education/ conservation (such as jobs created)

In fact, the annual gross marine product of the oceans is comparable to the Gross Domestic Product (GDP) of countries, coming in at **$2.5 trillion** per year—making it the world's eighth largest economy in country terms.

Unfortunately, experts warn that various human activities are endangering these ocean assets and their reliant ecosystems.

The Cumulative Human Impact on Oceans



Source: https://www.visualcapitalist.com/human-impact-ocean-economy/

An 11-year long scientific study tracked the global effect of multiple human activities across diverse marine environments. The researchers identified four main categories of stressors between 2003–2013.

1. **Climate change:** Sea surface temperature, ocean acidification, and sea level rise
2. **Ocean:** Shipping
3. **Land-based:** Nutrient pollution, organic chemical pollution, direct human pollution, light pollution
4. **Fishing:** Commercial and artisanal fishing, including trawling methods

Across the board, climate stressors were the most dominant drivers of change in a majority of marine environments. Similarly, pollution levels have also increased for many ecosystems.

Plastic pollution is especially damaging, as it continues to grow at unprecedented rates, with a significant amount ending up in the oceans. The World Economic Forum estimates that by 2050, there could be more plastic in the ocean than fish by weight.

Among the various marine environments, coral reefs, seagrasses, and mangroves proved to be most at-risk, experiencing the fastest increase in cumulative human impact. However, these are also the same ecosystems that we rely on for their direct economic output.

Overall, climate-induced declines in ocean health could cost the global economy **$428 billion** annually by 2050.

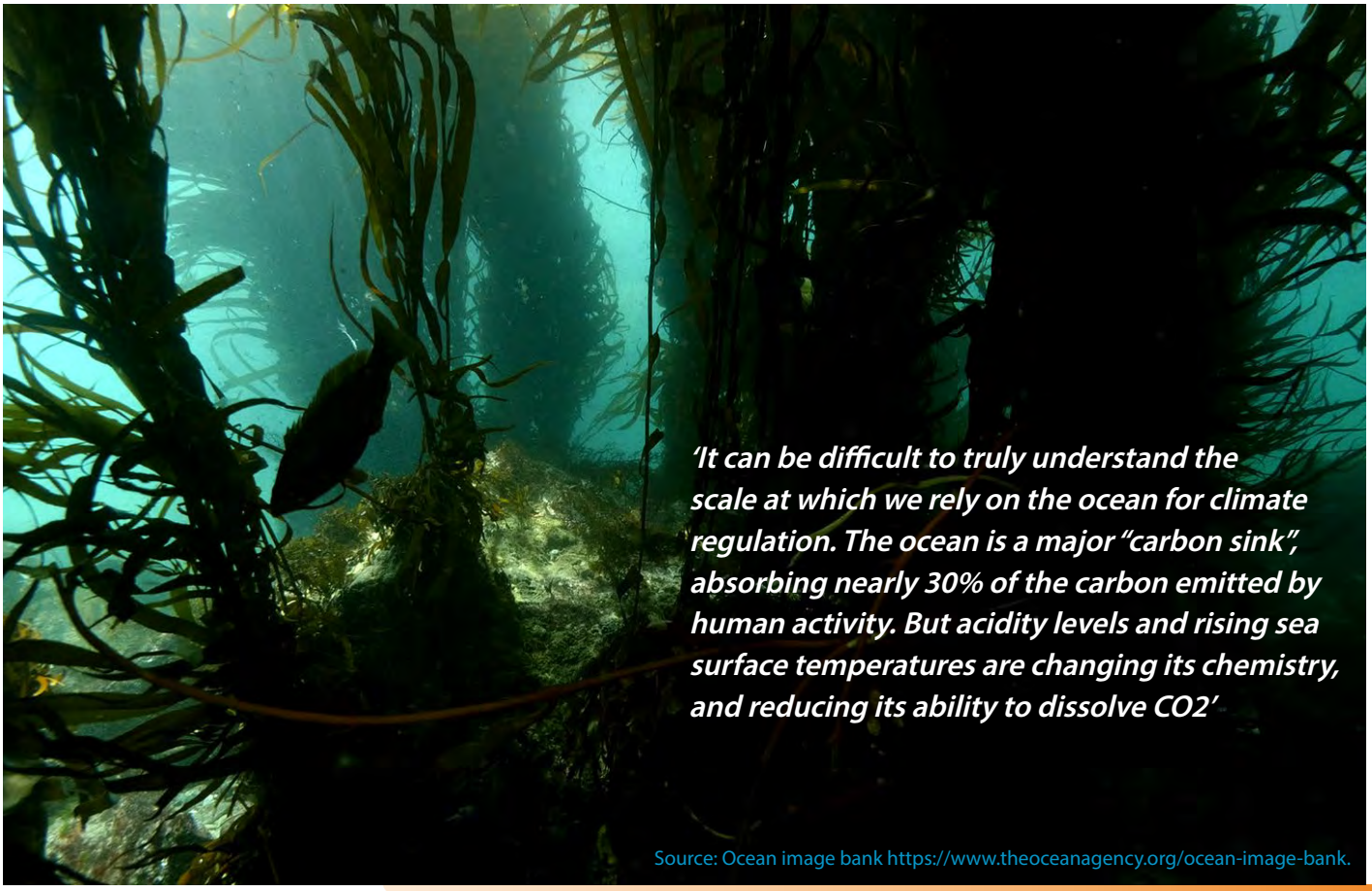
The Ocean Economy is in hot water

It can be difficult to truly understand the scale at which we rely on the ocean for climate regulation. The ocean is a major "carbon sink", absorbing nearly 30% of the carbon emitted by human activity. But acidity levels and rising sea surface temperatures are changing its chemistry, and reducing its ability to dissolve CO_2.

According to the UN, ocean acidification has grown by 26% since pre-industrial times. At our current rates, it could rise to **100–150%** by the end of the century. Overfishing is another urgent threat that shows no signs of slowing down, with sustainable fish stocks declining from **90% to 66.9%** in just over 40 years.

To try and counteract these issues, this year's virtual World Oceans Day is focused on "Innovation for a Sustainable Oceans" to discuss various solutions, including how the private sector can work with communities to maintain the blue economy. In addition, there's a petition in place to urge world leaders to help protect 30% of the natural world by 2030.

Will our human activities continue to stress the ocean economy, or will we be able to positively reverse these trends in the years to come?



'It can be difficult to truly understand the scale at which we rely on the ocean for climate regulation. The ocean is a major "carbon sink", absorbing nearly 30% of the carbon emitted by human activity. But acidity levels and rising sea surface temperatures are changing its chemistry, and reducing its ability to dissolve CO2'

Source: Ocean image bank https://www.theoceanagency.org/ocean-image-bank.

WHY INDIGENOUS KNOWLEDGE SHOULD BE AN ESSENTIAL PART OF HOW WE GOVERN THE WORLD'S OCEANS

On Jinluen beach by Pacific Ocean in Taimali, Taitung, Taiwan, diligent local people fishing fry in a traditional way with triangle nets in shallow seawater and headlamps in twilight before sunrise Shutterstock

Originally published in The Conversation in June 2021

Written by Meg Parsons and Lara Taylor

Source:https://theconversation.com/why-indigenous-knowledge-should-be-an-essential-part-of-how-we-govern-the-worlds-oceans-161649

The authors acknowledge Roa Crease, Karen Fisher, and Gloria Hinestroza for their assistance with the research as well as Sustainable Seas National Science Challenge for providing funding.

Our moana (ocean) is in a state of unprecedented ecological crisis. Multiple, cumulative impacts include pollution, sedimentation, overfishing, drilling and climate change. All affect the health of both marine life and coastal communities.

To reverse the decline and avoid reaching tipping points, we must adopt more holistic and integrated governance and management approaches.

Indigenous peoples have cared for their land and seascapes for generations, using traditional knowledge and practices. But our research on marine justice shows Indigenous peoples face ongoing challenges as they seek to assert their sovereignty and authority in marine spaces.

We don't need to wait for innovative Western science to take better care of the oceans. We have an opportunity to empower traditional and contemporary Indigenous forms of governance and management for the benefit of all people and the ecosystems we are part of.

Our research highlights alternative governance and management models to improve equity and justice for Indigenous peoples. These range from shared decision-making with governments (co-governance) to Indigenous peoples regaining control and re-enacting Indigenous forms of marine governance and management.

Indigenous environmental stewardship

Throughout Oceania, Indigenous marine governance is experiencing a revival. The long-term environmental stewardship of Indigenous peoples is documented around the globe.

In Fiji, customary marine tenure is institutionalised through the qoliqoli system. This defines customary fishing areas in which village chiefs are responsible for managing fishing rights and compliance.

Coastal communities in Vanuatu continue to create and implement temporary marine protection zones (known as tapu) to allow fisheries stock to recover. In Samoa,

villages are able to establish and enforce local fisheries management.

In Aotearoa New Zealand, Māori environmental use and management is premised on the principle of kaitiakitanga(environmental guardianship) rather than unsustainable extraction of resources.

Australian Aboriginal societies likewise use the term "caring for country" to refer to their ongoing and active guardianship of the lands, seas, air, water, plants, animals, spirits and ancestors.

From the mountains to the sea

These governance and management systems are based on Indigenous knowledge that connects places and cultures and emphasises holistic approaches. The acknowledgement of inter-relationships between human and nonhuman beings (plants, animals, forests, rivers, oceans etc.) is a common thread. So is an emphasis on reciprocity and respect towards all beings.

Coastal and island Indigenous groups have specific obligations to care for and protect their marine environments and to use them sustainably. An inter-generational thread is part of these ethical duties. It takes into account the lessons and experiences of ancestors and considers the needs of future generations of people, plants, animals and other beings.

In contrast to Western ways of seeing the environment, the Australian Indigenous concept of country is not fragmented into different types of environment or scales of governance. Instead, land, air, water and the sea are all linked.

Likewise, for Māori, Ki uta ki tai (from the mountains to the sea) encapsulates a whole-of-landscape and seascape view.

In Samoa, villages can set up and enforce marine protected areas. Simon_sees/Flicker, CC BY-SA

Sharing knowledge across generations

Māori hold deep relationships with their rohe moana (saltwater territory). These are increasingly recognised by laws that emphasise Indigenous rights based on Te Tiriti o Waitangi. One example is the Integrated Kaipara Harbour Management Group, which co-manages the Kaipara Moana (harbour). The co-management agreement specifies shared responsibilities between different Māori entities (Kaipara Uri) and government agencies.

The agreement recognises Kaipara hapū (sub-tribes) and iwi (tribe) rights, interests and duties. It provides financial support to enable them to enact kaitiakitanga practices as they work to restore the mauri (life force) of the moana through practical efforts such as replanting native flora and reducing sedimentation.

They are using their mātauranga Māori (Māori Knowledge) alongside scientific knowledge to enact kaitiakitanga and ecosystem-based management.

Another co-management agreement is operating in Hawai'i between the community of Hā'ena (USA) and the Hawai'ian state government. The Hā'ena community operates an Indigenous fishing education programme. Members of all ages camp together by the coast and learn where, what and how to harvest and prepare marine products.

In this way, Indigenous knowledge, with its emphasis on sustainable practices and environmental ethics, is transmitted across generations.

Indigenous knowledge, values and relationships with our ocean can make significant contributions to marine governance. We can learn from Indigenous worldviews that emphasise connectivity between all things. There are many similarities between ecosystem-based and Indigenous knowledge management systems.

We need to do more to recognise and empower Indigenous knowledge and ways of governing marine spaces. This could include new laws, institutions and initiatives that allow Indigenous groups to exercise their self-determination rights and draw on different types of knowledge to help create and maintain sustainable seas.

The authors acknowledge Roa Crease, Karen Fisher, and Gloria Hinestroza for their assistance with the research as well as Sustainable Seas National Science Challenge for providing funding

This story is part of Oceans 21 Our series on the global ocean opened with five in-depth profiles. Look out for new articles on the state of our oceans in the lead up to the UN's next climate conference, COP26. The series is brought to you by The Conversation's international network.

MAPPING THE WORLD'S KEY MARITIME CHOKE POINTS

First Published in Visual Capitalist, 2021

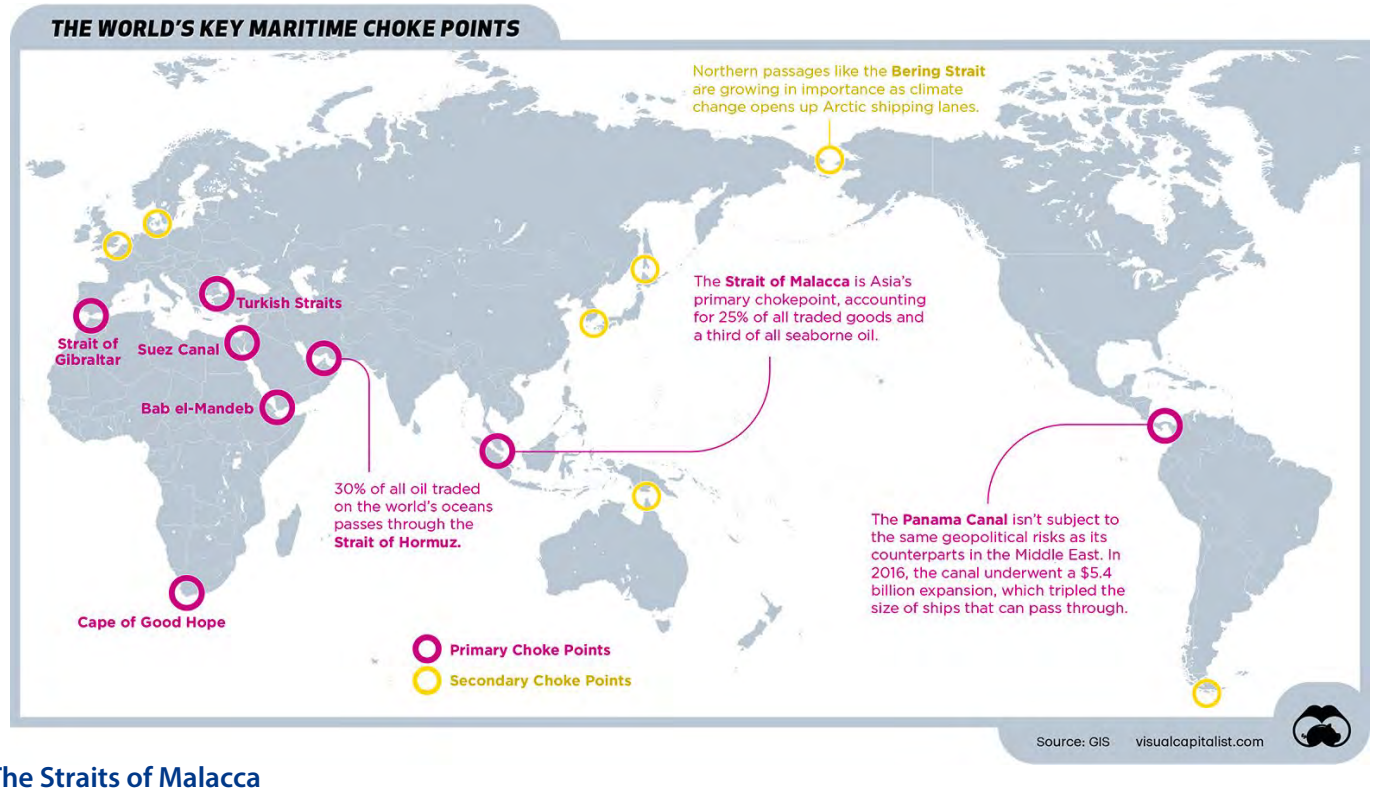
Author Carmen Ang

https://www.visualcapitalist.com/mapping-the-worlds-key-maritime-choke-points/

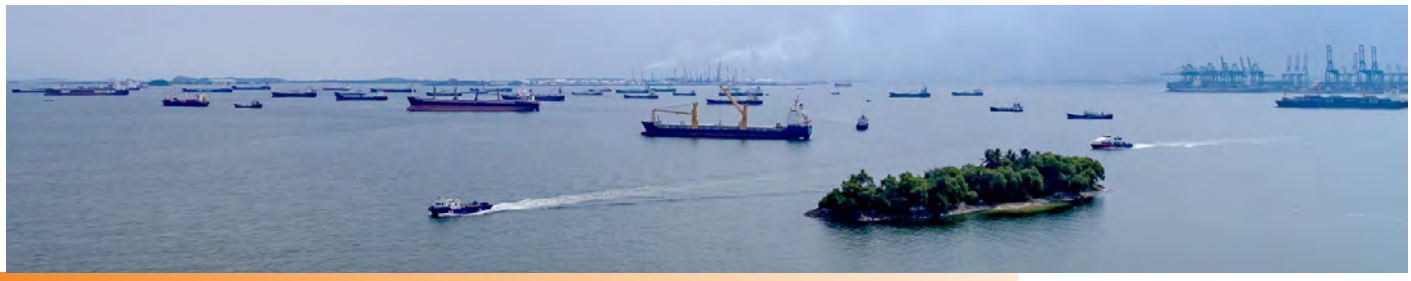
Maritime transport is an essential part of international trade – approximately 80% of global merchandise is shipped via sea.

Because of its importance, commercial shipping relies on strategic trade routes to move goods efficiently. These waterways are used by thousands of vessels a year—but it's not always smooth sailing. In fact, there are certain points along these routes that pose a risk to the whole system.

Here's a look at the world's most vulnerable maritime bottlenecks – also known as choke points – as identified by GIS.



The Straits of Malacca



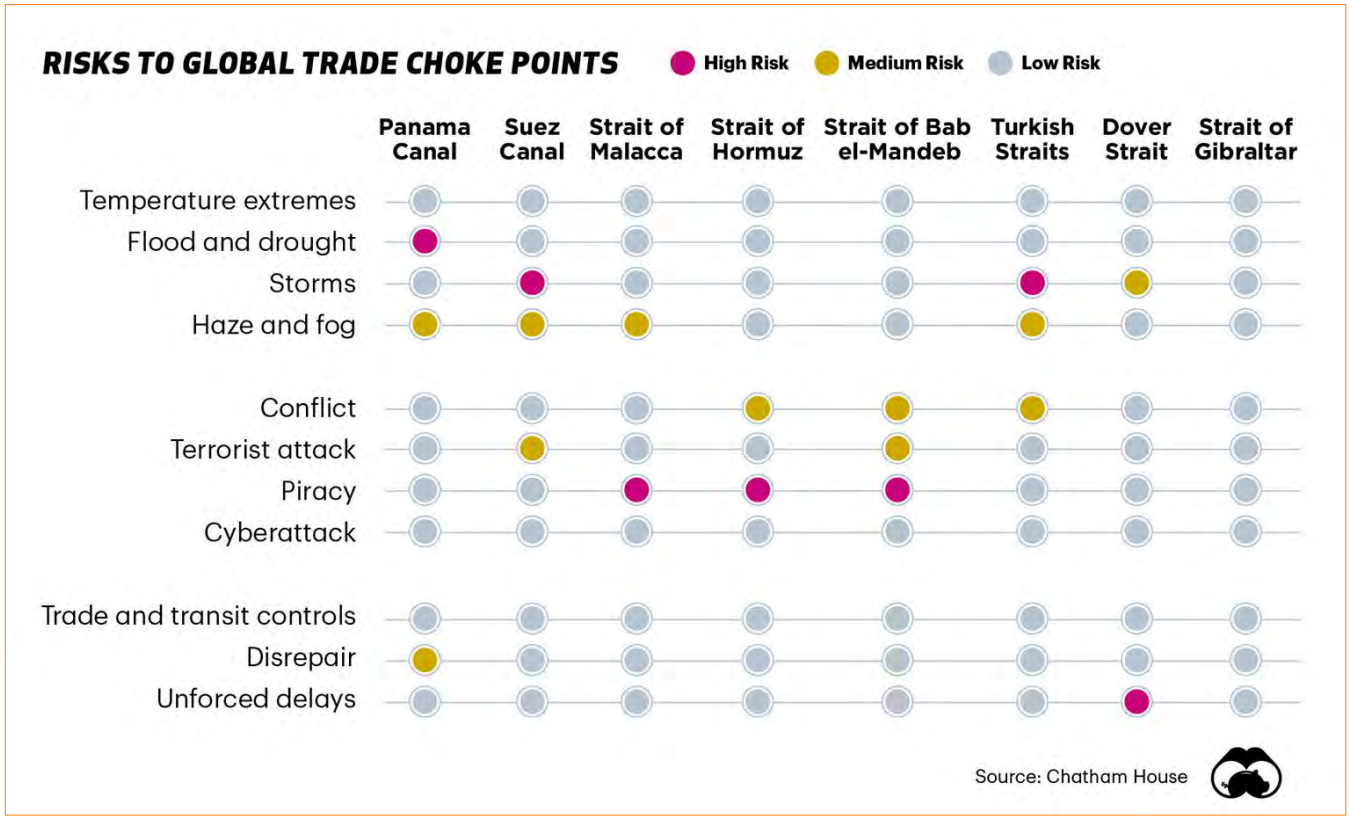
What's a Choke Point?

Choke points are strategic, narrow passages that connect two larger areas to one another. When it comes to maritime trade, these are typically straits or canals that see high volumes of traffic because of their optimal location.

Despite their convenience, these vital points pose several risks:

- **Structural risks:** As demonstrated in the recent Suez Canal blockage, ships can crash along the shore of a canal if the passage is too narrow, causing traffic jams that can last for days.
- **Geopolitical risks:** Because of their high traffic, choke points are particularly vulnerable to blockades or deliberate disruptions during times of political unrest.

The type and degree of risk varies, depending on location. Here's a look at some of the biggest threats, at eight of the world's major choke points.



Because of their high risk, alternatives for some of these key routes have been proposed in the past – for instance, in 2013 Nicaraguan Congress approved a $40 billion dollar project proposal to build a canal that was meant to rival the Panama Canal.

As of today, it has yet to materialize.

A Closer Look: Key Maritime Choke Points

Despite their vulnerabilities, these choke points remain critical waterways that facilitate international trade. Below, we dive into a few of the key areas to provide some context on just how important they are to global trade.

The Panama Canal

The Panama Canal is a lock-type canal that provides a shortcut for ships traveling between the Pacific and Atlantic oceans. Ships sailing between the east and west coasts of the U.S. save over 8,000 nautical miles by using the canal – which roughly shortens their trip by 21 days.

In 2019, 252 million long tons of goods were transported through the Panama Canal, which generated over $2.6 billion in tolls.

The Suez Canal

The Suez Canal is an Egyptian waterway that connects Europe to Asia. Without this route, ships would need to sail around Africa, which would add approximately seven days to their trips. In 2019, nearly 19,000 vessels, and 1 billion tons of cargo, traveled through the Suez Canal.

In an effort to mitigate risk, the Egyptian government embarked on a major expansion project for the canal back in 2015. But, given the recent blockage caused by a Taiwanese container ship, it's clear that the waterway is still vulnerable to obstruction.

The Strait of Malacca

At its smallest point, the Strait of Malacca is approximately 1.5 nautical miles, making it one of the world's narrowest choke points. Despite its size, it's one of Asia's most critical waterways, since it provides a critical connection between China, India, and Southeast Asia. This choke point creates a risky situation for the 130,000 or so ships that visit the Port of Singapore each year.

The area is also known to have problems with piracy – in 2019, there were 30 piracy incidents, according to private information group ReCAAP ISC.

The Strait of Hormuz

Controlled by Iran, the Strait of Hormuz links the Persian Gulf to the Gulf of Oman, ultimately draining into the Arabian Sea. It's a primary vein for the world's oil supply, transporting approximately 21 million barrels per day.

Historically, it's also been a site of regional conflict. For instance, tankers and commercial ships were attacked in that area during the Iran-Iraq war in the 1980s.

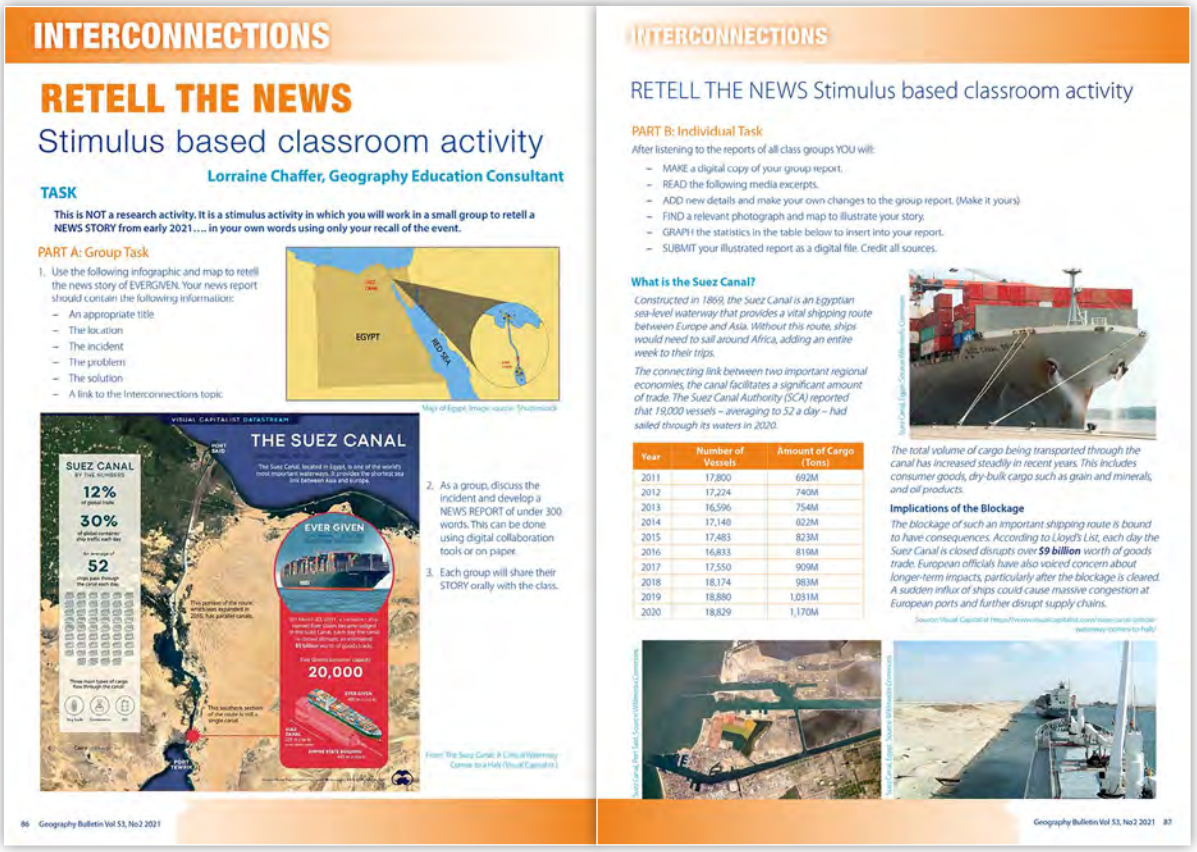
The Bab el-Mandeb Strait

The Bab el-Mandeb Strait is another primary waterway for the world's oil and natural gas. Nestled between Africa and the Middle East, the critical route connects the Mediterranean Sea (via the Suez Canal) to the Indian Ocean.

Like the Strait of Malacca, it's well known as a high-risk area for pirate attacks. In May 2020, a UK chemical tanker was attacked off the coast of Yemen–the ninth pirate attack in the area that year.

Due to the strategic nature of the region, there is a strong military presence in nearby Djibouti, including China's first ever foreign military base.

GTA Bulletin Volume 53 No 2 2021



INTERCONNECTIONS

RETELL THE NEWS

Stimulus based classroom activity

Lorraine Chaffer, Geography Education Consultant

TASK

This is NOT a research activity. It is a stimulus activity in which you will work in a small group to retell a NEWS STORY from early 2021.... in your own words using only your recall of the event.

PART A: Group Task

1. Use the following infographic and map to retell the news story of EVERGIVEN. Your news report should contain the following information:
   - An appropriate title
   - The location
   - The incident
   - The problem
   - The solution
   - A link to the Interconnections topic

2. As a group, discuss the incident and develop a NEWS REPORT of under 300 words. This can be done using digital collaboration tools or on paper.
3. Each group will share their STORY orally with the class.

86 Geography Bulletin Vol 53, No2 2021

INTERCONNECTIONS

RETELL THE NEWS Stimulus based classroom activity

PART B: Individual Task

After listening to the reports of all class groups YOU will:

- MAKE a digital copy of your group report.
- READ the following media excerpts.
- ADD new details and make your own changes to the group report. (Make it yours)
- FIND a relevant photograph and map to illustrate your story.
- GRAPH the statistics in the table below to insert into your report.
- SUBMIT your illustrated report as a digital file. Credit all sources.

What is the Suez Canal?

Constructed in 1869, the Suez Canal is an Egyptian sea-level waterway that provides a vital shipping route between Europe and Asia. Without this route, ships would need to sail around Africa, adding an entire week to their trips.

The connecting link between two important regional economies, the canal facilitates a significant amount of trade. The Suez Canal Authority (SCA) reported that 19,000 vessels – averaging to 52 a day – had sailed through its waters in 2020.

Year	Number of Vessels	Amount of Cargo (Tons)
2011	17,800	692M
2012	17,224	740M
2013	16,596	754M
2014	17,148	822M
2015	17,483	823M
2016	16,833	819M
2017	17,550	909M
2018	18,174	983M
2019	18,880	1,031M
2020	18,829	1,170M

The total volume of cargo being transported through the canal has increased steadily in recent years. This includes consumer goods, dry-bulk cargo such as grain and minerals, and oil products.

Implications of the Blockage

*The blockage of such an important shipping route is bound to have consequences. According to Lloyd's List, each day the Suez Canal is closed disrupts over **$9 billion** worth of goods trade. European officials have also voiced concern about longer-term impacts, particularly after the blockage is cleared. A sudden influx of ships could cause massive congestion at European ports and further disrupt supply chains.*

Geography Bulletin Vol 53, No2 2021 87

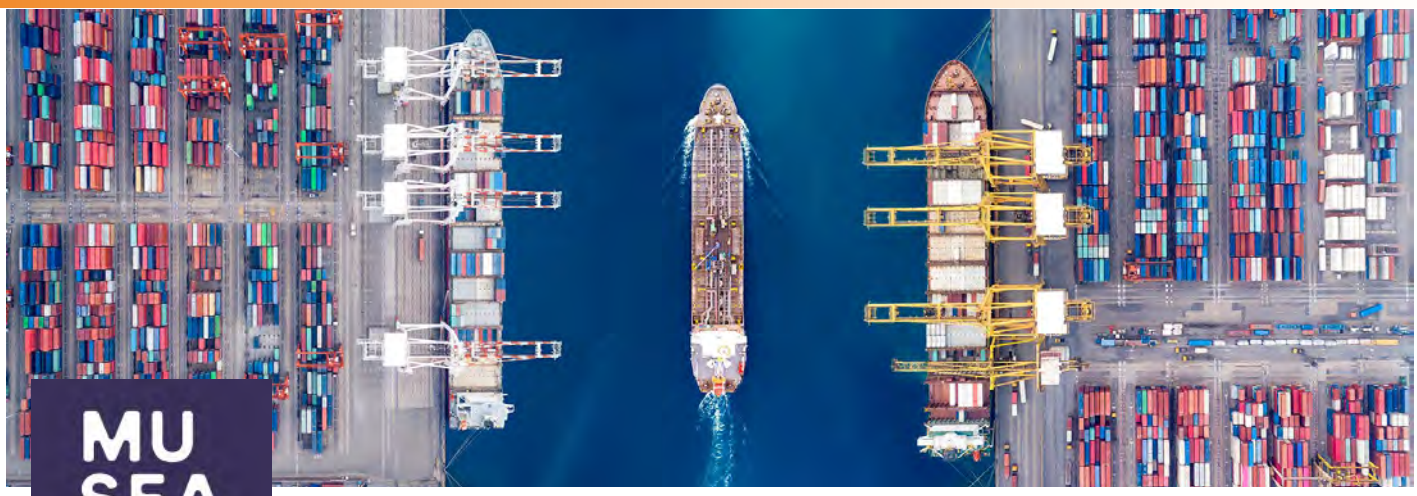


Image source: Shutterstock

CONTAINER: THE BOX THAT CHANGED THE WORLD

Dr Mary-Elizabeth Andrews
Curator – Australian National Maritime Museum

Australian Maritime Museum Blog post first published here https://www.sea.museum/2017/11/01/container

The box that changed the world. Seaborne trade accounts for 90% of all global trade and it relies on a humble steel box. Do you know the story behind this revolution?

The sailing of the *Ideal-X* in 1956 marked the beginning of a shipping revolution at once profound and largely invisible[1].

Take a moment to look around you. Are you sitting at home, at work, on a train, in a cafe? What's in the room, in your bag, on your feet? Chances are, many of the things you encounter have travelled by shipping container. If you're reading this article on an iPad, it not only arrived in Australia on a container ship, its various parts traversed the globe during its complex and highly integrated supply and manufacturing process. Its display and camera were made in Japan, its touch-screen sensors in Taiwan, its processor in the United States, its gyroscope in France and Italy.[2] And this does not account for the origins of its raw materials or their assembly, packaging and distribution points.

Seabourne trade still accounts for 90 per cent of all global trade by volume.

A product like this only makes sense in a world fundamentally transformed by the shipping container. The simple steel box may seem an unlikely candidate for a global revolution. It is, after all, just a box. But the impact of the container is far less about what it is than what it has made possible: intermodal transportation networks bridging ocean, road and rail; streamlined port operations that keep ever-larger ships on the move; global supply chains that give manufacturers the flexibility to pick and choose production centres; a sophisticated cold chain delivering fresh and frozen produce all year round; and, ultimately, the economies of scale that ensure shipping is, per unit, the cheapest mode of transport available. This is why, despite appearances to the contrary, seaborne trade still accounts for 90 per cent of all global trade by volume. In Australia that figure is closer to 99 per cent.

'The nation's lifeline', acrylic on board, James Thomson, 1991. ANMM Collection 00033939 Gift from James Thomson.

The container's economies of scale are perhaps best illustrated by the ships that carry them. The largest container ships today are 400 metres long – considerably longer than the Eiffel Tower is high – and capable of carrying more than 18,000 TEU, or twenty-foot equivalent units. This is the standard but imprecise measurement for ISO shipping containers, which come in 10-foot (3-metre), 20-foot (6-metre), 40-foot (12-metre) and 45-foot (13.7-metre) varieties and include extra-volume high-cubes, insulated 'reefers' with built-in temperature controls for refrigerated cargo, open-topped and flat containers for irregular and oversized goods, and tank containers for liquids and gases. Among the biggest ships today are the 'Triple E' class ships, named after shipping giant Mærsk's latest generation of container ships, the first to take the leap to 18,000-TEU capacity in 2013.

Containers on board Hapag-Lloyd's Boston Express, a 4,639-TEU 'Panamax' container ship built in 1993, travel through the Panama Canal, c 2014. Image courtesy Hapag-Lloyd.

Before the box

The box was born into an industry that had changed little since the adoption of the steam engine and steel hull during the second half of the 19th century. Despite some mechanisation, many of its practices dated back further still, particularly the loading of 'break bulk' cargo – the goods of varying sizes and weights that arrived at the dock in barrels, sacks, baskets, crates and pallets to be loaded onto slings and hauled aboard. From the deck the cargo was sent down to gangs in the ship's hold, whose job it was to unload and manoeuvre each item into irregular spaces with handcart, hook and brute force. This was a labour-intensive, backbreaking business. It was also time consuming. A single ship could be held in port for a week or more to unload and load again, all the time making no money for the ship owner.

In the post-World War II United States, the situation was hindered further by a dependence on small and inefficient Liberty ships, the cheaply constructed cargo vessels built as an emergency provision by the United States Maritime Commission between 1941 and 1945 and sold to merchant lines at war's end. Tight government regulation sheltered the shipping industry from competition, and there was little incentive to push for change when vast sums would be needed to modernise ships and docks that would still rely on manual labour.

Wharfies positioning wool bales in the cargo hold of the Magdalene Vinnen, Samuel J Hood Studio, 1933. ANMM Collection 00035586.

Pre-containerisation, loading cargo on vessels was a physically demanding and long process. Samuel J Hood Studio, circa 1933. ANMM Collection 00035833.

As Marc Levinson, author of *The Box*, shows, when change did come, it came not from the staid shipping industry, but from an entrepreneurial trucker with a keen talent for squeezing every last drop of profitability from his fleet.[3]

The first sailing of the world's first container ship, the ***Ideal-X***, on 26 April 1956. Courtesy Port Authority of New York and New Jersey.

The X factor

In a series of convoluted financial transactions, self-made trucking magnate Malcom McLean purchased the ailing Pan-Pacific Steamship Corporation, followed shortly by its parent company, Waterman Steamship, both in 1955. The idea was to put truck trailers on ships along United States east coast routes to circumvent the interstate trucking industry's own regulatory restrictions and to open up new territories. McLean soon realised that transporting truck bodies only, without the accompanying trailer chassis, would save considerable space. This was the spark of the container ship idea and in keeping with his propensity for action over analysis, within a year McLean purchased two World War II tankers and converted them to carry his new custom-built 33-foot (10-metre) containers.

Jim and Malcom McLean demonstrate their shipping plans, Winston-Salem, North Carolina, photo Frank Jones, 1954. Reproduced courtesy of Forsyth County Public Library Photograph Collection, North Carolina, USA.

On 26 April 1956 the *Ideal-X* set sail from Newark, New Jersey, to Houston, Texas, with 58 containers on board. Though wooden and metal cargo boxes, 'containers' of one form or another, had been in use for several decades, this was the first conclusive demonstration of the economic viability of containerisation. Not only did McLean's boxes withstand the 4,830-kilometre journey lashed to the deck of the converted tanker, cargo handling costs were reduced from US$5.83 per ton to just 16 cents.[4] Such massive savings had eluded prior containerisation efforts, where unwieldy boxes had been loaded onto traditional cargo ships, vying for space with mixed cargo. There was also the matter of port infrastructure. McLean had invested in heavy-duty shore-side cranes with custom-made spreaders, slashing the transfer time from ship to waiting truck.

While not the 'inventor' of the shipping container, Malcom McLean was certainly its most ardent advocate during the early years of containerisation. Despite the success of his experiment, an industry-wide shift was slowed by the huge capital investment required, both in terms of fleet conversion and on the docks. Many onlookers hedged their bets, waiting, in particular, for a verdict on standardisation. When it came it prompted an accelerated uptake of the new technologies. The world container ship fleet, estimated at just 16,000 TEU in 1965, jumped to 140,500 by 1970 and increased more than tenfold by 1990 to 1,765,868.[5]

> *The container was both a symptom of and a catalyst for a new era of globalisation*

Ships themselves also grew in capacity over this period. The 1980s saw the emergence of 3,000 – 4,000 TEU 'Panamax' ships. The name refers to the maximum size that could fit within the locks of the Panama Canal. An expansion of the canal, costing at least US$5.4 billion and completed in June this year, accommodates ships up to 12,500 TEU, the 'New Panamax' class, but not the Triple E

Some 999 containers being unloaded from the ***Yang Ming Singapore***, at Port Botany, Sydney. Image: Andrew Frolows/ANMM.

Box world

The result of this growth, which didn't show any signs of slowing until the global financial crisis hit in 2008, was the fundamental transformation of the shipping industry, its associated transport systems, labour practices and work cultures, and the economies it serves. Centuries-old shipping companies failed to adapt, as did many ports, while new and amalgamated liner companies were able to consolidate about three-quarters of the world's container business among the top 20 players. From the 1990s, a new era of piracy arose, placing ever-smaller crews in very real danger of hostage and ransom. New challenges stem from terrorism and other forms of illegal trade, which become more and more difficult to police as container volumes increase, while the

proliferation of open registries, or 'flags of convenience', complicates the shipping industry's legal, economic and environmental responsibilities.

View from the bridge of a container ship in the North Atlantic, photo Adrian Catalin, 2014. Reproduced courtesy Adrian Catalin. .

Sixty years on, it is worth taking stock of the container and its impact. As influential as the maiden voyage of the *Ideal-X* was, the container did not arrive in a vacuum. It was both a symptom of and catalyst for a new era of globalisation prompted by post-war political and economic changes and accelerated by advances in technology and communications. But as Jean-Paul Rodrigue and Brian Slack argue, globalisation could not have taken its present form without containerisation.[6] In terms of its contribution to trade growth, the container outstrips all other trade facilitation factors.[7] 'How ironic', writes British journalist Rose George, 'that the more ships have grown in size and consequence, the less space they take up in our imagination.'[8]

With close to 700 million container movements in and out of the world's ports each year and Australian container traffic set to rise from 7.5 million in 2014 to 19.4 million by 2033,[9] perhaps it's time we made a little more room in our imagination.

30-day time lapse

30 days at sea, travelling through open ocean, storms & ports on a container ship.

Source: JeffHK, via YouTube.https://www.sea.museum/2017/11/01/container

Endnotes

1 Marc Levinson, *The box: How the shipping container made the world smaller and the world economy bigger,* Princeton University Press, New Jersey, 2006, p1

2 Christopher Minasians, 'Where are the iPhone, iPad and Mac designed, made and assembled?', MacWorld Online, 18 April 2016

3 Levinson, pp 36–53

4 Martin Stopford, *Maritime Economics*, third edition, Routledge, London and New York, 2009, p 509

5 Stopford, p 508

6 Jean-Paul Rodrigue and Brian Slack, 'Intermodal Transportation and Containerization', The Geography of Transport Systems

7 Rodrigue and Slack

8 Rose George, *Ninety percent of everything: Inside shipping, the invisible industry that puts clothes on your back, gas in your car, and food on your plate*, Picador, New York, 2013, p 2

9 The World Bank, 'Container port traffic (TEU: 20 foot equivalent units)', 2014; Australian Government Department of Infrastructure and Regional Development, 'Research Report 138: Containerised and non-containerised trade through Australian Ports to 2032-33', Bureau of Infrastructure and Regional Economics, Canberra, 2014, p 71

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Source: http://www.sea.museum/whats-on/exhibitions/one-ocean-our-future

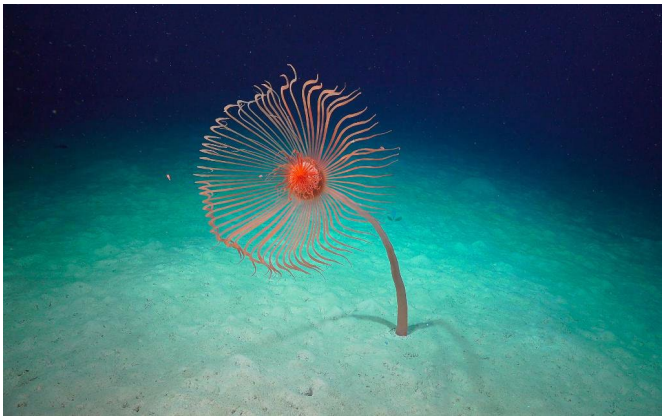
Mesmerising, mysterious and the future of all life on earth.

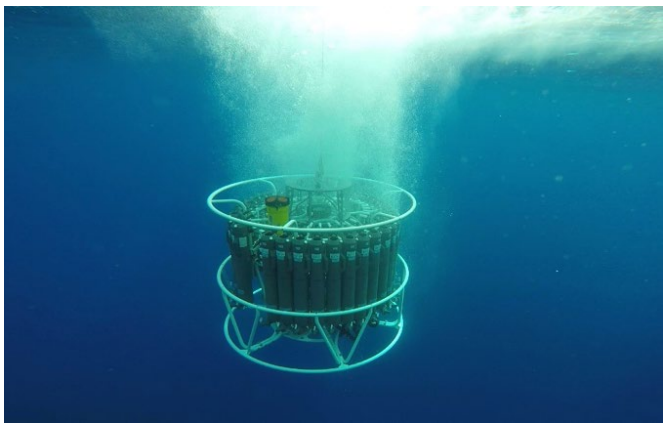
Covering more than 70 per cent of the Earth's surface and supplying half its oxygen, the ocean is our planet's life support system.

The ocean provides 50 per cent of the air we breathe and affects our weather, climate, food supply, culture and wellbeing. Learn how we are intimately tied to the ocean in this immersive exhibition and how a changing climate, overfishing and pollution are affecting our future.

Marvel at the wonders of the ocean and the diversity of Australia's marine life revealed by Schmidt Ocean Institute's 2020 circumnavigation of Australia aboard their research vessel *Falkor*. Discover, manipulate and inspect 3D visualisations of five extraordinary deep-sea specimens, ponder on the climate record contained in a real Antarctic ice core, hear about the impacts of a changing planet and ocean from witnesses, and learn how two centuries of analysing and examining the ocean have given us the knowledge to make things change for the better.

What kind of ocean would you be? Take our ocean personality quiz as you make your way through the exhibition to find out!





2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Source: http://www.sea.museum/whats-on/exhibitions/one-ocean-our-future

Source A

GROWTH IN SIZE OF VESSELS

As global trade has accelerated, so has the growth of the shipping industry – and ship size. Container capacity has increased 1,500% since 1968 and has almost doubled over last decade. The growth of the shipping industry and ship size has played a central role in creating the modern economy, but the growth in ship size has come at a cost. It has effectively pitted port against port, canal against canal.

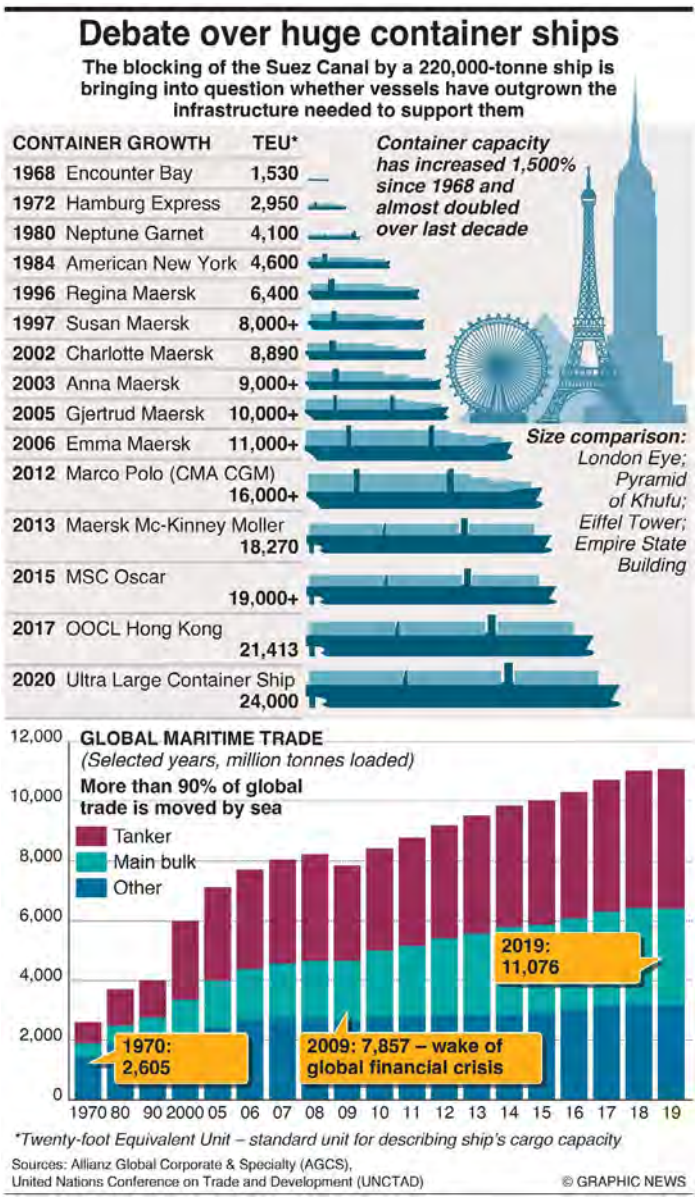
Ships of this size are both more efficient and environmentally friendly, but stacking containers higher makes such ships more susceptible to high winds, while stacking them wider can increase hydrodynamic forces that make them harder to steer in tight spaces, such as ports and canals.

Graphic shows container ships evolution and global maritime trade between 1970 and 2019.

Sources:

- Too big to sail? The debate over huge container ships (FT)
- Why the World's Container Ships Grew So Big (NYT)
- 50 Years of container ship growth (AGCS)
- Review of Maritime Transport 2020 (UNCTAD)

PUBLISHED: 31/03/2021; STORY: Graphic News



Source: https://www.cityam.com/worlds-largest-container-ship-docks-on-the-thames/

Port logistics

While the giant ships lower costs per container for the shipping lines and are better for the environment, they also create significant logistical challenges for the ports. The Port of Hamburg says a port call from an enormous ship requires around 3,800 trucks and 50 freight trains 48 hours before and after a ship's arrival.

See also:

Source B: Marine cargo vessels – is bigger better?

Source C: Shipping containers looking for new routes

Source D: Port of Rotterdam

Source B

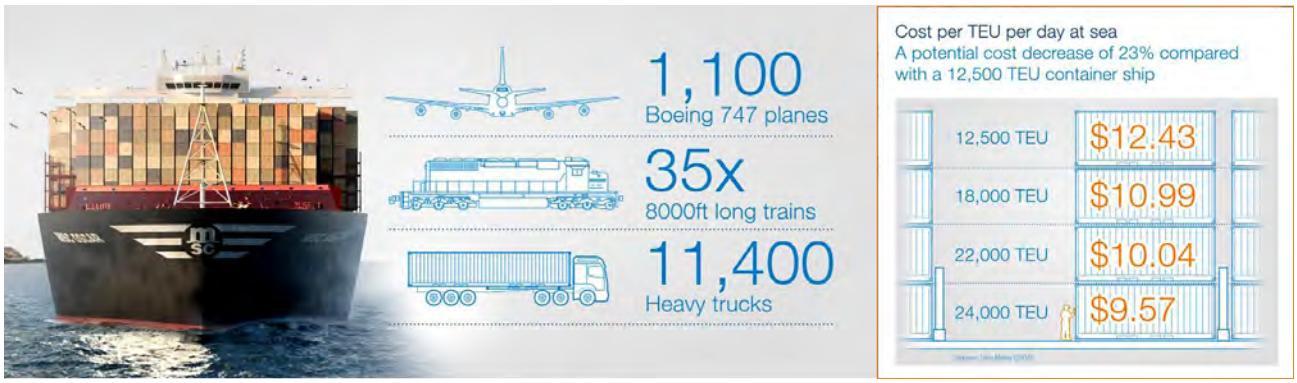
MARITIME CARGO VESSELS – IS BIGGER BETTER?

Cargo ships have transported commodities for over three thousand years. Ninety percent of goods traded globally travel by sea, stimulating spectacular increases in the size and capacity of ships. The increases in ship size are needed to create economies of scale with designs made to transport cargo with the greatest fuel and cost efficiency as possible.

The MSC Oscar for example has a deck is the size of four football fields and can accommodate 39,000 cars or 117 million pairs of sneakers. However, to reduce weight and cost, the steel hull is astonishingly thin. The Mediterranean Shipping Company says the MSC Oscar is the most energy efficient vessel on the planet: consuming 35% less fuel and emitting the same percentage less carbon dioxide.

Ongoing challenges to marine shipping include increased emission controls and the inability of docks and cargo handling infrastructure to accommodate vessels of such vast size. The MSC Oscar cannot squeeze through the Panama Canal even since its expansion in 2016.

The race for ever more fuel efficient cost-effective and environmentally friendly marine vessels will continue, driven by the growing demands of global trade, environmental constraints and the innovative design needed to meet these needs.



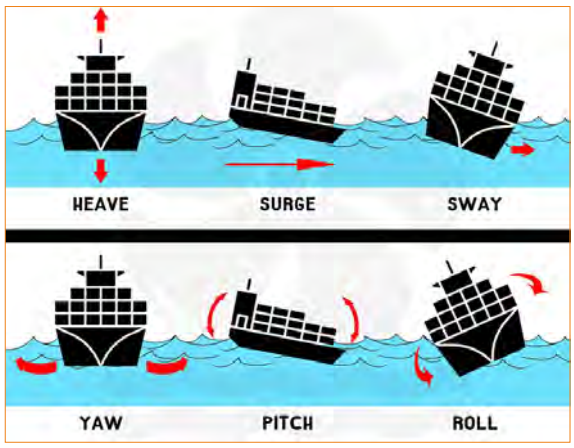
Source: ABB Group https://new.abb.com/turbocharging/maritime-cargo-vessels---is-bigger-better

LOST AT SEA

The World Shipping Council (WSC) says that on average 1,382 containers are lost at sea every year, but there was a downward trend between 2017 and 2019 period with 779 containers lost each year.

Source: https://www.yachtingworld.com/news/could-a-floating-shipping-container-sink-your-yacht-is-the-danger-to-sailors-real-or-imagined-107508

Motion of the ocean



Source: https://www.shippingandfreightresource.com/thousands-of-containers-overboard-in-worst-containership-disaster-one-apus/

Source C

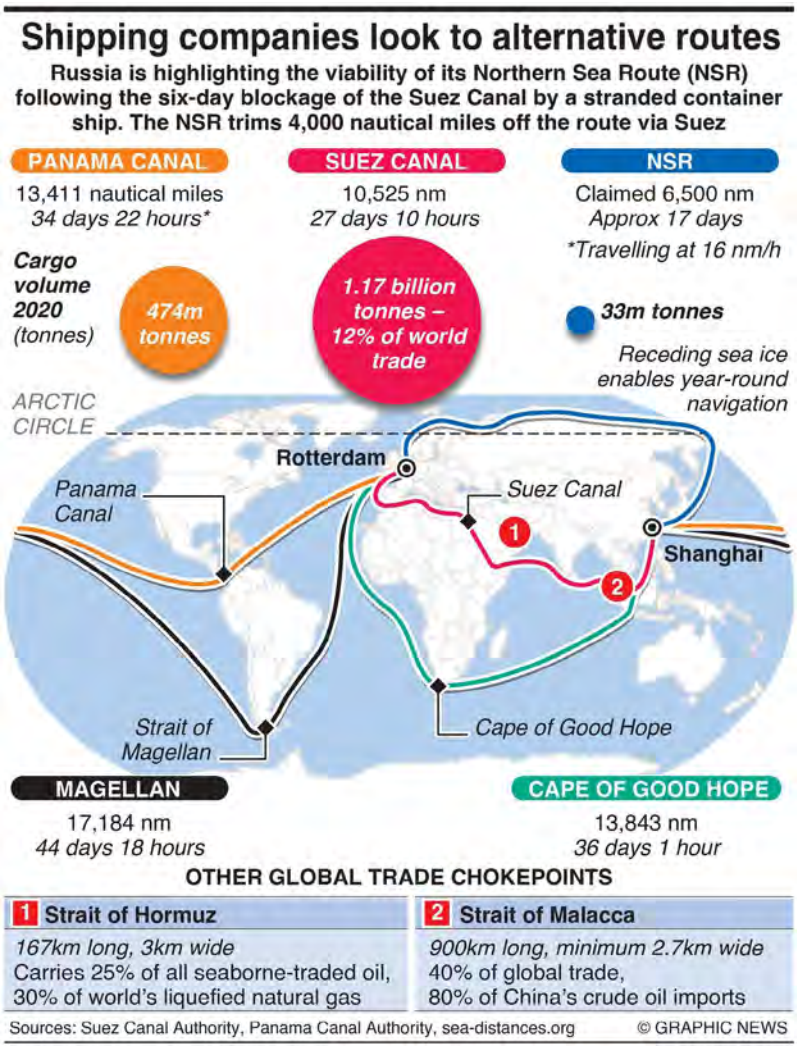
SHIPPING COMPANIES LOOK FOR NEW ROUTES

Receding sea ice is now making year-round navigation of the Northern Route possible, and cargo traffic is expected to more than double in the next few years, from 33 million tonnes to 80 million by 2024, although till a long way short of the 1.17 billion tonnes that pass through the Suez Canal.

The suspension of traffic through Suez quickly disrupted world trade already suffering due to the coronavirus pandemic. However, Suez is not the only bottleneck for world trade, with the Straits of Hormuz and Malacca, and the Panama Canal, all potentially vulnerable.

Sources:

- Suez Canal traffic (Suez Canal Authority)
- Christophe de Margerie arrives at Yamal LNG's Sabetta terminal (Sovcomflot)
- Shipping distances calculator
- Panama Canal marks 1% cargo increase for fiscal year 2020 (Safety4Sea)
- Panama Canal traffic (Panama Canal Authority)



PUBLISHED: 30/03/2021; STORY: Graphic News; PICTURES: Newscom

Ships queue to enter the Panama Canal

Source: https://www.overv.eu/panama-canal/

The Panama Canal is an artificial 77 km waterway in Panama that connects the Atlantic Ocean with the Pacific Ocean.

Also in this Edition

'Mapping the world's key maritime choke points' by Visual Capitalist.

Source D

PORT OF ROTTERDAM: OCEAN TRADE CONNECTIONS

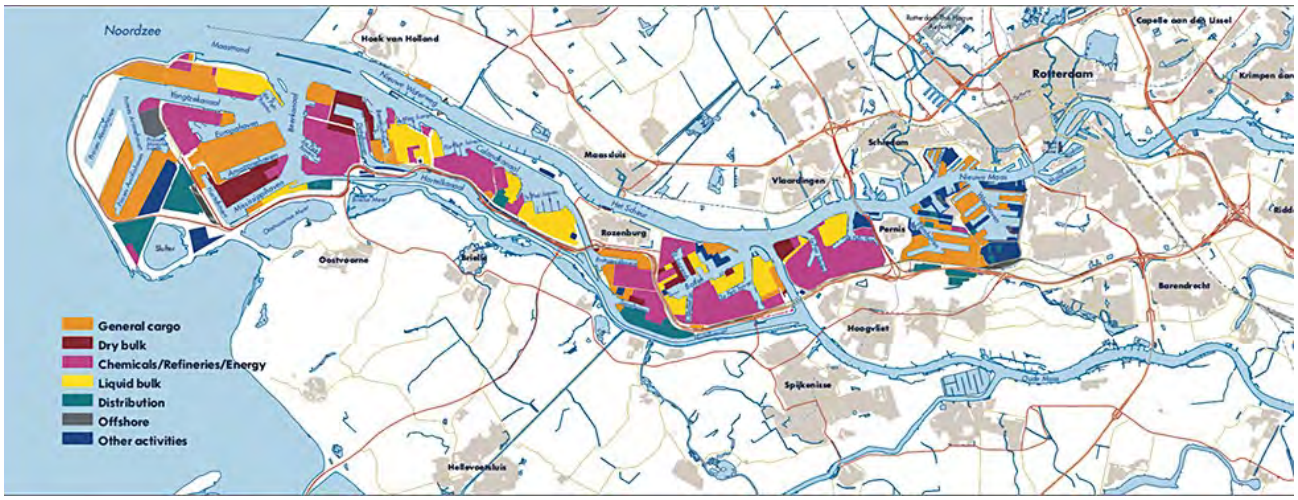
Image. Shipping to the Port of Rotterdam (2017). Credit portofrotterdam.com

Last year, the port of Rotterdam handled 436.8 million tonnes of goods. This makes Rotterdam the largest port in Europe.

The port of Rotterdam created an infographic to show cargo shipments from all over the world arriving in the port every day during 2017. It shows the top five origins of the three cargo types that arrive in Rotterdam, showing where this cargo comes from, and which routes it takes to get there.

Source: https://www.marineinsight.com/shipping-news/port-of-rotterdam-continues-24-7-operations/

Lansd use map for the Port of Rotterdam



Source: https://www.portofrotterdam.com/sites/default/files/2021-06/facts-and-figures-port-of-rotterdam.pdf

Port of Rotterdam

Visualising global shipping

Source: VOX. Visualization of the world's shipping routes – https://www.vox.com/2016/4/25/11503152/shipping-routes-map

Source E

GLOBAL SHARK POPULATIONS COLLAPSING

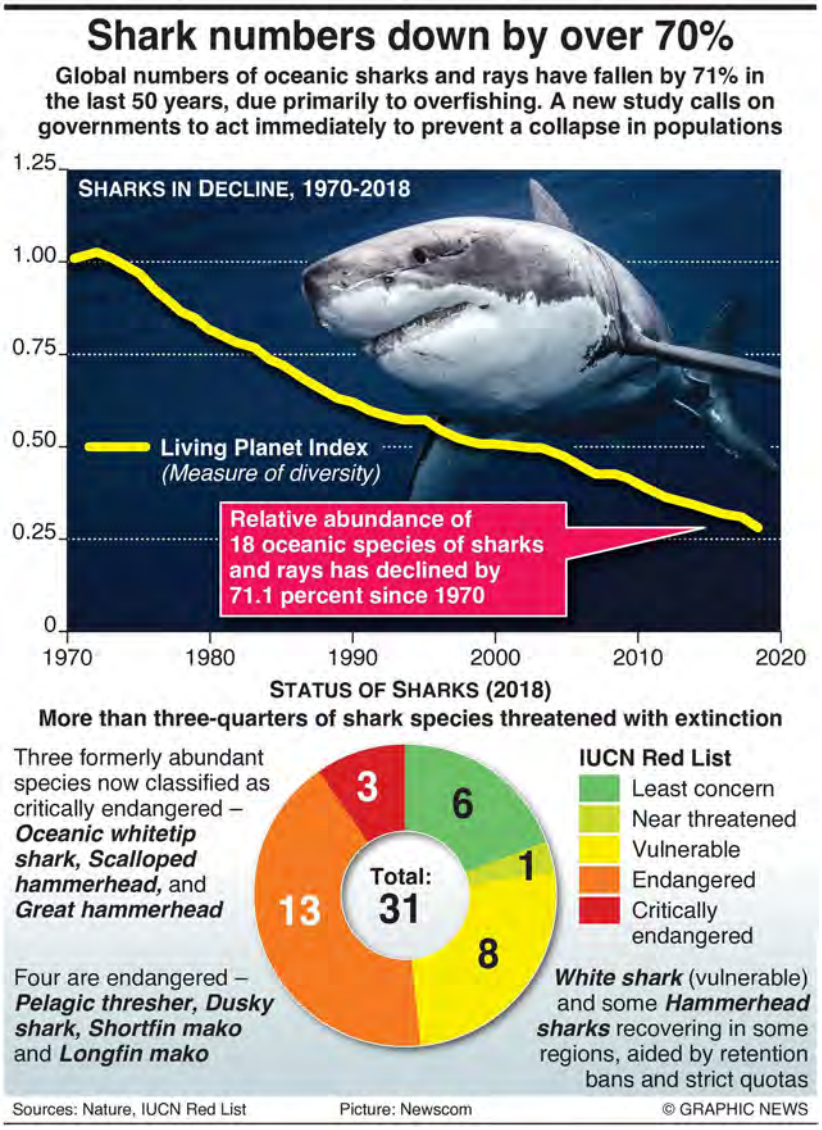
January 27, 2021 – Global numbers of oceanic sharks and rays have fallen by 71% in the last 50 years, due primarily to overfishing. A new study calls on governments to act immediately to prevent a collapse in populations.

Biologists estimated the relative abundance of 18 oceanic species of sharks and rays from 1970 to 2018 and assessed the risk of extinction for all 31 species.

Three formerly abundant species are now classified as critically endangered, the highest threatened category in a list produced by the International Union for Conservation of Nature (IUCN). Over three-quarters of shark species are now threatened with extinction. There is evidence some shark populations are rebuilding. The authors are calling for immediate government action to prevent collapses with catch limits to help promote species recovery.

Sources:

- Half a century of global decline in oceanic sharks and rays (Nature)
- Global shark and ray population crashed more than 70% in past 50 years (The Guardian)
- Extinction: 'Time is running out' to save sharks and rays (BBC)



PUBLISHED: 27/01/2021; STORY: Graphic News; PICTURES: Newscom

Bycatch

When fishing vessels go to sea, they go after a "target" catch, but as most fishing gear is unselective, fishing fleets also catch millions of tonnes of other marine life, commonly known as bycatch. The catch of "non-target" fish and marine creatures often occurs with no management. Bycatch includes turtles, marine mammals and seabirds as well as fish.

Source: https://wwf.panda.org/wwf_news/?162122/Forty-percent-of-global-fisheries-catch-wasted-or-unmanaged---WWF

Source F

OCEANS CAN BE RESTORED TO FORMER GLORY

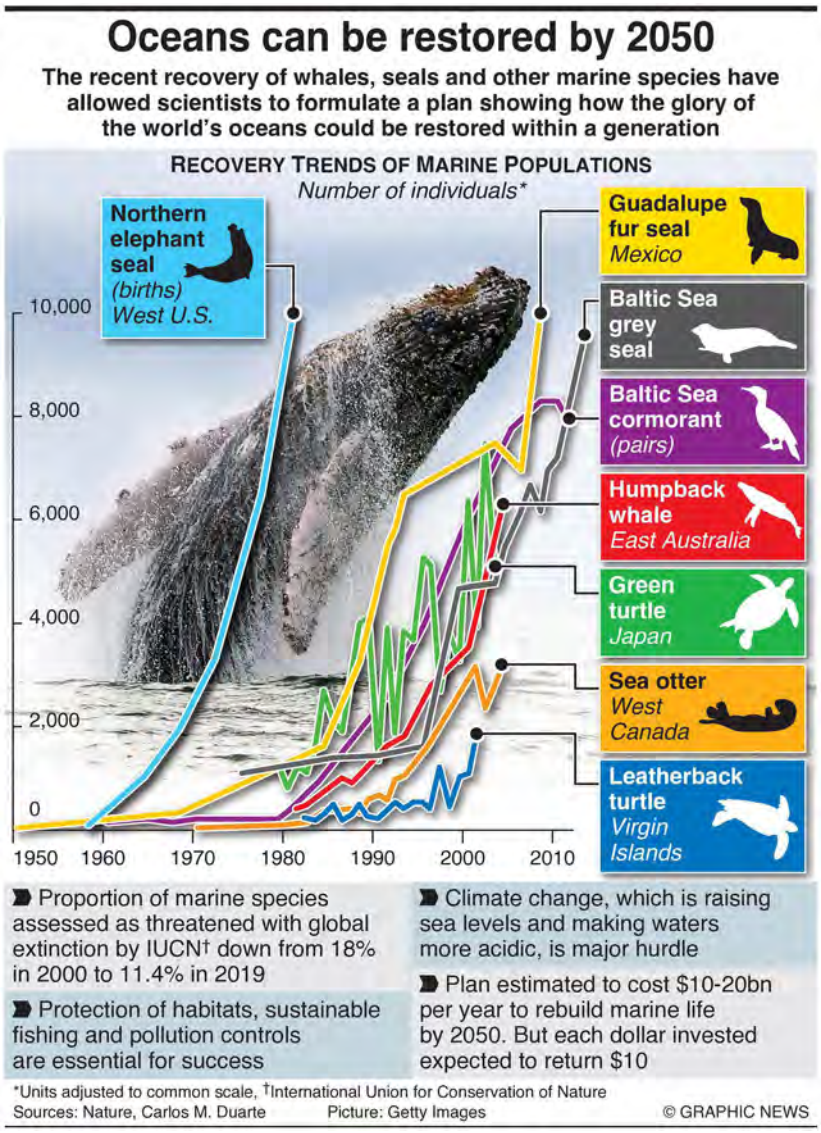
The recent recovery of whales, seals and other marine species have allowed scientists to formulate a plan showing how the glory of the world's oceans could be restored within a generation.

Humpback whale migrations from Antarctica to eastern Australia have been increasing by about 10 % a year, from a few hundred in 1968 to more than 40,000, benefiting from the 1986 ban on commercial whaling. Northern elephant seals hunted almost to extinction by 1880 when only 20 breeders remaine¬d now number more than 200,000 due to strong protection. Southern sea otter numbers in Canada have grown to several thousand. Scientists say there is now the knowledge to create an ocean renaissance for wildlife by 2050 and bolster the services that the world's people rely on, from food to coastal protection to climate stability. The measures needed, including protecting large swathes of ocean, sustainable fishing and pollution controls, would cost $10-20bn a year. Climate change, and the challenges of scaling up existing conservation efforts, are big hurdles and the window for action is very narrow. The study has been published in the journal Nature.

Sources:

- Rebuilding marine life (Nature)
- Whales' recovery shows we can fix damage to oceans from overfishing and climate change (The Australian)
- Oceans can be restored to former glory within 30 years, say scientists (The Guardian)
- Oceans can be successfully restored by 2050, say scientists (BBC

PUBLISHED: 03/04/2020; STORY: Graphic News; PICTURES: Getty Images



Green Sea Turtle by Amanda Cotton. Source: https://www.theoceanagency.org/ocean-image-bank

MARITIME TRADE VESSELS

SOURCE A and SOURCE B

1. Explain the measurement unit TEU.
2. By how much did TEU change between 2002 and 2020?
3. Calculate the % change in shipping container size between 2002 and 2020.
4. Explain two advantages of larger container ships. Use statistics from Source B to support your answer.
5. Outline two disadvantages of larger container ships. Use information from source B in your answer.
6. Define the term 'Economies of scale'.
7. Identify two types of cargo ship that make up most of the global maritime trade.
8. Calculate the amount of cargo in containers moved by sea in 2019.
9. What challenges do increasingly larger container ships create for maritime ports?
10. Select two types of sea motion and explain how these could result in the loss of containers at sea.
11. Discuss how containers lost at sea could threaten ocean ecosystems.
12. Suggest other ways shipping impacts on the world's oceans?

MARITIME TRADE ROUTES

SOURCE C

1. What does NSR refer to? Describe the location of the NSR.
2. State the time advantage of the NSR over other shipping routes.
3. Suggest why the NSR has become a more viable shipping route for Russia in recent years.
4. Why are new sea routes seen as a solution to increasingly larger container ships?
5. What do the major shipping canals (Suez and Panama) and straits (Magellan and Malacca) have in common?
6. Visit the Panama and Suez Canals using Google Earth. Use a Venn Diagram to identify similarities and difference between the two shipping routes.

SOURCE D

1. Study the location of Port of Rotterdam (POR) using Google Maps or Google Earth. Determine latitude and longitude, country, water bodies and neighbouring countries.
   a. Use this link to examine the '***All Shipping Routes lead to Rotterdam***' infographic https://tinyurl.com/jrt8vvhs
   b. Rank the three types of maritime cargo that travelled to POR in 2017 from most to least important by weight.
   c. How much Dry Bulk cargo shipped from Australia to POR in 2017? Suggest the potential content of that cargo.
   d. Identify the two most important sources of liquid bulk cargo into POR.
   e. List three types of goods transported to Amsterdam in containers.
   f. Justify the title of the infographic.

2. Refer to the article *'Mapping the world's key maritime choke points'* by Visual Capitalist in this edition.
   a. Name three potential choke points for container ships travelling from Australia to Rotterdam.
   b. Identify potential choke points for shipping between China and Rotterdam.
   c. Do you think Australia would benefit from using the NSR? Explain your answer.

3. Refer to the photograph and map of POR.
   a. Identify the type of photograph.
   b. Locate the area shown in the photograph on the map.
   c. Name the large water body in the background.
   d. Suggest the direction the photographer was facing to take the photo.
   e. Describe three general features of the POR you observe from the map and photograph.
   f. Suggest a reason why the two largest areas for general cargo areas are at different ends of POR. (Think historically)

4. Visit the website 'Visualisation of the worlds shipping routes.' https://www.vox.com/2016/4/25/11503152/shipping-routes-map
   - Observe the dominant trade routes.
   - Zoom in to see choke points.
   - Look to see if the NSR is actively being used.
   - Observe major maritime trade routes around, and to and from, Australia.
   - Identify areas with few or no shipping and suggest reasons.

OCEAN BIODIVERSITY LOSS

SOURCE E

1. What is the main cause of declining shark numbers?
2. How does poor 'bycatch' management contribute to overfishing?
3. Calculate the average rate of loss per decade between 1970 and 2020.
4. Calculate the % of critically endangered shark species using the sector graph. Remember 360 degrees = 100% making 3.6 degrees = 1%
5. Identify actions that are helping some shark species to recover.
6. Investigate strategies to minimise bycatch during ocean fishing.
7. Create a consequence diagram to illustrate the impact of overfishing on shark biodiversity and the flow on impacts of declining shark numbers on ocean ecosystems.

SOURCE F

1. Briefly describe how whale numbers have recovered over time, including the % threatened with extinction.
2. Explain the recovery of whale numbers since 1986.
3. Define the term 'renaissance' in relation to marine wildlife.
4. Compare the graphs showing numbers of Baltic Sea gray seals and West Canada sea otters since 1980. Use statistics in your answer.
5. The graph for the Japanese Green turtle and the Virgin Islands Leatherback turtle are unusual compared to other species on the graph. Suggest a reason.
6. List the three strategies suggested to see a resurgence in other ocean wildlife by 2050. Beside each strategy write a sentence outlining how the strategy would help build wildlife numbers.
7. Suggest how climate change could threaten the recovery of species into the future.
8. Why is investment in conservation value for money?

CHALLENGE QUESTIONS

Read the following articles and for each one, respond to the following challenge questions.

1. Visualising the human impact on the world's oceans.

Challenge Question

In your own words explain the concept "Blue Economy'. Use statistics in your response.

2. Why Indigenous knowledge should be an essential part of how we govern the world's oceans.

Challenge questions

a. Define these concepts.

cumulative impact; tipping point; governance, co-management

b. Provide an example of Indigenous governance and management and an example of co-management.

3. Container: Box that changed the world.

Challenge question

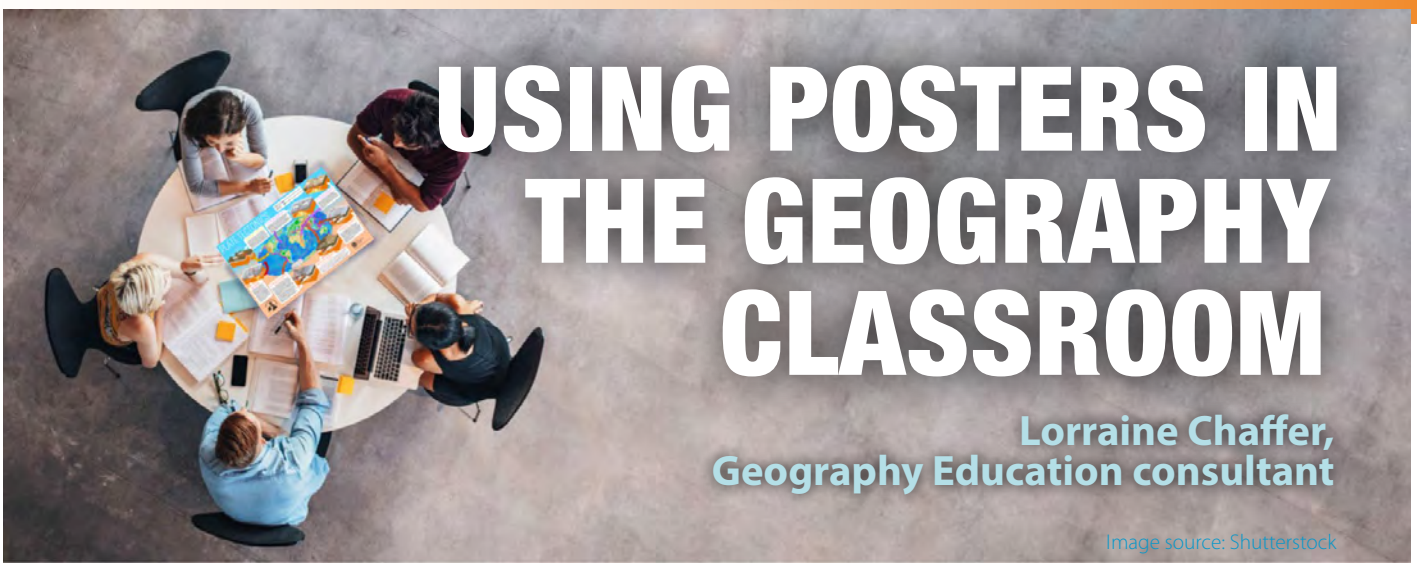
In 200 words explain the title of this article.

4. Mapping the world's key maritime choke points

Challenge question

a. In less than 200 words, describe the global distribution of marine traffic choke points

b. In 100 words, propose and justify ONE solution for a choke point of your choice.



USING POSTERS IN THE GEOGRAPHY CLASSROOM

Lorraine Chaffer,
Geography Education consultant

Image source: Shutterstock

Posters can be used as a basis for individual or group inquiry activities for most Geography topics using some creativity and planning. The activities included here focus on Oceans and Asia.

HOW WELL DO YOU KNOW EARTH'S SURFACE?

Use the Earth's Surface poster for the following groupwork. This groupwork could be completed in many topics including Landscapes and Landforms, Water in the World, Sustainable Biomes and Environmental Change and Management.

Activities: Oceans and Earth's surface

Students work in groups or individually to complete the following activities.

Each group will need access to a poster.

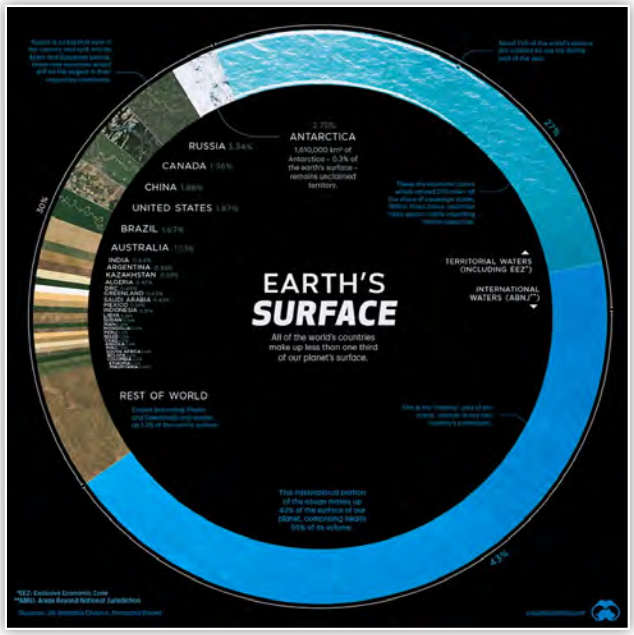
1. Begin with these thinking questions:
   - Will the proportion of Earth covered by oceans increase or decrease with climate change?
   - What might Australia's proportion of earth's surface be as a result of a global 1 metre rise in sea level?
   - Why is Antarctica and not the Arctic shown on the graphic as a portion of Earth's surface?

   Discuss as a group and then share ideas in a full class discussion.

2. In your group try these prediction activities

   A. Predict how the graphic depicted would change with a 1 metre rise in sea level.

   B. Predict how the graphic depicted would be different by 2100 due to climate change impacts on weather and climate.
   - Create a hand drawn simplified infographic to illustrate your predictions.
   - Conduct an inquiry to determine the accuracy of your predictions.



Posters available from GTA NSW& ACT Website – Resources tab

3. Find two sources that will validate the data shown in the infographic.
4. Calculate the % of Earth's surface occupied by China PLUS India. Compare this to the % occupied by the Earth's oceans.
5. Explain the difference between Territorial Waters and International Waters.
6. What message is the following quote giving?
   'A country is not measured by the size of its area on the map. A country is truly measured by its heritage and culture.'

Linked article at https://www.visualcapitalist.com/countries-by-share-of-earths-surface/

LANDFORMS and LANDSCAPES

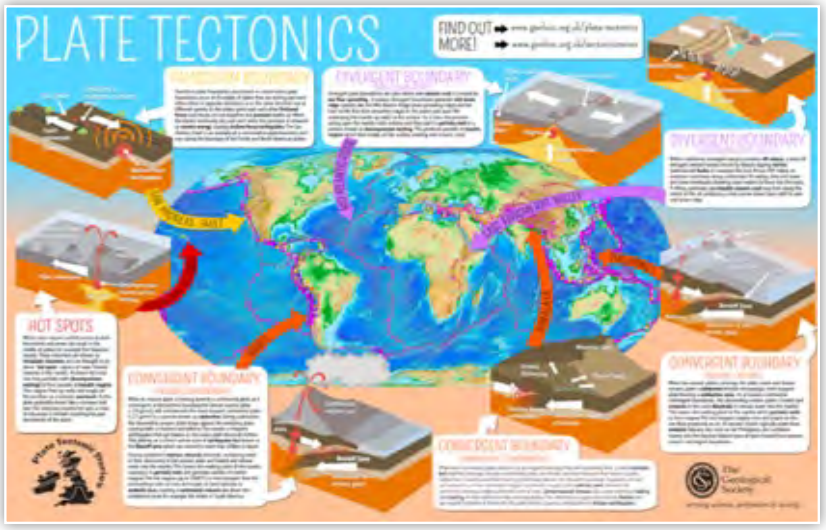
SYLLABUS LINK:

Geomorphic processes that create landforms: tectonic activity

Elective Geography: Oceanography

Use the 'Plate Tectonics' poster to complete the following activities

This activity would be timed to take place AFTER explaining geomorphic processes linked to plate tectonics or when integrating the Asia Cross Curriculum Priority.



Activities: Plate tectonics and Oceans

Each group will need a poster.

1. Identify one the three largest oceans on the poster. Circle with a red whiteboard marker ONE of these oceans. This ocean will be the focus of your investigation.
2. Describe the location of your selected ocean using geographical terms such as latitude, longitude, hemisphere, direction e.g., from Australia.
3. Name and locate at least 6 countries that border this ocean.

   You may use a map showing countries of the world for activities 2 and 3.
4. Identify the different plate boundaries located in your selected ocean and describe in your own words what is happening at each boundary.
5. Identify any landform features in the ocean that would be located on the any plate boundaries in this ocean. Explain the cause of any feature you have named.
6. Are there any geomorphic hazards that could impact on this ocean as a result of plate tectonics? Explain the cause of any hazard you have named.
7. Compare and contrast what is happening in your selected ocean with ONE other ocean.
8. Predict geomorphic changes that could occur within your ocean over the next 100 years. Justify your prediction using your geographical knowledge and understanding of plate tectonics.
9. Reflect on what you have learned in this activity. Create a catchy title or name to summarise the feelings of your group about plate tectonics in our oceans.

Activities: Plate tectonics in Asia

1. Identify the location of Asia on the poster. Circle with a red whiteboard marker. This is your Asian Circle for the following activities. *Let students debate where this circle should be drawn and reach a consensus.*
2. Describe the location of your Asian Circle using geographical terms such as latitude, longitude, hemisphere, direction e.g., from Australia.
3. Name and locate at least SIX Asian countries within the circle you have drawn. *You may use a map showing countries of the world for activities 2 and 3.*
4. Identify the different plate boundaries located in your Asian Circle and describe in your own words what is happening at each boundary.
5. Identify any landform features or hazards within your Asian Circle that result from these tectonics movements. Explain the cause of each feature you have named.
6. Compare and contrast what is happening in your Asian Circle with at least three other parts of the world, including Australia. (refer to countries or continents).
7. Predict geomorphic changes that could occur within your Asian Circle over the next 100 years. Justify your prediction using your geographical knowledge and understanding of plate tectonics.
8. Reflect on what you have learned in this activity. Create a catchy title or name to summarise the feelings of your group about plate tectonics in your Asian Circle.

ENVIRONMENTAL CHANGE

SYLLABUS LINKS

Investigate human-induced environmental changes across a range of scales, for example: brief examination of types, and extent, of environmental change

Activities: Biodiversity loss in the world's oceans?

Use the 'On the Brink' poster to complete the following activities

Each group will need a poster.

1. Use the poster to rank the five causes of global biodiversity loss from largest to smallest contribution.
2. In groups, use your knowledge about world **oceans** only to rank what you believe are the 5 causes of biodiversity loss in marine environments - from largest to smallest impact.

   Discuss group rankings as a class.
3. Select ONE cause of biodiversity loss to investigate. Focus your research on ONE ocean.

   Find facts, statistics, and information about specific places. For example:

   – Climate change and biodiversity loss in the Arctic Ocean.
   – The impact of pollution on biodiversity in the Pacific Ocean

   Create a media report to present your findings. Include images / artwork, facts, statistics and places.
4. Find a relevant video clip or article that you can embed into your report
5. Share your report with the class
6. After all groups have presented their research findings, discuss the response to Question 2 again to see if opinions have changed.

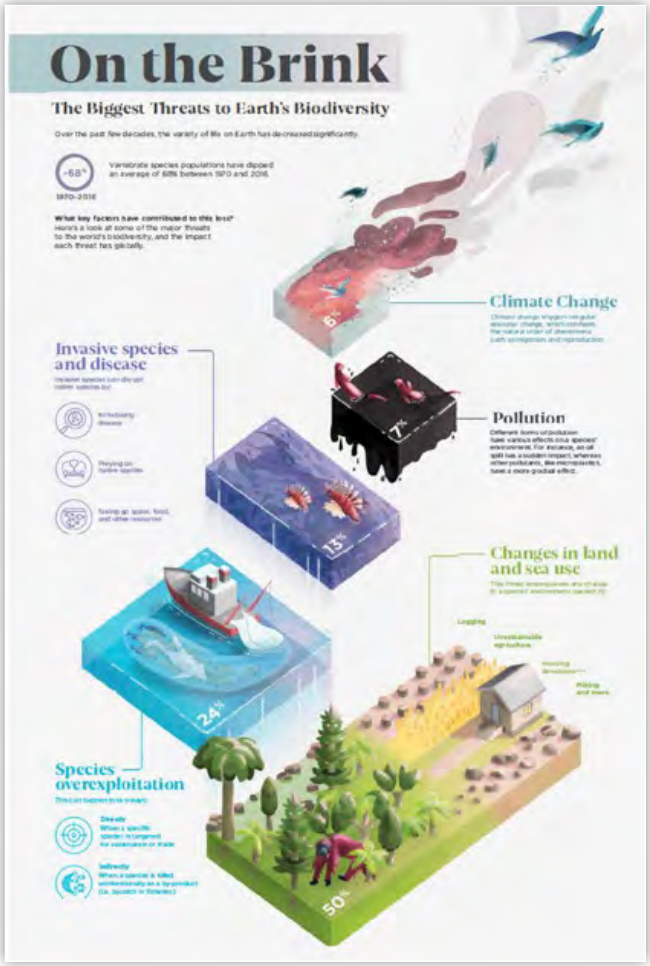
Activities: Biodiversity loss in the Asia Pacific

Study the poster On the Brink. The biggest threats to Earth's biodiversity.

1. As a group discuss the area of the world known as the Asia Pacific. Create a definition of the region. *You can use a map showing countries of the world for this activity if needed.*
2. Estimate the % contribution of the Asia Pacific to global losses in biodiversity.
3. Use the poster to rank the FIVE causes of global biodiversity loss from largest to smallest contribution.
4. Use your knowledge about the Asia Pacific Region to rank what your group believe are the FIVE causes of biodiversity loss for the region in order from largest to smallest.
5. Use the QR code on the poster or the following weblink to check your group's estimates in Activity 2 and ranking for Activity 4. Visualising the biggest threats to Earth's biodiversity. https://www.visualcapitalist.com/biggest-threats-to-earths-biodiversity/
6. How accurate were your estimates? Calculate the % difference between your answers to Activities 2 and 4 and the information in the article. Suggest reasons for the differences.
7. Select **ONE Asian country** to research biodiversity loss. Summarise your findings using the FIVE causes of biodiversity loss as headings. Create an infographic of your own using the following title: *On the Brink: The biggest threats to ..... 's* (name of country) biodiversity loss.

   Include images / artwork and a brief summary of your findings for each cause.

   Add a conclusion at the beginning or the end of the infographic.



INTERCONNECTIONS

SYLLABUS LINKS

Investigate the ways places and people are interconnected through trade in goods and services across a range of scales, for example:

- examination of a country's trade links with other countries e.g., sources of raw materials
- analysis of spatial patterns of global trade e.g., countries of production and consumption

Investigate the effects of the production and consumption of goods on people, places and environments throughout the world, for example:

- assessment of the effect of production or consumption of goods on ONE place or environment

Activities: Mobile phones and ocean trade

1. Your Nokia mobile phone is being produced in Finland.
   a. What is the most likely way you will transport the minerals you need to the processing factory? Justify your choice. Options include air freight, land freight, shipping container, bulk shipping)
   b. On a blank map of the world draw arrows to show the main trade routes used to transport the minerals by sea from a country of origin to your destination.
   c. Circle potential 'Choke points' in the routes you have shown.
   d. Identify other potential threats to the delivery of your minerals by sea.

Nokia headquarters Espoo, Finland Source: https://www.flickr.com/photos/pikkuanna/5754189284/. CC BY-SA 2.0, https://commons.wikimedia.org/w/index.php?curid=64791586

Multiple posters can be purchased by following this link: https://www.gtansw.org.au/wp-content/uploads/2021/03/Posters-for-sale_amended-postage_11.03.21.pdf

Activities: How does your mobile phone connect you to Asia?

1. Identify the location of Asia on the poster. Circle with a red whiteboard marker. This is your Asian Circle for the following activities.
2. Describe the location of your Asian Circle using Geographical terms such as latitude, longitude, hemisphere, direction e.g., from Australia.
3. Name and locate at least SIX Asian countries within the circle you have drawn. *You may use a map showing countries of the world for this activity.*
4. Identify the smartphone minerals mined in Asia and the countries of production.
5. As a group, discuss where you think most smartphones in the world are produced. List your group prediction of the THREE top smartphone producing countries and justify these choices.
6. Check the accuracy of your answer to Question 5 by researching the main locations where smartphones are produced. Conduct further research to explain the locations of smartphone production.

   The following website is a good starting point.

   List of Top mobile manufacturing countries in the world https://www.jagranjosh.com/general-knowledge/list-of-top-mobile-manufacturing-countries-in-the-world-1594643135-1
7. Map the flow of smartphone minerals to the top producing country from one other location for each mineral needed to produce smartphones. Name the selected production site for each mineral and the destination country i.e., the top smartphone producer. *Use a blank world map.*
8. Investigate the effects of mobile phone production. Refer to at least on one country from Asia in your response.

CREATING CLASSROOM WORKSTATIONS

Creating workstations around a classroom can put students in charge of their learning and promote independent thinking and teamwork skills … and get students moving. After '***being a student for one day***' and following a timetable in which every lesson had students seated at their desk made me more determined to increase the number of lessons that encouraged student movement and responsibility for learning.

Workstations

Workstations can be **wall displays** including posters and /or images or **sit at / stand around stations on desks** with a diversity of resources to investigate. Wall displays work best when students are given opportunities to interact with the content and link to the topics that are being studied. Static displays can make your classroom Geographical and an attractive learning environment but do not always engage all students. Displays should be changed for each new topic.

For this activity, I have used **posters** that are on sale on the GTA NSW & ACT website to show how poster displays can be used to put a **focus on Oceans and Asia**. For some activities students may need access to a map showing countries of the world. A1-page printed world map or a large world map on the classroom wall works well for this

Note: If posters are laminated, whiteboard markers can be used by the teacher OR students to create the focus of a lesson. Give one student in each team responsibility for drawing on your posters. I would use multiple copies of a single poster rather than a variety of different stimulus materials for Stage 4.

Differentiation

For students working at Stage 5 level or higher, posters could be used as a stimulus for a deeper, independent investigation or an additional early finishers station created to challenge these talented students.

Removable QR Code

QR codes can make workstation activities more sophisticated, integrate technology and add an element of fun. QR codes can be used as a way of engaging students with classroom displays. While not all schools allow phones in classrooms or have 1:1 with tablets, activities can be used with class tablets at each station. By making QR codes **removable** you can create different activities as post topic revision or formative assessment and protect your posters.

Getting started with QR codes

1. Google "free QR code generator" to find a website to create your codes.

2. Ask students to load a free QR Code reader app onto their phones or tablet devices – or the teacher does if using class tablets.
3. Generate QR codes that link to questions, videos, websites or information sheets about the topic or theme.
4. Print poster-size codes to use on posters or images on display.
5. Make worksheets live by adding QR codes that take students off the page and onto a relevant website, interactive game or video.
6. Create a fast-finishers area in the classroom where QR codes reveal an extension activity or analytical questions.
7. Use a QR code generator and a 3D QR Code Activity Cube Template to create QR code cubes. Each code can reveal a different question or activity.

In the previous poster activities, questions could be added to a QR cube using categories such as:

- Locate
- Identify and describe
- Identify and explain
- Compare and contrast
- Predict and justify
- Reflect and create

Each workstation could focus on one activity from the cube with students rotating around the room. For static stations students can work through the activities on each side of the cube.

Sources

10 Exciting QR Code Classroom Activity Ideas https://www.teachstarter.com/au/blog/10-exciting-qr-code-activity-ideas-for-classroom/

One way of creating 'removable' QR code stickers for your posters is described here: https://gymcraftlaundry.com/diy-peel-and-stick-removable-labels-free-printable/

Blank QR Code Activity Cube Template https://www.teachstarter.com/au/teaching-resource/blank-qr-code-activity-cube-template/

The Geography Teachers' Association of NSW & ACT

GEOGRAPHY POSTERS FOR SALE

POSTERS POSTERS POSTERS POSTERS POSTERS POSTERS

GTA has an array of infographic posters available for classroom use.

Posters are linked to topics studied in Geography K–12 for the Australian Curriculum and NSW Syllabuses.

- A **bank of questions** for individual and groupwork will be accessible via Google Drive to all schools /teachers purchasing posters.
- Posters can be purchased in **pre-packaged sets** or as **individual posters**.
- **New posters** will be added to the resource collection throughout the year.

PACK 1: THE CARBON SET

Contents: 5 posters

– *The Carbon Cycle*
– *Carbon & the Greenhouse Effect*
– *Carbon Reservoirs*
– *Hydrocarbon Formation*
– *Carbon & Climate Change*

1 x A1 poster: *The Carbon Cycle*

4 x A2 posters: *Carbon Set*

PACK 2: GEOGRAPHY CONTENT

Contents: 4 x A1 posters

– *Plate tectonics*
– *Minerals in a smartphone*
– *The Carbon Cycle*
– *On the Brink: The biggest threats to Earth's biodiversity*

PACK 3: A2 CAREERS POSTER

– *Pathways with Geography*

PACK 4: THREE SQUARE POSTERS

– *Earth's surface*
– *Earthquakes*
– *UN Sustainable development goals*

PACK 5: A3 GEOGRAPHY CAREERS SET

Set of six posters showing a variety of Geography career options

– *Careers Using Geography*

INDIVIDUAL SELECTION: A1 posters

Choose from posters:

– *Plate tectonics*
– *Minerals in a smartphone*
– *The Carbon Cycle*
– *Biomes and Ecosystems*

INDIVIDUAL SELECTION: 60cm square posters

– *Earth's surface*
– *Earthquakes*
– *UN Sustainable development goals*

For more details, prices and how to order follow this LINK

SOURCES AND PRICING

Posters have been sourced from organisations including the Geological Society (UK), Visual Capitalist and Graphic News. GTA NSW & ACT has also commissioned some posters.

Posters are being sold in sets of 4 or 5 to make postage viable. Affordability was a key consideration when determining pricing.

Administration, printing and distribution, licensing and design costs where relevant are incorporated into the cost of each pack.

Postage includes the cost of cylinders. A maximum of 5 posters will be packaged in any postage cylinder.

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FOCUS: ASIAN REGION

Dr. Susan Bliss Educational Consultant

Curriculum Links: Geography 7–10

Water in the World and Liveability

Biomes (Marine), Food Production and Food Security

Environmental Change and Management (Human-Induced Changes, Coast and Marine Environments and their Management, Human Wellbeing)

Elective Geography

Cross Curriculum Priorities

Asia and Australia's engagement with Asia

Sustainability (United Nations Sustainable Development Goal (SDG) 14)

Aboriginal and Torres Strait Islander histories and cultures

IMAGINE THE WORLD WITHOUT FISH

The movie 'End of the Line' claims the oceans will be fished out by 2048 impacting adversely on future food security. About 60 years ago seas were fished to a depth of 50 metres, however with advanced technology such as the Geographical Information System (GIS) and super trawlers with deep sea long-line fishing equipment, oceans are now fished to depths of over 200 metres.

Source: https://www.nationalgeographic.com/animals/2006/11/seafood-biodiversity/

The World Bank's Director of Agriculture and Environmental Services, Juergen Voegele, said that 'supplying fish sustainably — producing it without depleting productive natural resources and without damaging the precious aquatic environment — is a huge challenge.'

Source: http://www.fao.org/news/story/en/item/213522/icode/

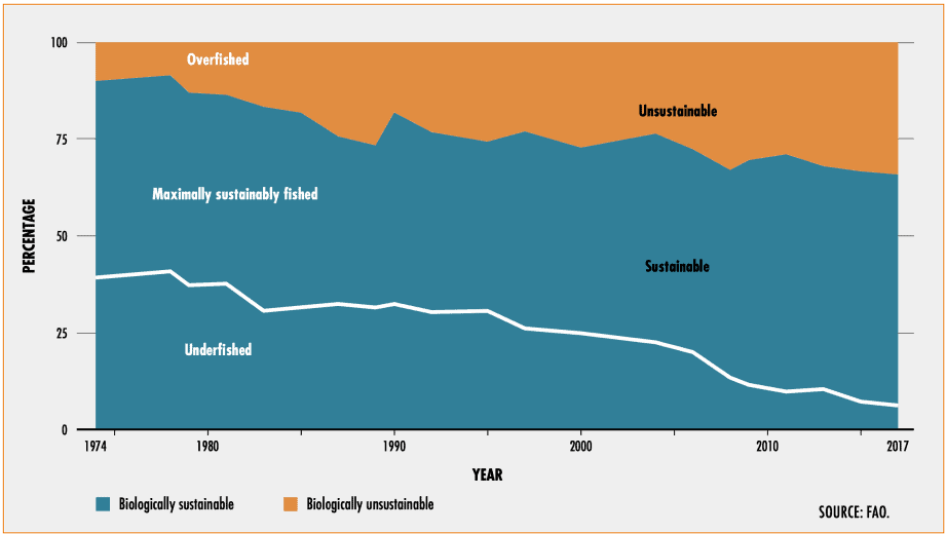
Sustainable fishing guarantees there will be populations of ocean and freshwater wildlife in the future.
https://www.nationalgeographic.org/encyclopedia/sustainable-fishing/

FAO: Status of global fishery resources

'… the fraction of fish stocks that are within biologically sustainable levels decreased from 90 percent in 1974 to 65.8 percent in 2017. In contrast, the percentage of stocks fished at biologically unsustainable levels increased, especially in the late 1970s and 1980s, from 10 percent in 1974 to 34.2 percent in 2017.'

2020 The State of the Worlds Fisheries and Aquaculture
http://www.fao.org/3/ca9229en/ca9229en.pdf

Figure 1: Global trends in the state of the world's marine fish stocks 1974–2017



From 2020 The State of the Worlds Fisheries and Aquaculture http://www.fao.org/3/ca9229en/ca9229en.pdf and https://sustainablefisheries-uw.org/fao-state-of-world-fisheries-2020/

GLOBAL OVERVIEW 1

Human impacts

* **40% of world's oceans are severely affected by human activities**, such as pollution, overfishing and loss of coastal habitats (eg wetlands for cities).
* **80% of marine and coastal pollution originates on land** such as fertilisers, pesticides, plastics and sewage.
* 21% of fish species are deemed at risk of extinction.
* From 1974 to 2018 the percentage of fisheries within biologically **sustainable levels decreased from 90% to 65.8%**
* **The most unsustainable fisheries** are located in the Mediterranean and Black Seas (62.5% of overfished stocks), Southeast Pacific (54.5%) and Southwest Atlantic (53.3%).

Image source: Wikimedia Commons – Plastic_Pollution_in_Ghana.jpg

GLOBAL OVERVIEW 2

Ocean values

* Oceans cover **75% of Earth's surface.**
* 97% of Earth is water.
* Oceans **absorb 30% of carbon dioxide** cushioning impacts of climate change.
* 91% of ocean species are unclassified.
* 95% of the ocean remains unexplored.
* Marine resources are worth $3 trillion per year or 5% of global GDP.
* 38% of fish caught or farmed is traded globally.
* Over 3 billion people directly and indirectly depend on marine and coastal biodiversity for their livelihoods.
* Over **60 million people are directly employed by seafood production –** 85% in Asia.
* **Asia** possesses 3.1 million fishing vessels – **68% of the global fishing fleet.**
* Women consist of 14% of the people engaged in fisheries and aquaculture.
* The **fishing industry supports the livelihoods of 8% of the world's population** with most living in developing countries. The majority are small-scale, artisanal fishers and aquaculture workers.

Image source: https://www.theoceanagency.org

GLOBAL OVERVIEW 3

Challenges and action

* Since 2020, **COVID-19** emerged as a major global challenge making the fight to defeat hunger and poverty more challenging. **COVID-19 had a major impact on the fishing industry** with the closure of fishing ports and fish markets, and reduced patronage of restaurants. Impossibility of crew changes on fishing boats, lack of Personal Protective Equipment (PPE) and restricted and enclosed spaces on fishing boats, led to the spread of the pandemic amongst crew who without medical assistance, died and were frequently buried at sea. Numerous poor unemployed fishermen became victims of forced labour, bonded labour and human trafficking.
* **United Nations Sustainable Development Goal (SDG) 14** relates to **life below water** that aims to conserve and sustainably use the oceans, seas and marine resources for sustainable development. It is committed to restore fish stocks, end overfishing and **Eliminate Illegal, Unreported and Unregulated Fishing (IUUF).**
* The State of World Fisheries and Aquaculture 2020 Report is devoted to **Sustainability in Action**. The sector contributes to securing all the 17 **Sustainable Development Goals (SDG)**.

Image source: Unsplash photo-Jeremy Stenuit.jpg

WORLD FISHERIES: PRODUCTION

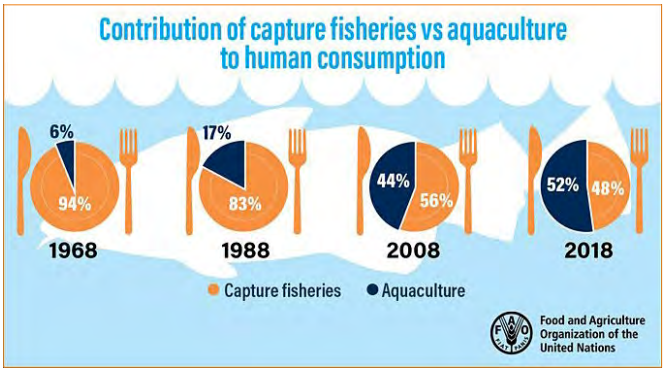
From 1990 to 2018, there was a 14% increase in global fish production and a growing trend for fisheries and **aquaculture** to provide food, nutrition and employment.

Global fish production is divided into **capture** and **aquaculture:**

- **Top fish capture producing countries: China, Indonesia, India,** Peru, Russia,USA and **Vietnam**, accounted for almost 50% of **global capture.**
- **China** accounted for 35% of global fish production and reported about 2.26 million tonnes from its "**distant-water fishery**" such as around coastal South America.
- **Asia** dominates aquaculture production. The region produced 89% of the global quantity during the last 20 years.

As population grows so does demand for fish. Aquaculture could be producing nearly two thirds of global food fish supply by 2030 in response to declining ocean stocks and increasing demand for seafood.

Figure 2: Growing importance of aquaculture



Source: FAO on Twitter https://twitter.com/faobrussels/status/1269964831467200514

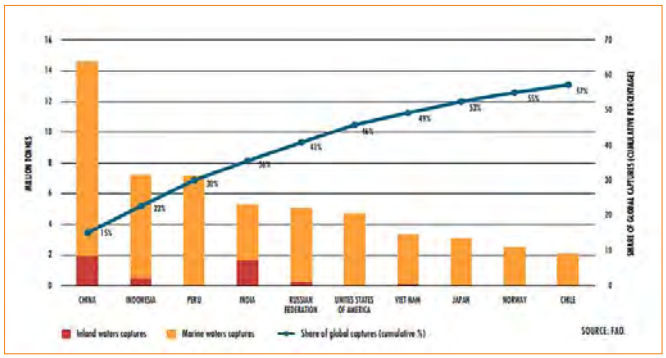
Recreational fishing

The Marine Recreational Information Program (MRIP) collects recreational fishing data and produces estimates of recreational catch. While surveys use peer-reviewed data collection and estimation methods, the statistics should not be viewed as fact…. they are estimates! For example, the exact number and species of finfish caught in saltwater by recreational anglers fishing from shore, private boats and for-hire vessels is impossible to determine.

Production dominated by Asian countries

Across Asia, 13 large marine ecosystems generate about 50% of the global marine fish catch and are a source of nutrition and employment and an essential component of economic and cultural landscapes. Currently, fisheries in these waters have declined due to coastal development, overfishing, pollution, acidification, unsustainable management and climate change. Consequently, there is an urgent need to protect and rebuild marine resources, particularly in the East and South China Seas.

Figure 3: Top 10 global Capture Producers 2018



Source: 2020 The State of the Worlds Fisheries and Aquaculture http://www.fao.org/3/ca9229en/ca9229en.pdf and https://sustainablefisheries-uw.org/fao-state-of-world-fisheries-2020/

WORLD FISHERIES: GENDER

Fishing, once considered men's work, has involved **women** throughout history. Approximately 2.1 million women are involved in **small-scale fishing** in all regions of the world. While 14% of women are employed in harvesting fish approximately 50% are employed in the post-harvest fishing sector although these statistics are debatable given knowledge is sketchy and limited.

Meryl Williams of the World Fish Centre estimates that at least 50 million women living in developing countries are employed in the fishing industry. Most live in Asia, Africa and Oceania. However, their work is often considered **'invisible'** as the macho image of the fisherman has coloured our thinking. Their fish catches are mainly located along shorelines using foot or **small, non-motorised vessels**. Most fish caught is consumed by the family with a small portion sold, making a contribution to their livelihood.

Image source: Shutterstock

Data collected about fishing frequently focuses on large-scale commercial fisheries, paying less attention to small- scale fishing activities, especially those for home consumption.

In Bangladesh approximately 60% of the fish farmers/ aquaculture farmers are women contributing to increased income and reduced poverty in coastal communities. In **Cambodia and Thailand,** the number of female fishers and boat owners is increasing.

Women play a vital role in fishing communities across Asia through fishing, mending nets, processing fish and selling or trading in markets.

Photos Shutterstock.

WORLD FISHERIES: CONSUMPTION

Currently:

- 88% of fish caught was used for **human consumption** and 12% for **non-food purposes**.
- Fish provided 3.3 billion people with about 20% of **animal protein**.
- Fish production consisted of 82.1 million tons of **aquatic animals**, 32.4 million tons of **aquatic algae** and 26,000 tons of **ornamental seashells and pearls**.
- Fish and fish products are vital for **food security** and contributed to eliminating **hunger and malnutrition.** Unfortunately, 35% of global fish harvest is lost or wasted.
- The top fish consuming countries China, Myanmar, Vietnam, Japan, India and Malaysia

Future projections:

- By **2030** the share of fish production destined for **human consumption** is expected to grow by 89%.
- Approximately 62% is anticipated to originate from **aquaculture** and Asia is projected to own 70% of global fish consumption.
- Growth in global population, expanding incomes and increased awareness of the health benefits of fish, will contribute to the expanding consumption of fish and fish products.

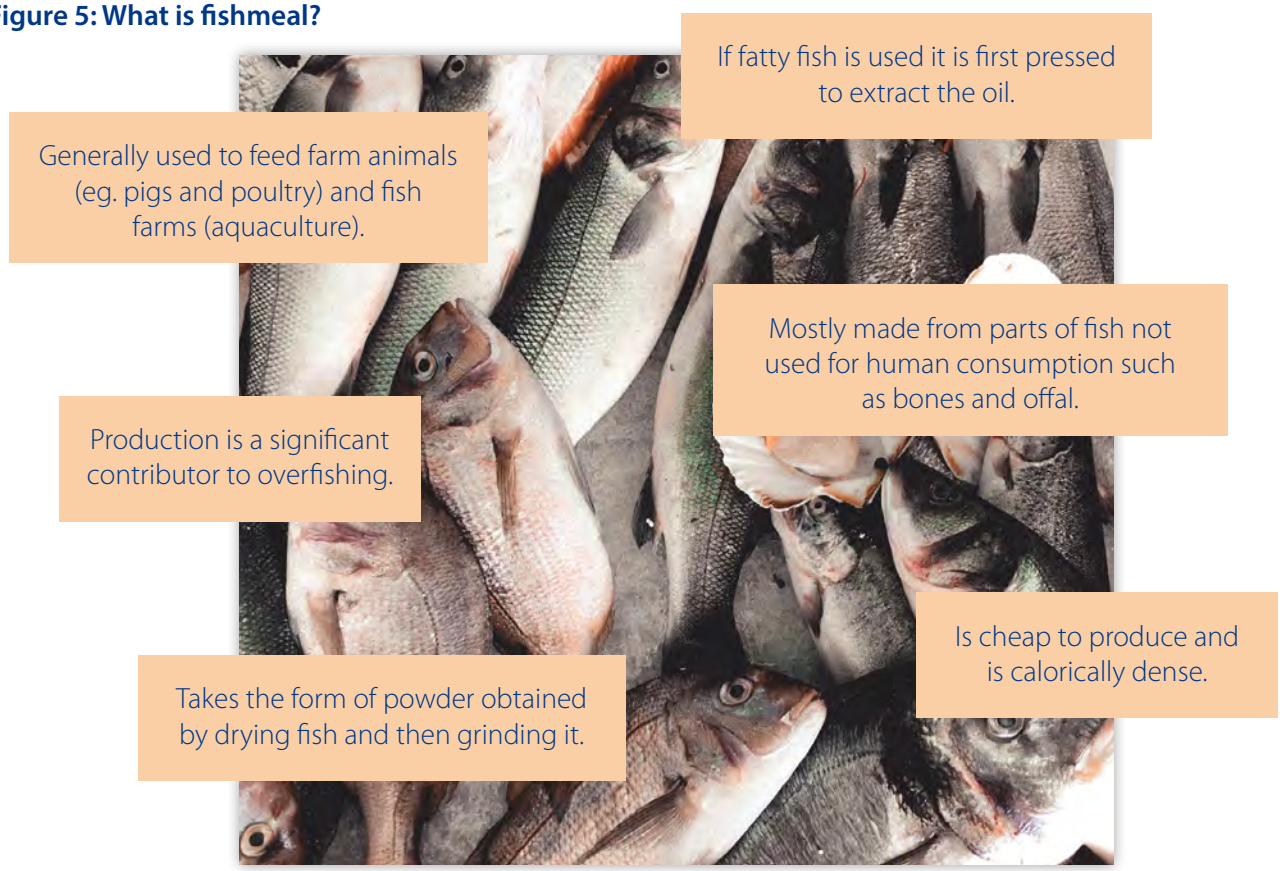
Figure 4: Reasons for increased fish consumption

Source: http://www.fao.org/state-of-fisheries-aquaculture/en/?utm_source=twitter&utm_medium=social+media&utm_campaign=fao

Approximately 25% of fish caught in the ocean does not directly end up on our plates. Instead,they are churned into **fishmeal.** Over the past fifty years the fishmeal and fish oil sector in **South-East Asia** grew significantly. This industry threatens the survival of many coastal fishing communities as more and more fish are purchased by big companies to produce fishmeal and fish oil.

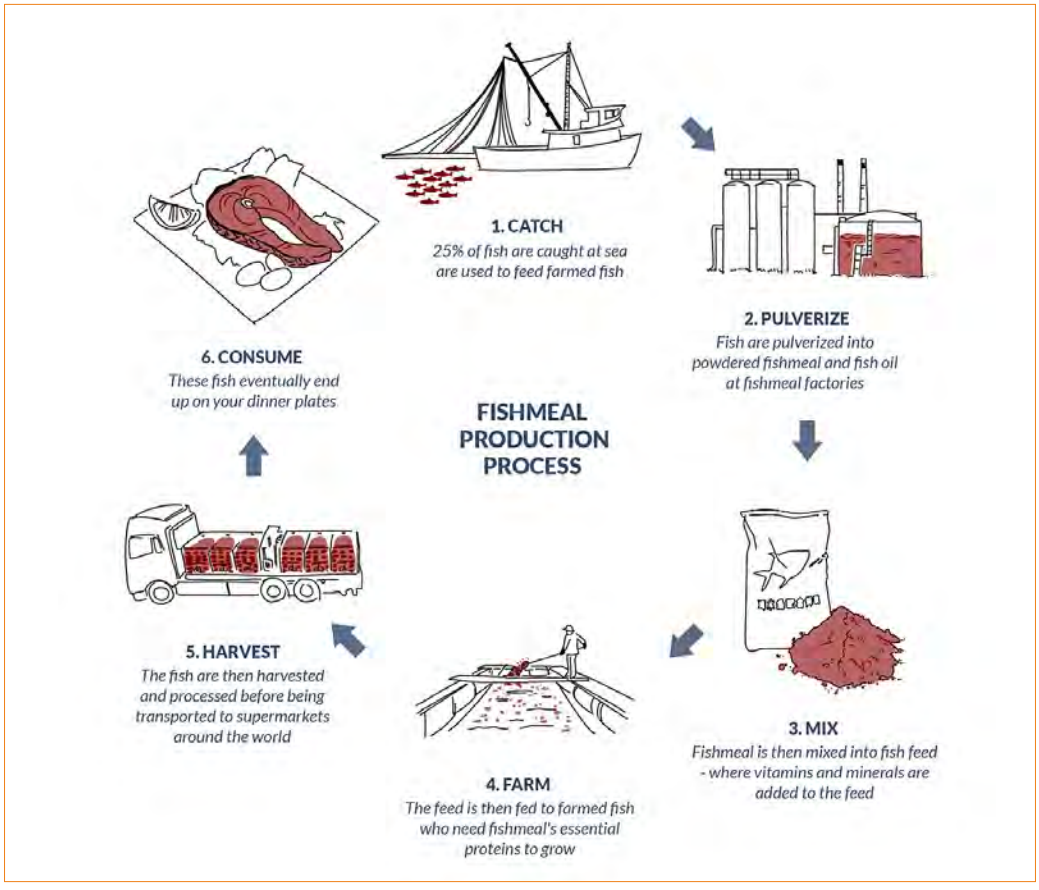
Image source: Wikimedia Commons – Dried_fish_at_Cox's_Bazar.jpg

Figure 5: What is fishmeal?



Source: https://ec.europa.eu/jrc/en/news/how-much-fish-do-we-consume-first-global-seafood-consumption-footprint-published

Figure 6: Fishmeal production for aquaculture



Source: https://globalreportingprogram.org/fishmeal/

WORLD FISHERIES: INDIGENOUS PEOPLES

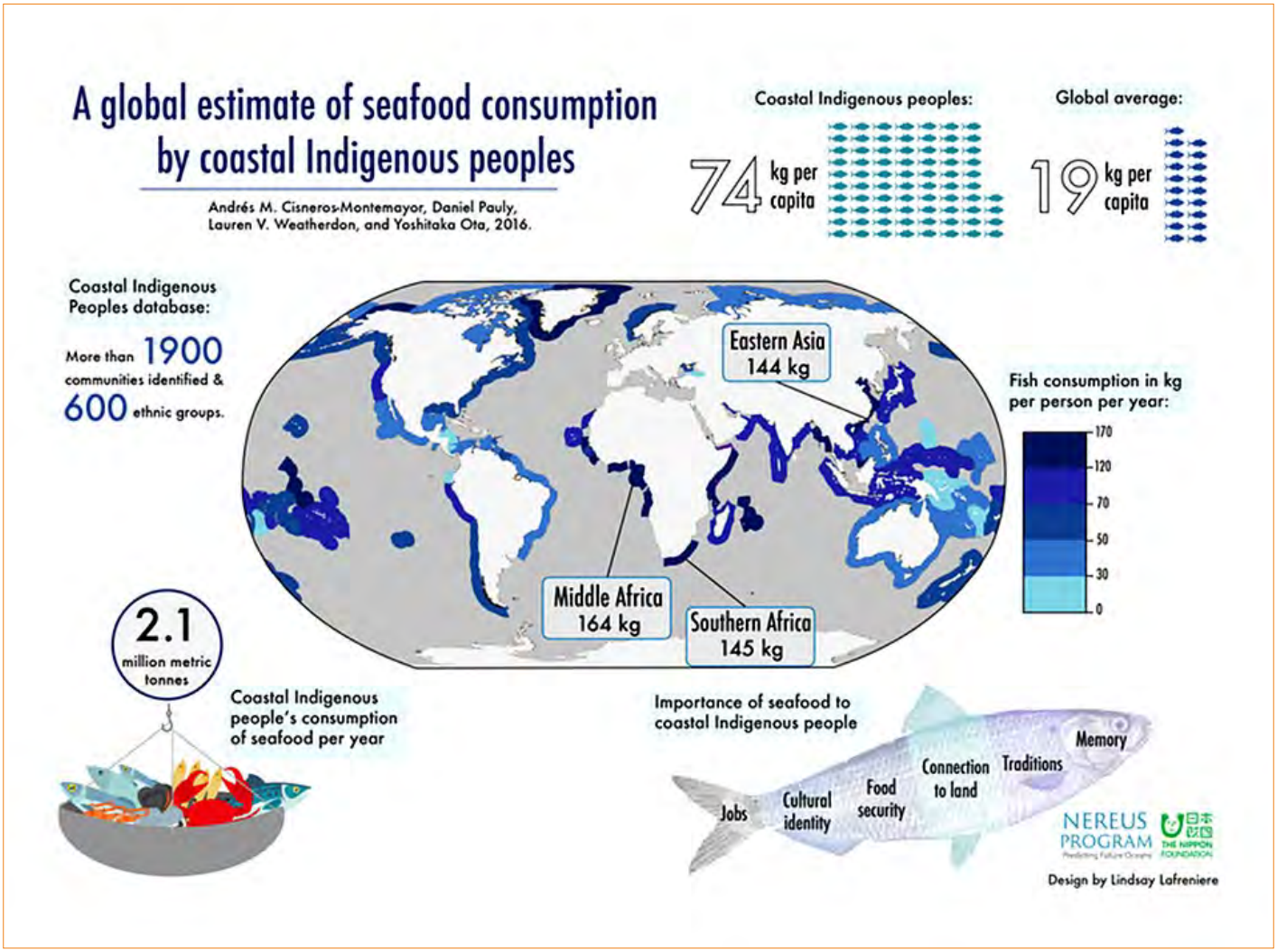
Coastal indigenous people consist of about 27 million people living in approximately 2,000 communities in 87 countries. They eat on average 15 times more seafood per person than non- Indigenous people in the same country.

For these communities the ocean provides a vital source of food and economic security while also shaping cultural heritage and spiritual values. The reliance of indigenous communities on marine resources means they are vulnerable to climate and ecosystem changes.

> *"I grew up always having salmon," Lorraine Loomis, fisheries director for the Swinomish Indian Tribal Community. The Swinomish are called the "People of the Salmon" as their culture is intertwined with the migratory salmon. Salmon feasts mark every phase of life such as naming ceremonies, weddings, funerals and memorials to the dead.*
>
> Source:https://www.washingtonpost.com/news/energy-environment/wp/2016/12/02/coastal-native-people-who-need-fish-the-most-are-losing-them/

> *The United Nations Declaration on the Rights of Indigenous Peoples recognises "the right to the lands, territories and resources which [indigenous peoples] have traditionally owned, occupied or otherwise used or acquired," should also apply to fish and oceans.*
>
> Source: https://phys.org/news/2016-12-seafood-consumption-higher-indigenous-non-indigenous.html

Figure 7: Seafood consumption by indigenous peoples



Source: https://theconversation.com/for-indigenous-communities-fish-mean-much-more-than-food-70129

Traditional fishing practices vary across Southeast Asia

People have fished sustainably across Asia for thousands of years. The Tagbanua people of the Philippines for example, use sustainable methods such as spears and hunt a variety of species at different times of the year to maintain healthy stocks of different fish.

Bajau Laut, or "sea nomads," are an indigenous group dispersed across **Indonesia, Malaysia** and the **Philippines.** They have been successful maritime traders for centuries and still live on houseboats, moving along coasts and fishing for their living. Bajau' Sea nomads' have genetically evolved to become expert divers.

Fishing, using traditional methods, is also followed by coastal communities in **India** and **Sri Lanka**. Over generations the use of traditional crafts and equipment, mostly non-mechanised, draws on **Indigenous Technical Knowledge (ITK)**. In recent years however, fishing using unsustainable methods to service fishmeal and fish oil industries is wiping out India's marine resources, upsetting marine ecology and food security. Indigenous fishing communities across India's coastal regions predict an end to fisheries in the near future.

Young Tagbanua diver with spear.
Source: https://www.nationalgeographic.org/encyclopedia/sustainable-fishing/

Traditional fishing methods: (left) The art of fishing with one leg paddling, Myanmar by Mega Caesaria and (above) Pole fishing in Sri Lanka by Daniel Klien, Unsplash.

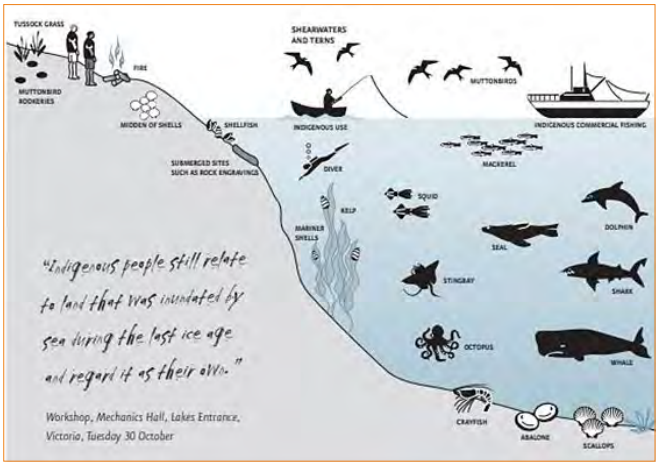
First Nation Australians: Fishing and Sea Country

'Aboriginal and Torres Strait Islanders have harvested marine species for millennia. They still do so, and via a combination of modern and traditional harvesting techniques. What is important to remember is that the cultural responsibilities and rights to harvest remain and that Australia's coasts and seas are an integral part of ongoing Indigenous connection to country and culture.'

https://www.oceanwatch.org.au/uncategorized/indigenous-and-cultural-fishing/

Ancient Aboriginal cave art of a fish. (http://archaeologynewsnetwork.blogspot.sg/2011/06/half-of-all-ancient-aboriginal-rock-art.html#.VFtCaxYkD3Q)

Figure 8: Indigenous use of oceans and marine resources in Victoria.



Source: https://www.environment.gov.au/system/files/resources/271c0bfc-34a2-4c6c-9b02-01204ebc0f43/files/indigenous.pdf

Torres Strait Islanders used large outrigger canoes that could remain at sea for long periods and hold large sea animals such as dugongs and turtles. The canoes allowed them to hunt as far south as the Great Barrier Reef. They have claimed native title for their country.

Creative Spirits, retrieved from https://www.creativespirits.info/aboriginalculture/land

Aboriginal and Torres Strait Islander Peoples view aquatic resources as part of their identity and their fishing practices as benefiting them **culturally, socially,** and **economically.**

Indigenous Australians:

- Possess traditional knowledge to maintain healthy marine ecosystems.
- Focus on the sustainable use of marine resources.
- Fish to fulfil traditional purposes and to maintain their livelihood.
- Use only the fish required to feed family. If more were caught any extra are kept alive and fresh in fish traps for later use.
- Use traditional fishing gear that does not damage the environment such as fishing rods, spears, hooks and nets. They usually use small boats with sails or oars, without an engine, while confronting competition from large or industrial-scale fisheries.

Indigenous communities are increasingly consulted in planning for the sustainable use and management of marine resources around the Australian coast through co – management with government organisations such as National Parks and Wildlife, programs such as the Indigenous Rangers Program and Indigenous communities under their rights to sea country.

WORLD FISHERIES: TRADE

In 2018, 67 million tonnes of fish were traded internationally, equating to almost 38% of fish caught or farmed worldwide.

Source: http://www.fao.org/3/ca9231en/CA9231EN.pdf

It is projected that in the future aquaculture will contribute to a growing share of international trade in fish commodities for human consumption. The bulk of the growth in fish exports is projected to originate from Asia.

Figure 9: Major fish importing and exporting countries

GLOBAL EXPORTS	GLOBAL IMPORTS
China 14%	USA 14%
Norway 7%	**China 9%**
Vietnam 5%	**Japan 9%**
Thailand 4%	Spain 5%
India 4%	Italy 4%
Chile 4%	Germany 4%
USA 4%	France 4%
Netherlands 4%	**South Korea 4%**

Information source: http://www.fao.org/3/ca9231en/CA9231EN.pdf

Live fish trade

The live fish trade refers to the live food fish trade (for human consumption) or to the ornamental fish trade (for aquariums). The live food fish trade is a global system that links fishing communities with markets, primarily in Hong Kong and mainland China. Many of the fish are captured on coral reefs in Southeast Asia or the Pacific Island nations. The live food fish trade is a lucrative business. According to University of Washington Professor Patrick Christie, live fish caught for food export earns approximately $6000 a ton.

Source: https://en.wikipedia.org/wiki/Live_fish_trade

In Hong Kong, where factory space is stacked within skyscrapers, the 15th floor of an industrial block houses vast water tanks containing thousands of rare fish that swim under UV lights. Normally found thousands of kilometres away on tropical reefs, the coral grouper is bred on land in one of the world's most densely populated metropolises to feed a local population that consumes 3.6 times the global average in seafood.

Source http://edition.cnn.com/2011/WORLD/asiapcf/02/08/reef.fish.trade/

Ornamental fish trade

Fish kept in aquariums and home tanks for aesthetic purposes, are considered **ornamental fish**. These fish encompass a wide variety of species of different shapes, sizes and colours.

Every year the ornamental fish industry is responsible for the global movement of a large number of species. About 2 million people worldwide are involved in ornamental fisheries trade. Corals, invertebrates and reef fish are shipped from Southeast Asia to predominantly USA, Europe and Japan. Singapore is one of the world's largest exporters of ornamental fishand the trading hub of Asia.

Source: http://www.fao.org/3/a-bb206e.pdf

Though the ornamental fish market's contribution to world trade is small, the sector contributes to the alleviation of poverty in developing countries as well as marine preservation. Coastal and riverine communities utilise ornamental fish, as a sustainable andrenewable resource, as well as a source of income.

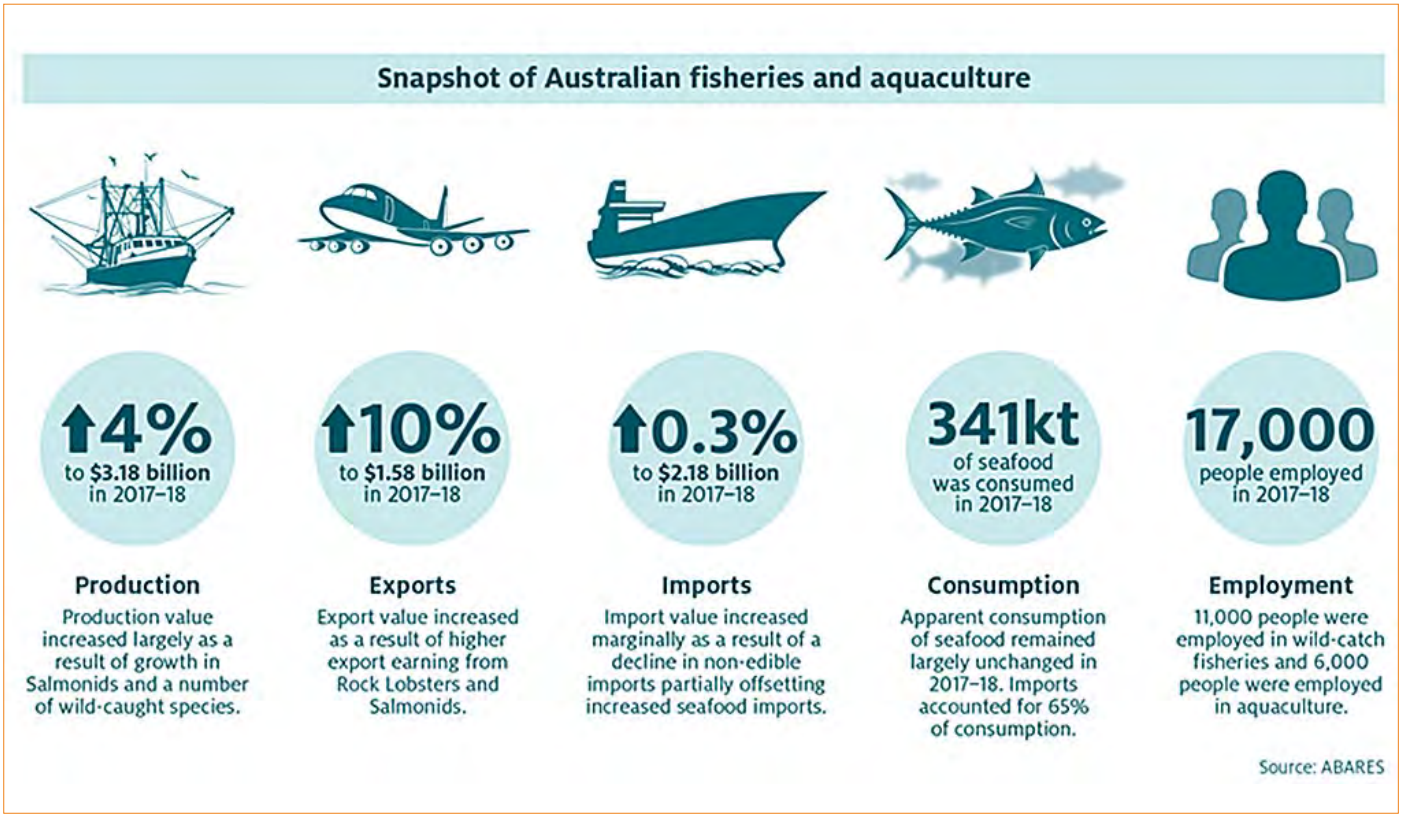
Source: https://upload.wikimedia.org/wikipedia/commons/a/ad/Amphiprion_ocellaris_%28Clown_anemonefish%29_by_Nick_Hobgood.jpg

Australia

Australia's role in global fish trade is relatively minor, with the value of exports and imports accounting for 1% of global trade. Production and trade in the global context Australia is a net importer of fish and fish products. Between 2008 and 2018, exports increased by a total of 16%, while imports increased by 33%. China exports approximately 5% of fish and fish products to Australia. Additionally, Australia is a significant exporter of fish species, including live Rock Lobsters, Bluefin Tuna and Abalone.

Source: https://www.agriculture.gov.au/abares/research-topics/fisheries fisheries-and-aquaculture-statistics/trade-2

Figure 10: Australian fish production, consumption and trade



Source: https://www.agriculture.gov.au/abares/research-topics/fisheries/fisheries-and-aquaculture-statistics

China

China is a key player in global production, consumption and trade of seafood. In addition to **China** being the world's major fish **producer** it is also the main **exporter** of fish and fish products.

Figure 11. Seafood production, consumption and trade in China

China is the world's largest fishing nation in terms of its fishing fleet and number of employees in the fishing industry. The fish sector provides jobs for over 14 million people and aquaculture accounts for over 5 million jobs. The sector also provides jobs in processing and marketing, adding a further employment of 16 million people. However, this does not count people involved in subsistence fishing occurring in poor rural locations aimed at improving food security and reduce hunger.

China is the leading aquaculture producer in the world accounting for 58% of global production. Approximately 90% of freshwater volumes are finfish.

Carp is mainly produced for domestic consumption and tilapia is primarily exported as a low-cost alternative to other whitefish in many countries.
Source: http://www.sciencedirect.com/science/article/pii/S259033222030302X

The development and construction of coastal cities and land reclamation has destroyed wetlands leading to reduced marine biodiversity. Climate change has also resulted in a decline of fishery. Mass coral bleaching has increased the mortality of marine species.

China's fishing industry has become a victim of its own success. The growth in the industry has been largely attributed to over utilisation of the country's limited fishing resources. Chinese fishermen have ventured out into the country's offshore waters, including disputed water in the East and South China Seas, as well as into other countries EEZs and the high seas to catch fish. This brings huge challenges not only to the marine fishery sector but also to regional and global marine security, especially in China's near seas.
Source: http://www.cna.org/cna_files/pdf/china-fishing-industry.pdf

Source: Dr S Bliss. UnSplash photo_SaschaSturm

THE GOAL OF SUSTAINABLE OCEAN FISHERIES

The economic and social and wellbeing of coastal communities in inextricably linked to ocean health and healthy marine ecosystems.

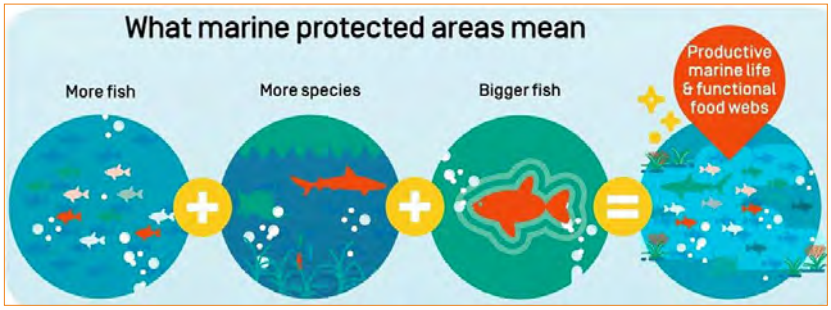
Sustainability in the global fishing industry will only improve through actions such as:

- Preventing overfishing
- Rebuilding decimated ecosystems and depleted fishing stocks
- Taking action at global, regional and local scales to achieve Sustainable Development Goal 14.

Figure 12: How to prevent overfishing

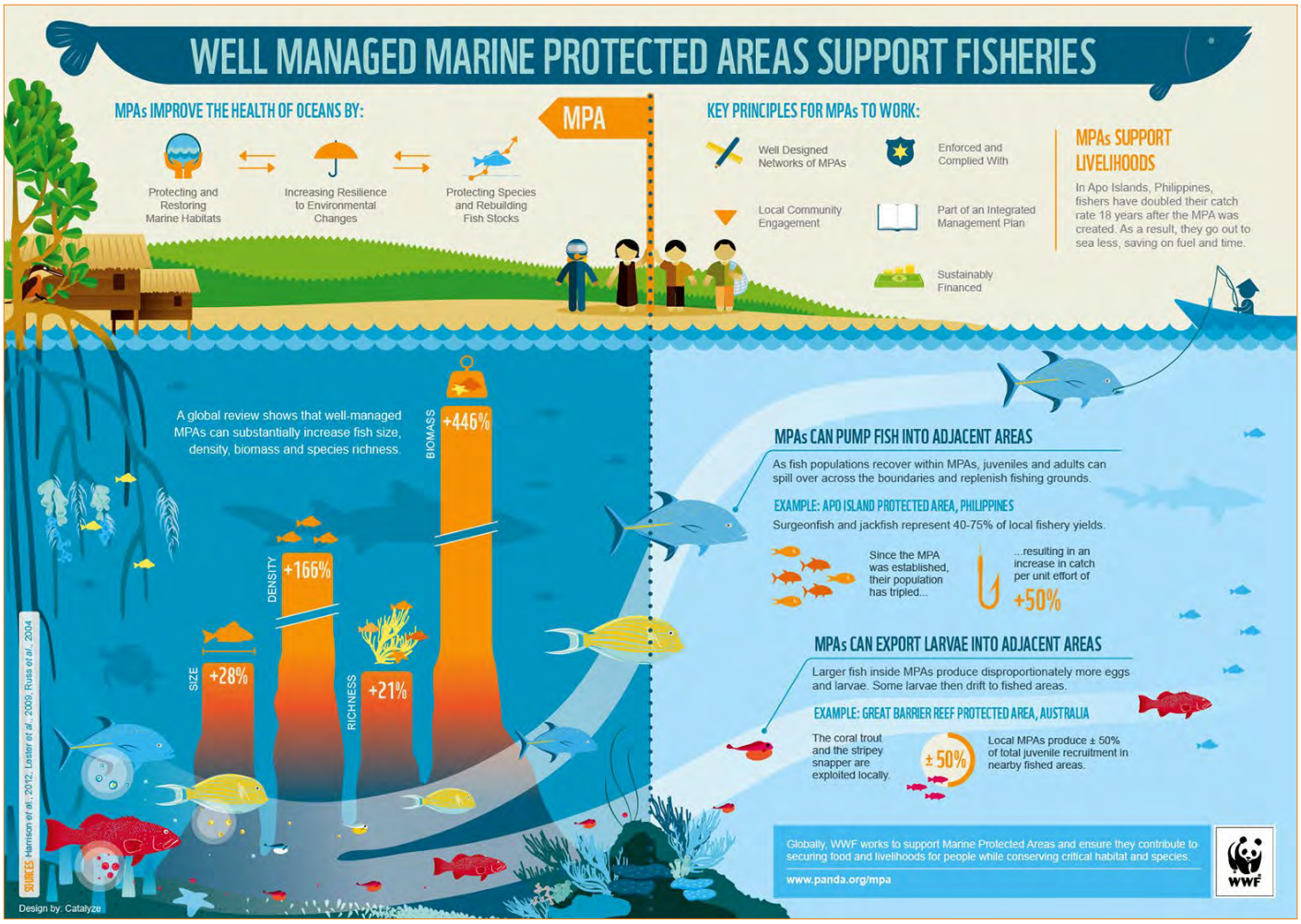
Source: http://www.bbhub.io/dotorg/sites/2/2015/06/How-to-Prevent-Over-Fishing.jpg and https://sites.google.com/a/region15.org/overfishing-prevention-organizatioin/pictures

Figure 13: Benefits of Marine Protected Areas



Source:https://saveourseasmagazine.com/marine-protected-area/

Figure 14: The benefits of Marine Protected Areas to ocean fisheries



https://wwf.panda.org/wwf_news/?244930/INFOGRAPHIC-How-well-managed-marine-protected-areas-support-fisheries-in-the-tropics

Geography NESA Accredited PD

GTA's online courses are NESA Accredited PD in the priority area of Delivery and Assessment of NSW Curriculum.

This is what one Geography teacher had to say after completing the new Landscapes and Landforms course: *"This course has been so helpful and reminded me of how to use visual representations in lessons as content or even a hook to a new concept. I have also thoroughly enjoyed looking at other people's ideas. It has been fantastic!"*

If you are a GTA NSW & ACT personal or school member; and between now and 8 October 2021 you register for and complete ONE course, then email gta.elearning@gmail.com and ask for ONE course for free – and that's what you'll get – **Complete ONE and get ONE FREE**. The free course needs to be completed by the same person that completed the initial course.

NOTE: All courses must be completed by **4 February 2022** to be eligible to count towards NESA Accredited PD.

Here are the courses available via https://www.gtansw.org.au/professional-learning/:

- **Geo 141: Teaching *Place & Liveability*** OR **Geo 241: Teaching *Place and Liveability*** (*experienced*) (3hrs)
- **Geo 142: Teaching *Landscapes & Landforms*** (3hrs)
- **Geo 101: Concepts Part 1** (5hrs)
- **Geo 102: Concepts Part 2** (5hrs)
- **Geo 110: Intro to Maps** (3hrs)
- **Geo 111: Intro to Topo Skills** (3hrs)

If a teacher new to Geography wanted to strengthen their capabilities, then a superb program would be to build their content knowledge with Geo 141 or 142, followed by deepening their concept understanding with Geo101, and rounding it out with the skills of Geo 110.

All of the courses are great value at $90, and very flexible. You can pay for your courses using credit card and start immediately. Alternatively, if you are keen for your school to pay for you, see the instructions on this page: https://docs.google.com/document/d/1W52M2Z_ZreiDt39Ypaaj3Ph33Zacm1AvgGTKBhUzSiU/edit?usp=sharing.

Registrations for multiple people and multiple courses are also possible using these instructions.

We look forward to seeing you online!

Dr Paul Batten and
Katerina Stojanovski

OCEANS SURROUNDING ASIAN COUNTRIES AT CRISIS POINT!

Dr Susan Bliss Educational Consultant

Fleets of large fishing boats working with a factory ship scour the oceans of fish. Shutterstock

IMPORTANCE OF FISHING IN THE ASIAN REGION

- Asian countries catch 53% of the world's fish.
- Over 85% of the world's fishermen/women and fish farmers are Asian.
- The impacts of declining fish species and climate change are projected to impact more severely in the Asian Region compared to other regions in the world.

Southeast Asian Countries

- Proportion of people depending on the fishing industry is significantly higher than in other countries.
- Surrounding seas not only serve as a major source of food and livelihoods for hundreds of millions of people they also generate several billion dollars in Gross Domestic Product (GDP) for the region.
- Most overfishing and destructive fishing is attributable to Illegal, Unreported and Unregulated Fishing (IUUF).
- After depleting fish stocks in their own waters, Asian countries such as China, Japan, Taiwan, and South Korea direct industrial fishing fleets to the Pacific Ocean to exploit fish stocks.

The Asia Foundation estimates that 64% of the region's fisheries are now facing medium to high level threat of collapse. Illegal and unreported fishing is the major contributor to this threat. Fishermen in the region frequently use illegal methods, such as poison fishing and blast fishing with dynamite. If IUU fishing is left unchecked, there is less fish for legitimate fishermen to catch.

Illegal fishing activities have long been a source of contention in regional disputes and flare- ups between ASEAN nations. Malaysia complained about the illegal movement of Vietnamese vessels in Malaysian waters and reportedly detained 748 IUU Vietnamese fishing vessels since 2006.

Adapted notes –
https://www.aseantoday.com/2019/11/vietnam-has-the-chance-to-showcase-its-progress-on-curbing-illegal-fishing-as-the-european-commission-begins-inspection/

Seafood is a large part of Asian diets, particularly in those countries with large coastlines and high coastal populations living in villages
Image source: lisheng-chang-m9BBVrPl87M-unsplash.jpg

Importance of fishing in China

- The world's largest fishing country in terms of quantity caught, followed by Indonesia, USA, India, Peru, and Japan.
- Fishing industry has made a significant contribution to food security, generated employment and sustained coastal economies.
- Present rate of fishing is unsustainable as many species are overexploited.
- As the population of China increases the demand for seafood is anticipated to increase.
- Threats to declining fish species are acute in the Spratly and Paracel Islands located in the South China Sea, where disputed resource rights have led to escalating IUUF.
- Deteriorating coastal fish resources have forced fishermen to take risks in disputed waters. As China shares the same waters as South Korea, Japan, Vietnam and the Philippines, numerous clashes concerning fishing have eventuated.

DEPLETION OF FISH SPECIES

Overfishing, illegal fishing, water pollution and climate change have contributed to the depletion of fish supplies. Already many species such as blue fin tuna have been pushed to the edge of extinction. If the trend continues some scientists predict that seafood suitable for human consumption could be exhausted by 2050.

Cause of depletion of fisheries in Asia

Aquaculture

- Farming fish and shellfish is susceptible to diseases and contributes to declining fish e.g. a salmon farm requires 4kg of fish to produce 1kg of farmed salmon.

Pollution

- Oceans are dumping grounds for nuclear waste, toxic chemicals, sewage and plastics.
- Oil and chemical spills occur at sea and at ports.

Coastal Development

- Runoff into water bodies of pesticides, fertilisers, sewage and sediments.
- Clearing wetlands for land reclamation.

Illegal, unregulated and unreported fishing (IUUF)

- For example: Bottom trawling, Blast fishing, Cyanide fishing, Muroami, Kayakas, and Electro-fishing.

Diseases and parasites

- Viral hemorhagic Septicemia (VHS) afflicts over 50 freshwater and marine fish species.

Pipelines and cables

Mining minerals and oil dredging spoil fish nurseries.

Munitions – Unexploded ordinance (UXO) pose a threat to recreational and commercial fishing boats, aquaculture, divers and whales.

Overfishing

- Bycatch – Catching unwanted species e.g. dolphins. Exploitation of undersized species.

Inadequate resources

- Insufficient funds and resources for surveillance and tracking.
- Lack of knowledge and supervision of fishing quotas and fishing methods.

Invasive species

- For example Nile Perch and Lionfish.
- Red tides – Algal blooms may produce toxins or consume dissolved oxygen and cause damage or death to marine species

Rising water temperature

- Results in lost habitats for fish. Many fish are sensitive to temperature and only survive in specific temperatures.

Habitat threats

- Bleaching of coral reefs, clearing wetlands, disappearing kelp forests – all are vital habitats for fish.

Factory fishing

- Giant factory ships vacuum schools of fish from the sea, which threatens future oceans ocean species.

Ballast water

- Introduction of exotic species from one port to another. Bacteria and organisms carried in ballast water damages aquatic ecosystems in other parts of the world.

Oceans Acidification

- Oceans absorb carbon dioxide from the atmosphere.

Blue swimming crabs overfished in Thailand Image source: WWF

Depletion of Fish Stocks – Thailand

Fishing is big business in the South China Sea and Gulf of Thailand. The industry supports millions of people in the region and accounts for 10% of global fisheries production every year. However, the region's success as a seafood exporter has come at a cost – the depletion of local fish stocks, environmental damage and a decline in food security and livelihoods for local communities.

Once a small-scale industry, dominated by individual fisherman using nets and traps, the fishing industry was adversely impacted by rapid expansion following the introduction of trawlers in the early 1960s, leading to overexploitation, stock depletion, and changes in ocean ecosystems. Today, fisheries are under pressure with growing population, overexploitation of marine resources and poor enforcement of fishing regulations.

The South China Sea Fisheries Refugia Initiative aims to build the resilience of Southeast Asian fisheries and reduce marine degradation. The blue swimming crab is one of the key species in the project. The crabs are a top export from Thailand, with the country ranking as the world's fourth largest exporter over the past two decades. Traditionally caught by small-scale and commercial fisherfolks using crab traps and bottom gillnets, the blue swimming crab population has suffered from large scale trawling operations, with the species frequently caught as bycatch by trawlers in both coastal and offshore areas.

By December 2019, crews from 45 trawlers were participating in the release programme in Thailand's Surat Thani Province – with over 4,000 berried female crabs returned to the sea to spawn. Adapted: https://www.unep.org/news-and-stories/story/banking-sea

The **Surat Thani blue swimming crab fishery** is an important export product for Thailand with an export value of US$60-80 million. There are a number of issues facing this fishery, including the over-exploitation of the population in heavily fished inshore areas, harvest of undersized crab and gravid females, lack of a management plan or harvest strategy, and lack of enforcement capacity.

Source: https://seafoodsustainability.org/portfolio/thai-blue-swimming-crab/

Blue swimming crab
Source: https://www.fishsource.org/stock_page/747

ILLEGAL, UNREPORTED AND UNREGULATED FISHING (IUUF)

Illegal, Unreported and Unregulated Fishing (IUUF) or pirate fishing is a global phenomenon, particularly pronounced in Southeast Asian countries such as Thailand and Indonesia. See Figure 1.

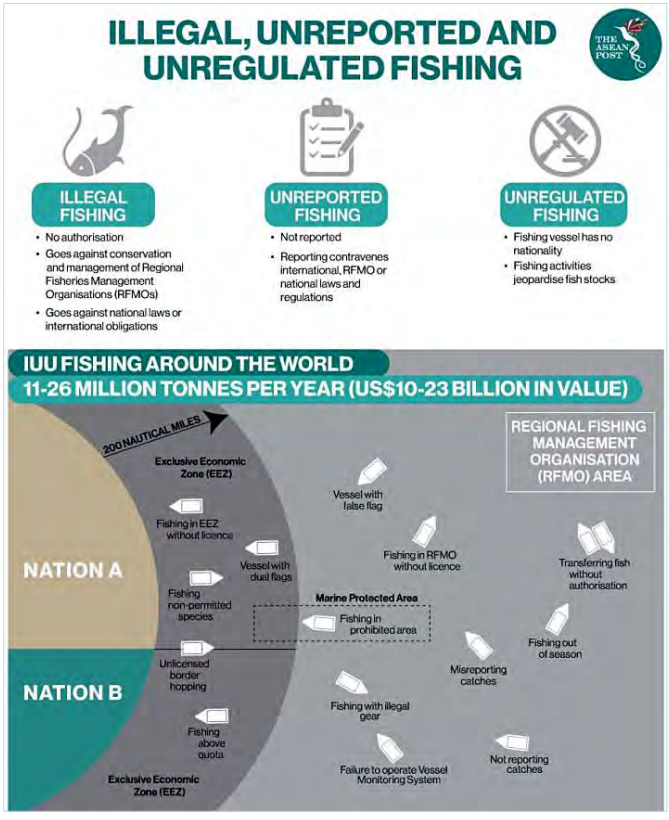
The Asia-Pacific region loses US$5billion annually to IUU with 14% –33% of the illegally harvested global catch sold in black markets. See Figure 2

The fishing 'black industry' ranges from small-scale violations by local artisanal fishermen to mass illicit enterprises conducted by large-scale open factory trawlers. It includes the following:

- Operating in another country's territorial waters without agreement and/or falsifying catch documents.
- Using illegal methods or gear.
- Harvesting protected species.
- Fishing in restricted zones.
- Contravening closed-area or closed-season stipulations.
- Transhipping fish species at sea, to avoid landing a haul of fish in the same country where it was fished.

Adapted from source: https://www.aspistrategist.org.au/illegal-fishing-southeast-asia-multibillion-dollar-trade-catastrophic-consequences/.

Figure 1: Facts about Illegal, Unreported and Unregulated Fishing

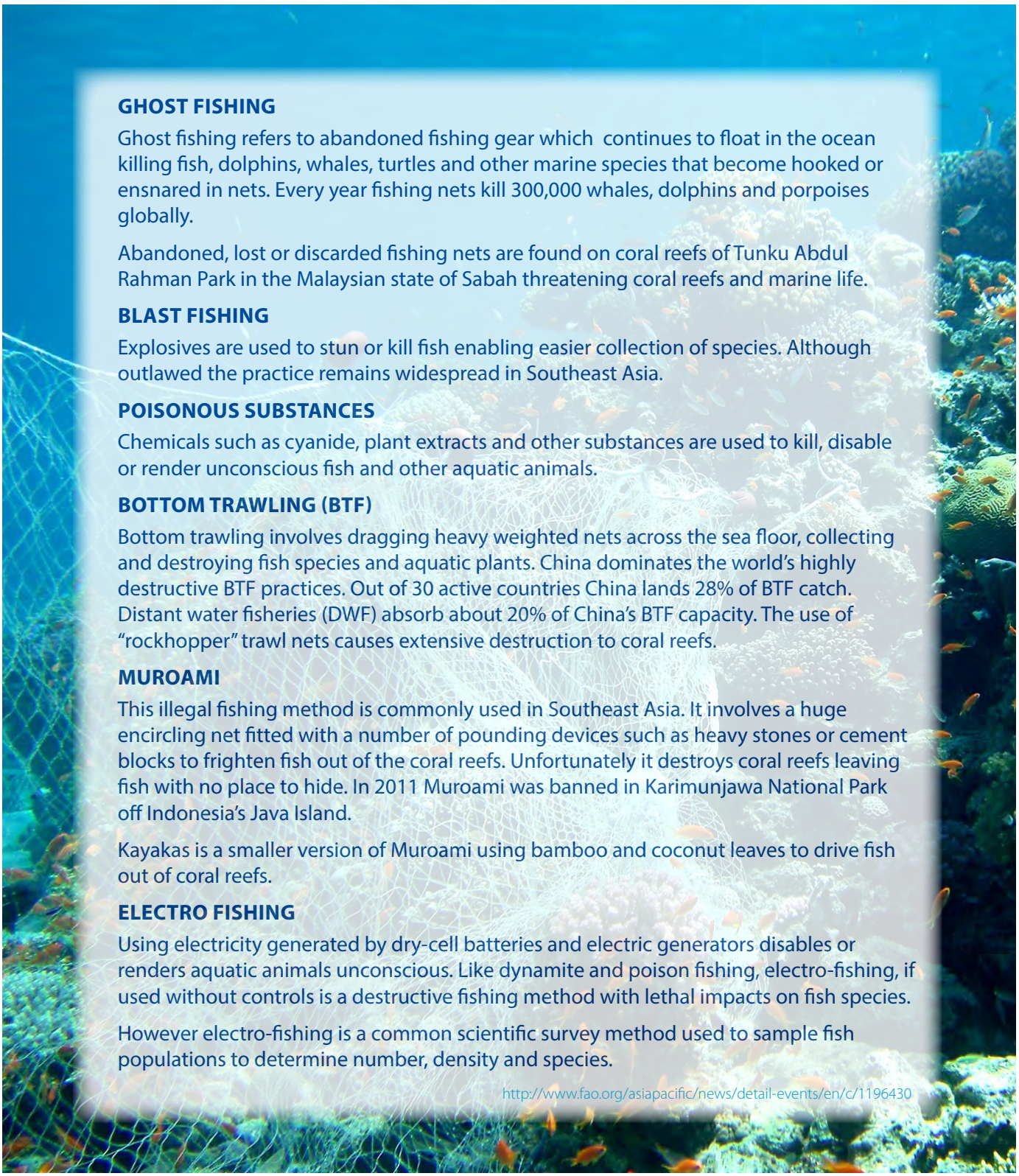


Infographic: https://theaseanpost.com/article/asean-losing-billions-illegal-fishing

The monetary value generated from illegal, unreported, and unregulated fishing (IUUF) is estimated to be between $10 billion and $36.4 billion annually, making it the third most lucrative natural resource crime in the world, following timber and mining.

Source:https://c4ads.org/natural-resources-cell?gclid=EAIaIQobChMIqZ2Y6tCf7wIVQzVyCh11ggcHEAAYASAAEgJEd_D_BwE

Figure 2: Illegal, Unreported and Unregulated Fishing Methods (IUUF)



GHOST FISHING

Ghost fishing refers to abandoned fishing gear which continues to float in the ocean killing fish, dolphins, whales, turtles and other marine species that become hooked or ensnared in nets. Every year fishing nets kill 300,000 whales, dolphins and porpoises globally.

Abandoned, lost or discarded fishing nets are found on coral reefs of Tunku Abdul Rahman Park in the Malaysian state of Sabah threatening coral reefs and marine life.

BLAST FISHING

Explosives are used to stun or kill fish enabling easier collection of species. Although outlawed the practice remains widespread in Southeast Asia.

POISONOUS SUBSTANCES

Chemicals such as cyanide, plant extracts and other substances are used to kill, disable or render unconscious fish and other aquatic animals.

BOTTOM TRAWLING (BTF)

Bottom trawling involves dragging heavy weighted nets across the sea floor, collecting and destroying fish species and aquatic plants. China dominates the world's highly destructive BTF practices. Out of 30 active countries China lands 28% of BTF catch. Distant water fisheries (DWF) absorb about 20% of China's BTF capacity. The use of "rockhopper" trawl nets causes extensive destruction to coral reefs.

MUROAMI

This illegal fishing method is commonly used in Southeast Asia. It involves a huge encircling net fitted with a number of pounding devices such as heavy stones or cement blocks to frighten fish out of the coral reefs. Unfortunately it destroys coral reefs leaving fish with no place to hide. In 2011 Muroami was banned in Karimunjawa National Park off Indonesia's Java Island.

Kayakas is a smaller version of Muroami using bamboo and coconut leaves to drive fish out of coral reefs.

ELECTRO FISHING

Using electricity generated by dry-cell batteries and electric generators disables or renders aquatic animals unconscious. Like dynamite and poison fishing, electro-fishing, if used without controls is a destructive fishing method with lethal impacts on fish species.

However electro-fishing is a common scientific survey method used to sample fish populations to determine number, density and species.

http://www.fao.org/asiapacific/news/detail-events/en/c/1196430

Ghost nets on a coral reef Source: https://upload.wikimedia.org/wikipedia/commons/2/28/CIMG2733_Fishing_Net_On_Reef_%282692835363%29.jpg

'IUU fishing enterprises routinely exploit vulnerable migrants. On IUU vessels they face human rights abuses including physical violence, dangerous working conditions, unacceptably long periods at sea and when voyages eventually end, agreed wages are often withheld'

FAO http://www.fao.org/asiapacific/news/detail-events/en/c/1196430

FISHING TYPES & THEIR IMPACT

A variety of fishing methods and equipment are employed in and across Asia. These range from hand fishing and small vessels to large industrial fishing fleets that trawl the sea.

Small scale fishing. Image source 1: evgeny-nelmin-xSn0WW7PsF4-unsplash.jpg. Image source 2: erg-zhukov-fNrCZRWuZD0-unsplash.jpg

Fishing Trawlers cast nets far from the vessels to target mid depth or bottom species. Image 1 iStock. Image 2 Shutterstock

Muroami fishing (Muro Ami)

In **Muroami fishing** trawlers are mostly unseaworthy and stay out at sea for up to ten months. They roam the seas and drop anchor in coral reefs and atolls. The unsanitary and cramped quarters are often packed with 400 to 500 adults and boys as young as 7 years old.

The nets are cast between 7 and 10 times a day, with children working from 6am to 5pm. The children are whipped if the nets failed to fill 50%–70% of the containers with fish every dive. On some occasions, the boys are made to stand under the sun for hours as punishment. When fishing trawlers encounter Navy patrols the children are hidden.

Muroami fishing was commonly used in the Philippines as it was the most lucrative type of fishing technique outside larger-scale fishing businesses. In 1986, Muroami fishing was banned in the Philippines after the bodies of 100 child divers, unable to escape the closing net, came up with the catch.

The child divers, usually on a ten-month contract, are promised to be paid at the end of the contract. Their food budget is deducted from their salary at 20 pesos a day. Unfortunately, when the trawler arrives back home, children discover they have no wages left after the ten-month contract.

Adapted content from: https://instablogs.com/muro-ami-death-of-reefs-and-little-boys.htm

Children participating in Muroami Image source 1: http://aqualifeforyou.blogspot.com/2011/01/child-slave-of-deep-sea.html Image source 2: https://blueplanetarchive.photoshelter.com/image/I0000BMu3DThqL9o

Cyanide fishing

(See Figure 2 and Figure 3)

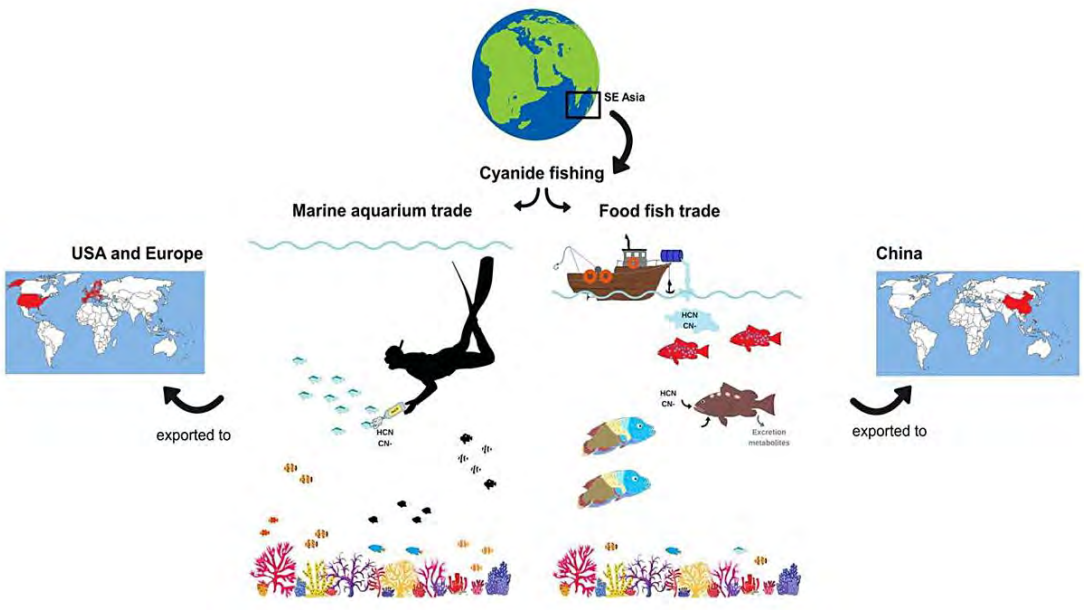
This is one of the chemical methods used to catch fish for the aquarium and food fish trade.

A Sodium Cyanide mixture is sprayed into the habitat to stun the fish, affecting not only the target species but other marine creatures, including coral and coral reefs.

The 2016 Centre for Biological Diversity Report found that 6 million tropical marine fish imported into US each year have been exposed to cyanide poisoning. Non-invasive, non-destructive and cyanide detection methods are urgently required for a sustainable fishing industry.

ABOVE: Image source: World Ocean Review https://worldoceanreview.com/en/wor-5/living-with-the-coasts/coastal-pressures/reef-fishing-at-the-limit-spermonde-archipelago/

Figure 3: Cyanide Fishing for global trade.



LEFT: Source: Research Gate Madeira, Diana & Calado, Ricardo. (2019). Defining research priorities to detect live fish illegally collected using cyanide fishing in Indo-Pacific coral reefs. Ecological Indicators. 103. 659-664. 10.1016/j.ecolind.2019.03.054.

About Cyanide Fishing – What, Where, Why?

- Method of collecting live fish mainly for global aquariums and livefish food trade in Asia.
- Involves spraying a mix of sodium cyanide into the fish's habitat aimed to stun them.
- Practice harms target fish and other marine organisms, including coral reefs
- Believed to have originated in the Philippines in the 1950s
- Practiced mainly in saltwater fishing regions of Southeast Asia
- Grouper, wrasse and coral trout are among the main species captured.
- Results in the death of 90% of fish before they reach the retailer
- Is illegal in many countries, however laws are ineffectively enforced
- Prohibited in exporting countries surrounding the indo-Pacific Oceans including Indonesia.

About 400 tons (360 t) of Chilean jack mackerel (Trachurus murphyi) are caught by a Chilean purse seiner off of Peru. Source: https://commons.wikimedia.org/wiki/File:Chilean_purse_seine.jpg

Geographical Inquiry into fishing methods:

- Gillnets
- Longlines
- Purse seine
- Pole and line
- Pots and traps
- Dredges
- Pelagic or midwater trawls

Learn more about the following fishing methods and their impacts through **Geographical Inquiry Activities** in the **Appendix.**

Source: https://upload.wikimedia.org/wikipedia/commons/f/f4/Kapal_Nelayan_Purse_Seine_Number_Two.jpg

OVERFISHING

Overfishing has a negative impact on **aquatic biodiversity** as all living organisms play a role in maintaining balanced ecosystems. When fish become extinct it reduces species depending on them up the food chain such as birds.

There are three **types of biological overfishing**, such as growth overfishing, recruit overfishing and ecosystem overfishing.

Types of Overfishing:

- **Ecosystem Overfishing** occurs when the balance of the ecosystem is altered by overfishing.
- **Growth Overfishing** occurs when smaller fish species are caught causing depletion in reef fish species, a food source for over a billion people.
- **Recruit Overfishing** occurs when the adult population lacks the reproductive capacity to replenish itself i.e. there are insufficient adults to produce offspring.

GLOBAL

In 2018, the Food and Agriculture Organisation (FAO) estimated that approximately 33% of global fish stocks were overfished. The Mediterranean and Black Sea had the highest percentage of overfished stocks (62.2%), followed by SE Pacific (61.5%) and SW Atlantic (58.8%).

SOUTHEAST ASIA

Across Southeast Asia 64% of the fisheries varies from medium to high risk of extinction from overfishing. Cambodia and Philippines are among the most adversely affected by overfishing.

SATELLITE TECHNOLOGY MONITORING

Fishing vessels equipped with electronic devices, or "blue boxes", form part of the satellite-based vessel monitoring system (VMS). The blue box sends data about the location of the vessel to the fisheries monitoring centre (FMC). Vessels are also equipped with GPS transmitters which track the ship's speed and position.

2021 Australian Geography Competition

The COVID-19 pandemic continued to present challenges for the Australian Geography Competition in 2021. The Competition was to be held in schools from 18 March to 31 March. However, an extension of two weeks for the return of answer sheets was given due to the short lockdowns affecting several states during the Competition timeframe. Answers received after the cut-off were marked and results and certificates returned, but those students were ineligible for prizes.

The Committee appreciated the support from teachers around Australia as entry numbers returned to pre-2020 Competition levels, with 73,032 students from 728 schools entered. The Competition is particularly strong in New South Wales and the ACT, with **30,870 students from 273 schools** and **2,227 students from 13 schools** respectively.

Prizes

Congratulations to the NSW and ACT students who were awarded prizes, as shown in the tables below. Because of lockdown disruptions to schools, we do not yet have the permissions to share all the names.

Year	NSW Students	Name	School
7	Equal first in Australia	Zygmunt Gray	Finigan School of Distance Education
		William Gray	Finigan School of Distance Education
8	Equal first in Australia	Jeffrey Tang	North Sydney Boys' High School
		Darcy Redican	St Andrew's Cathedral School
		Findlay Gordon	Sydney Grammar School
		Ben Murphy	Champagnat Catholic College Pagewood
		Daniel Becker	Shore School
		Wil Lo Russo	Shore School
		Daniel Davey	Arndell Anglican College
		Edward Baker	Newcastle Grammar School
9	Equal first in NSW	Bowen Wu	North Sydney Boys' High School
		James Boyle	Sydney Grammar School
		Manas Jiwane	Sydney Grammar School
		Kevin Du	James Ruse Agricultural High School
		t.b.c.	St Aloysius' College
10	First in Australia	Ashton Searle	Searle Home School
11	First in Australia	William Stafford	Sydney Grammar School
12	Equal first in Australia	Charlie Veeneklaas	Sydney Grammar School
School	First in Australia		Sydney Grammar School

ACT is part of the Combined Territories group is the calculation of prizes. This also includes students from: Christmas Island, Cocos Keeling Islands, Norfolk Island and Northern Territory. Prizes were awarded in the ACT as follows:

Year	ACT Students	Name	School
7	First in Territories	Jorden Warmington	Campbell High School
8	Equal first in Territories	Edward McCammon	Canberra Grammar School
9	First in Territories	George Birmingham	Radford College
10	First in Territories	Thomas Lin	Canberra Grammar School
11	First in Territories	Jack Gardner	Canberra Grammar School
12	Equal first in Territories	Owen Stothart	Canberra Grammar School
		Alexander Popple	Narrabundah College
School	First in Territories		Canberra Grammar School

School prizes and rankings are calculated using the scores of the school's best five students from each of Years 7, 8, 9, 10, 11 and 12. This method is used so that schools that enter only their best students are not advantaged. These NSW and ACT schools ranked in the top 10 in Australia.

Australian Rank	School
1	Sydney Grammar School
2	Sydney Boys High School
3	Knox Grammar School
7	Northern Beaches Secondary College - Balgowlah Boys
8	Canberra Grammar School

2021 International Geography Olympiad

The fieldwork-based Geography's Big Week Out (GBWO) is the usual method to select students to represent Australia at the International Geography Olympiad (iGeo). The 2020 GBWO was to have been hosted by the Geographical Association of Western Australia (GAWA) but had to be cancelled due to COVID-19. Instead, top-performing Year 11 students were invited to complete a two-hour written examination. The four students selected for the 2021 iGeo Australia team were:

Nikki Ballinger – Walford Anglican School for Girls, SA

Imogen Cooper – Wesley College, Vic

Rhea Sankar – Canberra Grammar School, ACT

Gemma Snyman – Roseville College, NSW

The four students selected came together with members of the Competition Committee during the Easter school holidays to receive some of the training that would normally be provided by GBWO. This training was to have been held in Brisbane, but COVID-19 border restrictions interfered, and it was transferred to Sydney at short notice.

Australia's iGeo team in Sydney for training

The 2020 iGeo had been cancelled because of the pandemic. The 2021 iGeo was scheduled to be held in Istanbul, Turkey, from 10 to 16 August. At a Zoom meeting of representatives of the participating countries, it was decided that the 2021 iGeo would be held virtually, rather than cancelled.

The recommended scenario was for all students from one country to sit the three tests in the same place. However, given the lockdowns, Imogen and Gemma had to compete from home, and Nikki and Rhea were able to come together in Darwin – the only place possible without quarantining. Rhea just made it before the ACT lockdown. All students were observed and recorded by international monitors, both via the computer on which they were working, and via a second observing camera.

Rhea and Nikki sitting a test in Darwin

Nikki checking out the crocodiles

It wasn't Istanbul, but Rhea and Nikki were able to explore the area around Darwin, including the local markets, a jumping crocodiles cruise and swimming under waterfalls in Litchfield National Park.

However, even the students in lockdown appreciated the experience, as this quote from Imogen attests:

> ***For me, the 2021 iGeo was a little challenging, but mostly lots of fun. It was bizarre to do the tests online and from home, especially since there were people all over the world sitting the same tests, despite time differences and covid. I thought it was awesome how even though we all came from different cultures and backgrounds we were able to come together (virtually) because of a shared passion: geography. I loved that the Olympiad gave me the opportunity to learn about other countries and cultures, and make new friends. It's a shame we couldn't all meet in person, but it was still a fantastic experience.***
> Imogen Cooper

A short lockdown also affected the travel plans of the Committee members. It was fortunate that Simon Roos-Freeman was able to fill the supervising role at short notice. Simon was a key staff member at the 2017–2019 GBWOs held at Kangaroo Island, SA, as well as at an earlier one when he was teaching in Perth. Simon was also a leader with the Australian team to the 2019 iGeo, so was excellently fitted to the role.

Teams from 46 countries took part. All four Australian students won bronze medals, placing all our students in the top half. Australia was one of 14 countries from which all team members won medals.

2021 Geography's Big Week Out

The 2021 GBWO was scheduled to have been held in Perth in July, hosted by GAWA. However, in February the Competition Committee, in consultation with GAWA and AGTA, took the decision that it should be postponed to later in the year to avoid any winter spike of cases and when the vaccination programme would be further advanced. As the Western Australian teachers were unable to host it later in the year, the 2021 GBWO has been rescheduled to take place on the Gold Coast and its hinterland in December 2021. Given the COVID-19 cases in four Australian states in July and the closing of Western Australia's borders, this proved to be a wise decision.

The 2021 GBWO will run from 6 to 10 December and will mainly be based at the Numinbah Valley Environmental Education Centre. The programme will concentrate on a catchment study, including land cover transformations. It will conclude with an assessment that will be used to select Australia's team to the 2022 iGeo to be held in Paris, in association with the International Geographical Union Centennial Congress.

The Committee does not yet have the necessary permissions to share the names of the participating students. We very much hope that both the 2021 GBWO and the 2022 iGeo will not be disrupted by COVID-19 restrictions.

2022 Competition Goes Digital

Next year's Competition will change from paper-based to online delivery using the Education Perfect platform. (Think of the trees and vehicle emissions saved!) This will allow a greater range of question types than have been possible in the past. Over 50 schools and nearly 10,000 students are taking part in the trial of the digital delivery. We have included interactive stimulus material in the trial and if that does not present practical difficulties in the classroom, we look forward to being able to use further examples in the 2022 Competition.

The 2022 Competition will be held in schools from **24 March to 6 April 2022**. Here's hoping to no more lockdowns in 2022.

We look forward to your school's participation in what we trust will be an even more engaging Competition for your students.

For more information, please contact:

Rachel Honey, Competition Coordinator
W. www.geographycompetition.org.au
E. AGCcoordinator@rgsq.org.au
T. 07 3330 6907

ADVICE TO CONTRIBUTORS

Geography Bulletin guidelines

1. *Objective:* The Geography Bulletin is the quarterly journal of The Geography Teachers' Association of NSW & ACT Inc. The role of the Geography Bulletin is to disseminate up-to-date geographical information and to widen access to new geographic teaching ideas, methods and content. Articles of interest to teachers and students of geography in both secondary and tertiary institutions are invited, and contributions of factually correct, informed analyses, and case studies suitable for use in secondary schools are particularly welcomed.
2. *Content:* Articles, not normally exceeding 5000 words, should be submitted to the GTA NSW & ACT Office by email gta.admin@ptc.nsw.edu.au

   Submissions can also be sent directly to the editors: Lorraine Chaffer (lchaffer@tpg.com.au)

   Articles are welcomed from tertiary and secondary teachers, students, business and government representatives. Articles may also be solicited from time to time. Articles submitted will be evaluated according to their ability to meet the objectives outlined above.
3. *Format:* Digital submission in Word format.

- Tables should be on separate pages, one per page, and figures should be clearly drawn, one per page, in black on opaque coloured background, suitable for reproduction.
- Photographs should be in high resolution digital format. An indication should be given in the text of approximate location of tables, figures and photographs.
- Every illustration needs a caption.
- Photographs, tables and illustrations sourced from the internet must acknowledge the source and have a URL link to the original context.

Note: Please try to limit the number of images per page to facilitate ease of reproduction by teachers.

Diagrams created using templates should be saved as an image for ease of incorporation into the bulletin.

All assessment or skills tasks should have an introduction explaining links to syllabus content and outcomes. A Marking Guideline for this type of article is encouraged.

4. *Title:* The title should be short, yet clear and descriptive. The author's name should appear in full, together with a full title of position held and location of employment.
5. *Covering Letter:* As email with submitted articles. If the manuscript has been submitted to another journal, this should be stated clearly.
6. *Photo of Contributor:* Contributors may enclose a passport-type photograph and a brief biographical statement as part of their article.
7. *References:* References should follow the conventional author-date format:

   Abbott, B. K. (1980) *The Historical and Geographical Development of Muswellbrook* Newcastle: Hunter Valley Press.

   Harrison, T. L. (1973a) *Railway to Jugiong* Adelaide: The Rosebud Press. ***(2nd Ed.)***

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All suitable manuscripts submitted to the Geography Bulletin are subject to the process of review. The authors and contributors alone are responsible for the opinions expressed in their articles and while reasonable checks are made to ensure the accuracy of all statements, neither the editor nor the Geography Teachers' Association of NSW & ACT Inc accepts responsibility for statements or opinions expressed herein.

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