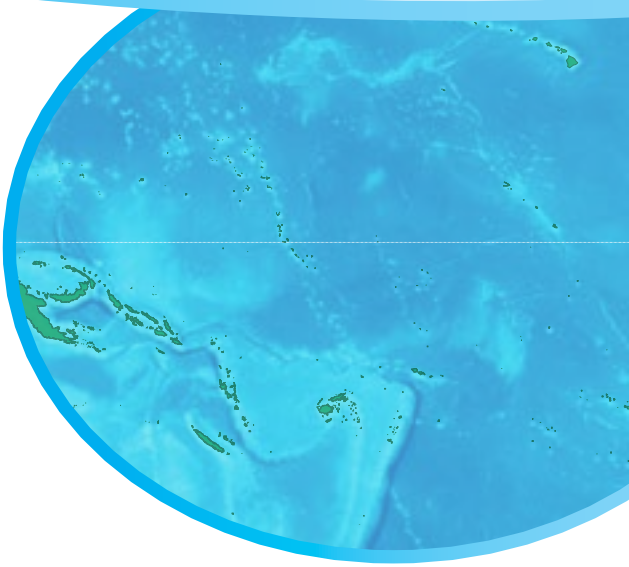
OUR PACIFIC OCEAN, OUR STORIES

Why we should tell our stories about our Pacific Ocean

The Pacific is the world's largest ocean, covering nearly one-third of the Earth's surface. It is our region's largest resource that helps defines us as Pacific people, underpinning our livelihoods and way of life.



Although most Members of the Secretariat of the Pacific Regional Environment Programme (SPREP) have small populations and economies, they are Large Ocean Island States responsible for managing more than ten per cent of the planet's oceans. Approximately 98% of this area, totalling over 30 million square kilometres, is contained within the Exclusive Economic Zones (EEZs) of SPREP Members.[1]

Our Pacific Ocean is home to many of the world's marine species, and supports Pacific island ecosystems with its diverse corals reefs, the deepest oceanic trenches and the healthiest and in some cases largest, remaining populations of many globally rare and threatened species such as whales, sea turtles, dugongs and saltwater crocodiles.

It's time we shared more stories about our Pacific ocean!

Did you know?

The ecosystem services provided to the entire planet by the ocean in, the SPREP region can be valued in many billions of dollars annually. For example, Pacific Ocean-based fishing and tourism provide USD 3.3 billion to the national economics of Pacific countries and territories.[2] Micronesia's ocean economy has an estimated worth of USD 548 billion, or USD 5.4 billion annually.[3] Globally, coral reefs protect at least USD 5,995 million of built capital, with other estimates exceeding this value.[4]

Ocean threats

- Marine pollution is a significant threat, with at least eight million tonnes of plastic leaking into the ocean each year.
- Marine ecosystems are affected by both marine and land based invasive species, the lead cause of extinction of endemic Pacific species.[5]
- Climate change leading to ocean acidification and coral bleaching threatens aqua life by wiping out marine habitats.

Is it "Coastal", "Sea" or "Ocean"?

Many definitions exist for coastal, inshore, sea and oceanic waters. The geographic boundaries of these water bodies can be very non-precise, and there are many important ecological connections between them. The term "ocean" may be used to include coastal waters and seas, however "oceanic waters" usually refers to the waters beyond the continental shelf.

Coastal – Coastal areas are commonly defined as the interface or transition areas between land and sea, including large inland lakes. Coastal areas are diverse in function and form, dynamic and do not lend themselves well to definition by strict spatial boundaries.[6]

Sea - Seas are smaller than oceans and are usually located where the land and ocean meet. Typically, seas are partially enclosed by land.[7]

Ocean – The Merriam-Webster dictionary defines "ocean "as the whole body of salt water that covers nearly three fourths of the surface of the earth, and any of the large bodies of water such as the Pacific, Atlantic, Indian, Antarctic and Arctic Oceans – into which the greater world ocean is divided. Oceans may include the coastal waters and seas adjacent to the main landmasses, however "oceanic waters or habitats" usually refers to the marine waters and habitats beyond the continental shelf.[8]

1 American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Guam, Kiribati, Republic of Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United Kingdom, United States of America, Vanuatu and Wallis and Futuna.

2 Seidel & Lal. 2010. Economic value of the Pacific Ocean to the Pacific Island Countries and Territories. IUCN. Gland. 75 p https://cmsdata.iucn.org/downloads/economic_value_of_the_pacific_ocean_to_the_pacific_island_countries_and_territories_p.pdf

3 Spalding et al. 2016. Atlas of Ocean Wealth. The Nature Conservancy. http://oceanwealth.org/wp-content/uploads/2016/07/Atlas_of_Ocean_Wealth.pdf

4 Ibid.

5 SPREP. 2014. State of Conservation in Oceania : Key Findings and Full Report. SPREP, Apia.

6 FAO. 1998. Integrated coastal area management and agriculture, forestry and fisheries. FAO, Rome. http://www.fao.org/docrep/W8440e/W8440e02.htm

7 NOAA. 'What's the difference between an ocean and a sea?' https://oceanservice.noaa.gov/facts/oceanorsea.html

8 Webster. 2018. Online Dictionary – 'Ocean'. https://www.merriam-webster.com/dictionary/ocean

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Talking the talk

- **Ecological** – The relation of living organisms to one another and their surroundings
- **Endemic** – A plant or animal native or restricted to a certain place.
- **Marine ecosystems** – are among the largest of Earth's aquatic ecosystems. Examples include salt marshes, intertidal zones, estuaries, lagoons, mangroves, coral reefs, the deep waters and seabeds of seas and oceans. They can be contrasted with freshwater ecosystems, which have a lower salt content. Marine waters cover two-thirds of the surface of the Earth.
- **Exclusive Economic Zone (EEZ)** – An ocean or sea zone over which a state has special rights regarding the exploration and use of marine resources, including energy production from water and wind, as prescribed by the United Nations Convention on the Law of the Sea. It stretches from the baseline out to 200 nautical miles (nmi) from its coast. (http://www.un.org/depts/los/convention_agreements/texts/unclos/part5.htm)
- **Marine Protected Area (MPA)** – Protected areas of the ocean, seas, estuaries or lakes, where human activity is restricted for conservation purposes, usually to protect natural or cultural resources.
- **Marine Park** – A park consisting of an area of sea (or lake) sometimes protected for recreational use, but more often set aside to preserve a specific habitat and ensure the ecosystem is sustained for the organisms that exist there.
- **Marine Spatial Planning** – is a process of analysing and monitoring the distribution of human activities affecting coastal and marine areas in order to make informed and coordinated decisions amongst all users of the ocean, including government, conservation, recreation and tourism, energy and industry. A key goal is to balance ecological, economic, social and cultural objectives.

Telling our Pacific stories

How much do you know about your national Economic Exclusive Zone (EEZ)? How large is it? How much of it is a sanctuary for marine species or a Marine Protected Area or a Marine Park? What structures are in place to protect your national EEZ? What ocean based industries are in your country and what do they do?

The more you know about your EEZ, how it is managed and what happens within it, the stronger your ocean stories will be.

People to contact: Do you have contacts in your environment and marine fisheries departments? Are there national NGO's that work to conserve and protect your ocean and marine species? Who are the local communities that rely on our ocean or coastal waters for their survival?

Knowing the right people to talk to at the right time can form the basis for your story, as you know a good solid contact base makes all the difference!

Issues to think of: What successful initiatives are happening in your country and what are the benefits of these? What challenges is your EEZ facing and how is that effecting Pacific communities?

Understanding the actions underway in your country provides opportunities for a wide range of Pacific stories to be told with Pacific voices.

The Ocean Factsheets by the UN Environment Programme and SPREP are a good place to start when looking for more information.

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OUR PACIFIC OCEAN, OUR STORIES

Pacific Ocean or Plastic Ocean?

Marine Litter is a deadly threat. It has equally deadly ramifications not just on Oceans and Marine life but also for you, me and everyone in our Pacific communities.

According to a report by the Ellen MacArthur Foundation, there are now more than 150 million tonnes of plastics in the oceans; that's about one tonne of plastics for every three tonnes of fish. The report further warns that if the trend continues, **plastics would outweigh fish in the oceans by 2050**.

Each year at least eight million tonnes of plastics leaks into the ocean, there are at least 51 trillion micro plastic particles already in our ocean with marine litter harming over 600 marine species.[1] Approximately 80% of marine debris originates from land-based activities, with inputs from shorelines or via rivers and wastewater pipelines with the most prevalent types of marine debris being plastic materials.[2]

Let's tell our stories, make people aware and help people make the right choices so we can make a difference for our Pacific ocean.

Marine debris is a problem because it...

1. Adds to our financial burden of waste clean-up and management, Pacific islands can be vulnerable to marine litter impacts due to our waste management challenges.
2. Can wound or entrap animals, does physical damage to infrastructure, can be hazardous to navigation and safety at sea, can alter habitats of marine species and can also transfer invasive species.
3. Has negative socioeconomic impacts, especially on coastal communities.
4. May impact our tourism industry as seeing marine debris in our waters does not make good aesthetics.
5. Can contaminate food supply, notably the absorption of heavy metals, organic contaminants and other chemical pollution onto the surfaces of microplastics which can then bioaccumulate up the food chain, including into human food sources.

> "Air, land, and water pollution caused 9 million premature deaths in 2015, or 16% of all deaths worldwide. About 92% of all pollution-related mortality is seen in low-income and middle-income countries, with the poor, marginalized, and young hardest hit by the health effects of the contamination. The economic burden is immense: in 2016, ambient air pollution alone cost the global economy US$5.7 trillion – 4.4 percent of global GDP."[3]

Did you know that approximately 80% of marine debris comes from land?[4]

There is a misconception that marine debris is only from waste that is discarded at sea, yet the majority of this comes from actions on land. It travels to the ocean from rivers, streams and wastewater pipelines. It can also be intentionally dumped on the coast, or littering on the street can eventually see it end up in our ocean.

1 Clean Seas. 2017. http://www.cleanseas.org/get-informed. Accessed 9 May 2018.
2 Markic A & Costello MJ. 2016.
3 The World Bank. 2018. http://www.worldbank.org/en/programs/pollution-management-and-environmental-health-program. Accessed at 9 May 2018.
4 Markic A & Costello MJ. 2016.

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Interesting things to know

Global Ghost gear

Ghost gear is any abandoned, lost or discarded fishing gear in our ocean that continues to trap and entangle marine line, smothers habitats and can be a hazard to navigation. It is estimated that at least 640,000 tonnes[2 5] of fishing gear are lost or abandoned in our ocean each year.

Micro plastics and the food chain

The national fish consumption in our island region is as high as ten times the global average. Research shows that microplastics are being ingested by fish, fish that is also ingested by humans. While research has not yet been released on this in the Pacific islands, research[6] from Belgium indicates that Europeans that eat shellfish are also eating up to 11,000 plastic fragments in their seafood each year.

Microfibres

These are tiny plastic fibres from synthetic fabrics that are making their way from washing machines to our waters and are found in abundance on shorelines where waste water is released. Synthetic fabrics include polyester, nylon, spandex, rayon and acrylic. On average, synthetic fleece jackets release 1.7 grams of microfibers with each wash.[7] The size of synthetic microfibers allows them to be readily consumed by fish and other wildlife.

Microbeads

These are tiny plastic particles are up to 5 millimetres in size and are mostly used in products such as face scrubs, body washes, and even toothpastes there are approximately 100,000 microbeads in a facewash product. These are washed down through waterways to our ocean and have the potential to enter the food chain.

Talking the talk

- **Bioaccumulate** – refers to the accumulation or concentration of substances in an organism
- **Microplastics** – tiny pieces of plastic less than 5mm in size

Telling our Pacific stories

What story ideas can you think of to help raise awareness about this issue in your country? What links can you see this information have to issues in your country? Has there been ghost gear found in the EEZ's of your country? Has there been bird or marine life been found dead because of plastic or marine debris?

The information provided tells you about the issue, localising this can help make it more real for your communities and audiences.

What work is happening at the national level to help address this issue? Not just that of your government, but also that of local community groups, NGO's, villages and schools.

Highlighting the positive work on the ground can help empower people to do more there may be many good stories that are yet to be told.

The Ocean Factsheets by the UN Environment Programme and SPREP are a good place to start when looking for more information.

5 Macfadyen, G., Huntington, T., Cappell, R. Abandoned, lost or otherwise discarded fishing gear. UNEP Regional Seas Reports and Studies, No. 185; FAO Fisheries and Aquaculture Technical Paper, No. 523. Rome, UNEP/FAO. 2009. 115p.

6 Van Cauwenberghe L, Janssen C, 2014. Microplastics in bivalves cultured for human consumption. Environmental Pollution, 193, 65-70.

7 Bren Microplastics. 2018. https://brenmicroplastics.weebly.com/project-findings.html. Accessed at 9 May 2018.

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OUR PACIFIC OCEAN, OUR STORIES

A Plastic-Free Ocean, Our Actions, Our Responsibility

"We are the ocean." – Epeli Hau'ofa

"For years we thought that the oceans were so vast and the inhabitants so infinitely numerous that nothing we could do could have an effect upon them. But now we know that was wrong. The oceans are under threat now as never before in human history." – Sir David Attenborough

In 1950 it was estimated that two million metric tonnes of plastic was produced, in 2015 the planet produced 32 million metric tonnes of plastic. So where does it all go? Of the world's plastics nine percent is recycled, 12 percent is incinerated and 79 percent accumulates in landfills[1], but remember what we do on land has great impact on our ocean.

Since Leo Baekeland invented the first synthetic plastic in 1907, plastic now plays a significant role in our lives, but each year over eight million tonnes of plastic ends up in our ocean with it making up at least 60–80% of the marine debris found in our ocean.[2]

There is now a public drive to ban the use of single use plastics, this sheet looks at what is being done across the globe and in our Pacific to address this issue.

Our Pacific

It is proven that global plastics production, most of which ends up in the ocean, is a significant contributor to **climate change**.

Ninety-nine percent of plastics come from fossil fuels, and plastics production is estimated to produce >400 million tonnes of **greenhouse gases (GHGs)** per year. This figure does not include emissions from waste management (including transport), mismanagement, and degradation of plastic products. Marine litter magnifies climate impacts in the Pacific region and threatens **the right** to a safe, clean, healthy and sustainable environment.

We rely on the Ocean and marine life for survival. Without the Ocean and our marine life, LIVES are under threat, a deadly one at that.

What causes it?

Marine litter and pollution does not cause itself; it is caused by people. You **might not know** that marine litter and pollution is caused by:

- Behaviours when waste is dumped or abandoned in the environment either on the ground and then the waste will arrive at sea under the effect of wind and rain.
- Some waste is thrown into the sea from the coast or from boats.
- The mismanagement of landfills, which can lead to leachate leakage, especially in illegal sites without controls, or to mismanagement of wastewater treatment systems, which can also lead to leakage of sludge that can be contaminated with heavy metals, especially when it come from the wastewater treatment systems of chemical companies, for example.
- Marine litter and pollution can also come from runoff from agricultural fields, which may contain pesticides or fertilisers.
- This can also be caused by accidental events at sea such as lost cargo or even oil or chemical spills from ships damaged at sea.

1 Geyer, R. et al. 2017. Production, use, and fate of all plastics every made. Science Advances. http://advances.sciencemag.org/content/3/7/e1700782.full

2 Markic, A. & Costello, MJ. 2016. Plastic ingestion by fish in the South Pacific. www.sprep.org/attachments/2016SM27/official/WP_9.3.2.Att.1_-__Plastic_ingestion_by_fish_in_the_South_Pacific_-_Samoa_results.pdf

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What do we do from here?

We, the People of the Pacific, must respond immediately to the deadly threat before us. As people at the forefront on the impacts of marine pollution and climate change, we call for urgent action to address marine litter. We call on the world's major producers to cease the production of unnecessary and toxic fossil fuel based plastics.

Ways we can protect our Pacific islands is through robust plastic pollution prevention policy frameworks to restrict the importation of plastics, legislate container return schemes prioritising reuse and refill, legislate extended producer responsibility schemes that return post-consumer plastics back to site of production for responsible management outside the region, strengthen compliance and enforcement of waste dumping including global ghost gear, and ban waste-to-energy incineration.

We need media to be the voice, advocate for change

We know the Media plays such a key role in informing, educating and influencing behaviour. As reporters and media workers, your role in highlighting the perils of marine litter, as well as the work that is being done to mitigate the damage, is extremely important. We need you to care about this that you would research, investigate, write and report on it. Marine litter and pollution is a crisis that deserves coverage.

Talking the talk

- **Container deposit** – Containers refer to bottles, or cans, any container that holds the product you wish to buy. When you purchase that product a deposit fee is built into the price, encouraging you to return the container for a part refund of the deposit fee. The other part of the deposit fee is used to pay for the collection, storage and recycling of your container.
- **Single use plastics** – plastic that tends to be used only once.
- **Used Oil Levy** – This is a similar concept as the container deposit. When you purchase lubricant oil, the levy is built into the price. When you return your used oil, you are refunded part of the levy, the remaining part of the levy pays for the system of collection, storage, and recycling or disposal.

Telling our Pacific Stories

Tell the stories of the people in your community who are experiencing the impact of marine litter and pollution. It is important to contextualise and also highlight the experience of Pacific people at every opportunity, to show the human face of the impacts we have talked about here

Highlight communities fighting back against marine litter and the work that is being done to keep the Pacific Clean.

In your stories, provide ways that people can change their mindsets and behaviour about Marine litter.
What can people change about their lifestyles that can help make a difference?

What has your country done, or is doing to help reduce the use of plastics?
How is that progressing? What impacts are being felt?
What needs to be done to revive this further?
What is the private sector doing and is it working?

If you can raise awareness of the work happening in your country, we can all be held accountable and all make sure we play our part in protecting our communities and our ocean. It's not just for the government, NGO's or communities, it can be for the media too!

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Small steps can lead to big impacts!

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OUR PACIFIC OCEAN, OUR STORIES

Learning more about our Coral Reef

Our Coral Reef is one of our greatest environment assets and in our Pacific region we are home to the world's largest coral reef, the Great Barrier Reef, which is also the largest structure on Earth made by living organisms. Spanning over 2,500 kilometers, it is about 500,000 years old.[1]

We are also home to the second longest double barrier reef in the world, the New Caledonia Barrier Reef which reaches a length of 1,500 kilometers. Fish diversity is high with at least 1,000 species documented, over 600 speices of sponges, 5,500 species of mollusks, 5,000 species of crustaceans, and over 350 species of algae.[2]

The more we tell our Pacific stories about our coral reefs, the more we can all learn about the best way to protect and care for them.

What are Coral Reefs?

Coral reefs are created by millions of tiny polyps, which are soft bodied animals without a backbone. They form large carbonate structures by extracting calcium from surrounding seawater. This is used to create a hardened framework, a coral reef, for protection and growth as well as the foundations for homes of hundreds of thousands, if not millions, of other species.[3]

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Why are Coral Reefs important?

Covering less than one percent of the ocean floor, reefs support an estimated twenty-five percent of all marine life including over 4,000 species of fish.[4] The reefs provide food, shelter, fish nurseries and are the perfect location for marine mammals to reproduce and raise their young.[5] Organisms such as sponges, worms, crustaceans (shrimp, spiny lobsters and crabs), molluscs, echinoderms (starfish, sea urchins and sea cucumbers), sea squirts, sea turtles and sea snakes are nurtured by the coral reef.[6]

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Healthy reefs sustain the lives of many Pacific Islanders. More than 80% of Pacific Islanders live in or near coastal areas and depend on coral reefs for their livelihoods. A projected estimate of fish needs for all of SPREP Member states for 2030 is 328,000 tonnes.[7]

Fisheries and tourism industries rely heavily on coral reefs, which in turn boost the economy of the Pacific islands.[8] According to World Resource Institute, destroying one kilometre of coral reef translates to the economic loss of around USD 137,000 to USD 1,200,000 over 25 years.[9] Reef structures also play vital roles as they prevent storm surge and coastal erosion by breaking the impact of strong waves before they reach shorelines. The stronger our reefs are, the greater the protection of our island homes.[10]

Coral reefs are important sources of medicines developed to treat many diseases such as heart disease, cancer and arthritis.[11]

1 Zimmermann, KA. 2012. Great Barrier Reef: Facts, location & animals. Live Science. https://www.livescience.com/6290-great-barrier-reef.html. Accessed 2018 July 17.

2 http://clonewwf.wwf-dev.org/about_our_earth/ecoregions/newcaledonia_barrier_reef.cfm

3 International Coral Reef Initiative. What Are Corals? www.icriforum.org/about-coral-reefs/what-are-corals. Accessed 2018 July 10.

4 International Coral Reef Initiative. What Are Corals? www.icriforum.org/about-coral-reefs/what-are-corals. Accessed 2018 July 10.

5 Secretariat of the Pacific Regional Environment Programme. Coral Reefs & Climate Change. 2009 July. https://www.sprep.org/climate_change/PYCC/documents/climatechangecoralreef_final_001.pdf.

6 International Coral Reef Initiative. What Are Corals? www.icriforum.org/about-coral-reefs/what-are-corals. Accessed 2018 July 10.

7 Bell JD, Kronen M, Warwick JN, Keeble G, Demmke A, Pontifex S, Andréfouëtc S. Planning the use of fish for food security in the Pacific. Marine Policy. 2009 January; 33 (4): 64-76.

8 Secretariat of the Pacific Regional Environment Programme. Coral Reefs & Climate Change. 2009 July. https://www.sprep.org/climate_change/PYCC/documents/climatechangecoralreef_final_001.pdf.

9 Bryant D, Burke L, McManus J, Spalding M. Reefs at Risk: A Map-Based Indicator of Threats to the World's Coral Reefs. World Resources Institute; 1998.

10 Secretariat of the Pacific Regional Environment Programme. Coral Reefs & Climate Change. 2009 July. https://www.sprep.org/climate_change/PYCC/documents/climatechangecoralreef_final_001.pdf.

11 National Oceanic and Atmospheric Administration. What Does Coral Have to Do with Medicine? NOAA's National Ocean Service. https://oceanservice.noaa.gov/facts/coral_medicine.html. Accessed 2018 July 10.

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Getting up close and personal with polyps

Polyps have a saclike body and a mouth lined with stinging tentacles to capture small prey that swim or drift by.

Coral polyps secrete calcium carbonate from underneath their skin through the food that they consume and absorb.

Zooxanthellae are single-celled photosynthesizing algae that live within the tissues of the polyps. They convert the sun's energy into food and are the reason why shallow reefs can grow fast enough to create large reef structures and gives the corals their vibrant colours.[12]

Did you know?

The fastest growing coral takes about 15 cm per year, but most grow less than 2.5 cm per year. Most reefs take decades to centuries of polyps secreting calcium carbonate to form the enormous hard structures we know today.[13]

Talking the Talk

Calcium carbonate – a chemical compound ($CaCO_3$) that is the main component of pearls, shells of marine organisms, eggs, snails and corals.[14]

Echinoderms – a major group of marine animals, there are around 7,000 species normally found on the sea floor of every marine habitat; sea cucumbers, sea stars, brittle stars, sea urchins, sand dollars, etc.[15]

Organism – a living thing that can respond to stimuli, grow, and reproduce.

Telling our Pacific Stories

What activities are being done in your country to help raise awareness of our Coral Reefs?

Are there actions undertaken by the tourism industry or the government?

Do you feel coral reefs are being taken for granted and, if so, how can we change that mindset through the media?

The more that you learn about our coral reefs and know of the environmental work being done to conserve and protect them, the fuller your news stories can be.

12 The Ocean Portal Team. Ocean, Find Your Blue. Smithsonian; 2018 April. **https://ocean.si.edu/ocean-life/invertebrates/corals-and-coral-reefs**. Accessed 2018 July 10.

13 The Ocean Portal Team. Ocean, Find Your Blue. Smithsonian; 2018 April. **https://ocean.si.edu/ocean-life/invertebrates/corals-and-coral-reefs**. Accessed 2018 July 10.

14 Calcium Carbonate. PubChem. 2018. **https://pubchem.ncbi.nlm.nih.gov/compound/calcium_carbonate**. Accessed 2018 July 17.

15 Echinoderms. Marine Education Society of Australasia. 2018. **http://www.mesa.edu.au/echinoderms/**. Accessed 2018 July 17.

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OUR PACIFIC OCEAN, OUR STORIES

The challenges our Coral Reefs face

Cakaulevu barrier reef, Fiji © Stuart Chape

Coral Reefs support an estimated 25 percent of all marine species in the world.

For those marine species, coral reefs provide spawning, nursery, refuge and feeding areas.

Coral reefs are also important for humans, especially Pacific islanders who depend on them for income, food, livelihoods, coastal protection and cultural identity.

Many small and large island communities rely heavily on fisheries as a food and economic resource, but did you know that there are different types of coral reefs that provide unique environments all over the Pacific? Let's take a look at the different types of coral reefs!

The three main types of coral reefs are:[1]

Fringing reefs are the most commonly found reefs, which grow seaward from the coastlines of land masses such as islands. A shallow and narrow lagoon sometimes separates the main reef from the shore.

Barrier reefs surround island coastlines and parts of continents, at varying distances from the shoreline up to several kilometres, and water often depth of several dozens of metres. The New Caledonian barrier reef and Fiji's Cakaulevu barrier reef are famous barrier coral reefs in the Pacific..

Atolls are formed when a volcanic island subsides completely below sea level, while the fringing reef continues to grow seaward and upward, creating low-lying islands. Atolls are usually circular or oval shaped, with a lagoon in the centre. Parts of the reef platforms may emerge as one or more islands, while gaps in the reefs provide access to the central lagoon. Kiribati and Tokelau are examples of groups of atoll islands.

1 Secretariat of the Pacific Regional Environment Programme. About Coral Reefs – 2008 Pacific Year of the Reefs; 2008. https://www.sprep.org/pyor/about.htm. Accessed 2018 July 10.

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Challenges faced by Our Reefs

- **Climate change** is causing oceans to warm resulting in coral bleaching, as well as strong El Nino events that increase sea surface temperature events. When the water is too warm, zooxanthellae which give the corals their vibrant colours, expel themselves from the coral tissues, exposing the colour of the white skeleton.[2] Coral reefs tolerate temperatures ranging from 20–30°C. In the Pacific, most corals live in waters of 26–29°C. Even a slight rise in temperature can impact the reefs.[3] A recent study shows that it takes five years for reefs to recover from a bleaching event and as these events become more frequent and the duration of each event becomes longer, corals are having a difficult time recovering.
- **Ocean Acidification** is changing ocean chemistry and making it unsuitable for corals to live in. The ocean absorbs about 30 percent of the CO_2 that is released in the atmosphere, and as levels of atmospheric CO_2 increase through the burning of fossil fuels, so do the levels in the ocean. When CO_2 is absorbed by seawater, a series of chemical reactions occur resulting in the increased concentration of hydrogen ions. This increase causes the seawater to become more acidic and causes carbonate ions to be relatively less abundant. Carbonate ions are an important building block of structures such as sea shells and coral skeletons. Decreases in carbonate ions will negatively impact coral reefs.[5]
- **Development** Forest and mangrove clearing creates nutrient overload and increases sediment levels, smothering seagrass and corals. Tree roots and vegetation hold together sand and soil, once they are removed erosion can cause soil to be washed into the sea. Coastal development such as building for beach fronts, sand mining and seawalls affects the natural movement of sand, exposing the land to erosion, which breaks away parts of the coasts.
- **Destructive tourism** has lasting impacts on coral reefs. Anchoring, touching or walking on corals breaks and removes a protective layer of mucus that the corals create to protect themselves from sunlight. Human activities, such as feeding or disturbance, affect animal behaviour and change the balance in reef ecosystems. As tourism increases, so do human activities, leading to a higher concentration of water and solid waste pollution, development impacts, and introduction of invasive species.
- **Pollution** ffects the health of corals from both land and marine sourced pollutants. Without proper treatment or disposal, the pollutants that we create are entangling, smothering and being ingested by corals, such as Styrofoam containers, concentrated animal excrement, unnatural sunscreens, to name a few.
- **Overfishing, destructive fishing and overharvesting** of coral, bêche-de-mer, fish, and other marine species disrupts the balance in coral reef communities. The loss of even one key species can break a link, affecting the food chain, and disturbing the reef ecosystem at large..

Did you know?

There are numerous islands in the Pacific making this region home to over a quarter of the worlds reef, a total of nearly 61,000 km^2.[7] This is equivalent to the total land area of Samoa, New Caledonia, Solomon Islands and Vanuatu combined.[8]

Telling our Pacific Stories

Highlight Pacific voices when you tell stories about Our Ocean and Coral Reefs. There are many ways to tell a story, but one of the most interesting ways is to write from the perspective of those living on the land and most affected by challenges. Use their stories, past and present, to show the world a side they don't often get to see.

How much do people know about the coral reef in your community? This may be your opportunity to help make a difference!

Talk to experts in your community. Find out the local context of issues within your community by talking to local scientists, policymakers, relevant government officers and non-government organisations who work in marine environment conservation.

Establish a strong network of experts in this field who you can call upon for guidance and advice when developing your story, as well as a subject to provide the professional input.

Glossary

Bêche de mer – a large sea cucumber that is harvested for consumption and considered a delicacy, particularly in Asian and Pacific countries

Erosion – a geological process in which earthen materials are worn away and transported by natural forces such as wind or water.[6]

Overfishing – to fish or exhaust the supply of usable fish.

Overharvesting – taking more from the land or sea than can be replenished.

Food chain – describes who eats whom in the wild.

Sediment – solid material, usually pieces of rock, that settles at the bottom of a liquid, carried along and then left somewhere by water, ice, or wind.

Zooxanthellae – are single-celled tiny plant-like organisms that live in symbiosis with marine invertebrates and are commonly found in certain corals, clams, anemones, worms, sponges and other reef organisms.

2 National Oceanic and Atmospheric Administration. What is Coral Bleaching? NOAA's National Ocean Service. https://oceanservice.noaa.gov/facts/coral_bleach.html. Accessed 2018 July 10.

3 Secretariat of the Pacific Regional Environment Programme. Coral Reefs & Climate Change. 2009 July. www.sprep.org/climate_change/PYCC/documents/climatechangecoralreef_final_001.pdf.

4 University of Miami. New research predicts the future of coral reefs under climate change. Phys.org. https://phys.org/news/2017-01-future-coral-reefs-climate.html. Accessed 2018 Aug 22.

5 National Oceanic and Atmospheric Administration. What is Ocean Acidification? NOAA's National Ocean Service. https://oceanservice.noaa.gov/facts/acidification.html. Accessed 2018 August 20.

6 National Geographic Society. National Geographic Society Education Programme. https://www.nationalgeographic.org/encyclopedia/erosion/. Accessed 2018 Aug 22.

7 Bryant D, Burke L, McManus J, Spalding M. Reefs at Risk: A Map-Based Indicator of Threats to the World's Coral Reefs. World Resources Institute; 1998.

8 Central Intelligence Agency, Central Intelligence Agency. The World Factbook: WORLD; 2018 June 20. www.cia.gov/library/publications/the-world-factbook/geos/xx.html. Accessed 2018 July 10.

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OUR PACIFIC OCEAN, OUR STORIES

Getting to know Ocean Acidification

Savaii, Samoa © Stuart Chape

What is Ocean Acidification?

Our global ocean absorbs approximately 30% of the carbon dioxide (CO_2) released into the atmosphere.

This CO_2 combines with seawater to produce carbonic acid, turning the seawater more acidic and depleting the seawater of carbonate that many forms of sea life need to build their shells.

CO_2 is an acid gas, so the addition of CO_2 to the ocean from burning fossil fuels is making seawater more acidic; we call this process "ocean acidification."

Understanding ocean acidification in detail

As the ocean absorbs CO_2, the CO_2 combines with seawater forming carbonic acid. The carbonic acid quickly dissociates into hydrogen ions and bicarbonate ions. Some of the hydrogen ions then combine with naturally occurring carbonate ions to form more bicarbonate. This reduces the concentration of carbonate in the seawater.

A reduction in carbonate concentration is bad because carbonate is an important building block for sea life that builds calcium carbonate shells and skeletons, such as calcifying plankton and algae, clams, sea urchins, and corals.

This chemical reaction also results in decreasing the seawater's pH. pH is a measure of the concentration of hydrogen ions, also known as acidity; the lower the pH, the higher the concentration of hydrogen ions, and the more acidic the water.

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Ocean acidification is happening now

For the last 20 million years, the pH of the ocean has remained relatively stable between approximately 8.1 and 8.2. Over the last 200 years, as humans have accelerated the burning of fossil fuels, the ocean's average surface pH has decreased by 0.1[1], representing a 28% increase in acidity since the start of the industrial revolution. Hence, ocean acidification is not a problem expected to occur in the future, ocean acidification is already happening and being observed now.

Projections for the end of this century indicate that our oceans' surface waters could be 150 times more acidic than pre-industrial revolution. This would result in an ocean that is more acidic than at any time over the last 20 million years. It would also mean a change in pH that is 100 times faster than at any time in the past.

What is the Pacific doing to address ocean acidification?

The Secretariat of the Pacific Regional Environment Programme (SPREP) is coordinating the **Pacific Partnership on Ocean Acidification** (PPOA) in collaboration with the University of the South Pacific (USP), and the Pacific Community (SPC) to build resilience to ocean acidification in Pacific island communities and ecosystems with financial support from the New Zealand Ministry of Foreign Affairs and Trade and the government of the Principality of Monaco. This partnership is tackling ocean acidification in the Pacific by supporting research and monitoring, building capacity, raising awareness, and implementing practical adaptation actions.

At pilot sites in Fiji, Kiribati, and Tokelau, work is underway to increase resilience to ocean acidification through practical adaptation activities such as planting mangroves to locally buffer pH; restoring and farming coral to enhance reef resilience; and establishing locally managed marine areas to reduce secondary reef stresses.

PPOA is also working with international partners like the Ocean Foundation and the Global Ocean Acidification Observation Network to build local capacity to monitor and report ocean acidification data. Monitoring ocean acidification is needed to understand baseline conditions and to help distinguish long-term anthropogenic acidification from natural variability.

Thirteen Pacific islands are signatories to the Paris Agreement, and are working to reduce their greenhouse gas emissions to limit global average temperature rise to 1.5 degrees Celsius. While reducing emissions of any combination of greenhouse gasses[2] can address the goal of limiting temperature rise, for ocean acidification, CO_2 is the only greenhouse gas that matters. Reducing methane emissions, for example, can limit temperature rise, but it will not help address ocean acidification; only by reducing CO_2 emissions can we directly mitigate ocean acidification.

Telling our Pacific Stories

There are several obstacles that make reporting on ocean acidification difficult. It can be challenging to explain to your audiences in a way that maintains interest while remaining factually and technically accurate. The name is clunky and evokes memories of boring chemistry class for many people. Though ocean acidification is happening now, there are few tangible, visible impacts of ocean acidification that are easy for reporters to show to help audiences relate to the problem.

There is also often confusion regarding the "acid" part of the name "ocean acidification." The ocean will not literally turn into an acid[3], rather it will become more acidic than it currently is. The projected changes in seawater pH may seem small, however the speed with which the changes are occurring may outpace many organisms' ability to adapt.

How can journalists address these challenges?

- **Keep learning!** Reading this is a great start. Ocean acidification is a topical issue, the more you know about it the better the foundation of your news articles and your ability to communicate this in a way that your audience will understand.
- **Keep a glossary of technical terms**, try defining them yourself and check with an expert that your definitions are correct and maintain consistency in using them.
- **Strengthen your networks and connect with experts in this area**. You can reach out to your government departments or your Pacific regional agencies. You may also want to request a special seminar for your news team with a government department, regional agency, or NGO that specialises in this area.

1 Since the pH scale is logarithmic, a 0.1 pH change represents approximately a 28% increase in acidity.
2 Gases that trap heat in the atmosphere are called greenhouse gases, and include carbon dioxide, methane, and nitrous oxide.
3 An acid is defined as having a pH less than 7. Projections for the end of the century are for an average surface ocean pH of ~8.01, depending upon emissions scenario.

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OUR PACIFIC OCEAN, OUR STORIES

Learning more about ocean acidification

Upolu, Samoa © Stuart Chape

What is Ocean Acidification?

Our global ocean absorbs approximately 30% of the carbon dioxide (CO_2) released into the atmosphere.
This CO_2 combines with seawater to produce carbonic acid, turning the seawater more acidic and depleting the seawater of carbonate that many forms of sea life need to build their shells. CO_2 is an acid gas, so the addition of CO_2 to the ocean from burning fossil fuels is making seawater more acidic; we call this process "ocean acidification."

Q Why is ocean acidification a problem?

A It reduces the ocean's concentration of carbonate

With decreasing seawater saturation of carbonate, marine life, including calcifying plankton and algae, clams, sea urchins, and corals, will find it difficult to build their skeletons and shells. This will lead to a reduction in the growth rates of many of these creatures.

One study[1] projects that by 2050, coral reefs will dissolve faster than they can build their skeletons. Loss of coral reefs will mean loss of critical habitat for important seafood species and would result in increased rates of coastal erosion.

This will have a huge impact on ocean and coastal ecosystems, including coral reef ecosystems, shellfish, and plankton – the basis of the food web. Ocean acidification threatens our biodiversity. Eventually this will affect livelihoods, food security, and indigenous cultural practices and traditions.

1 Eyre, Bradley D., et al. "Coral reefs will transition to net dissolving before end of century." Science 359.6378 (2018): 908-911.

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Q Why is ocean acidification a problem?

A Many species of fish could experience reduced productivity and growth rates

A study[2] that looked at ocean acidification effects on yellowfin tuna found that larvae reared at decreasing pH levels (pH 8.1, 7.6, 7.3 and 6.9) showed increasing organ damage in the kidney, liver, pancreas, eye and muscle, which correlated with decreased growth and survival.

A loss of fisheries productivity would threaten national economies that are highly dependent on fisheries resources, particularly Pacific islands. Fish is a cornerstone of food security for the people of the Pacific – fish provide 50–90% of animal protein in the diet of coastal communities across a broad spectrum of Pacific islands, and national fish consumption per person in many Pacific islands is more than 3–4 times the global average[3].

A Ocean acidification adds to other stresses coral reefs face, like ocean warming and coral bleaching

Ocean acidification can be considered a "stress multiplier" for coral reefs, as it combines with other stresses that corals are currently facing, e.g., rising sea surface temperatures, increasing frequency and duration of bleaching events, increasing intensity of tropical cyclones, overfishing, destructive fishing methods, and land-based sources of pollution.

Loss of coral reefs would mean loss of critical habitats for important seafood species and would result in increased rates of coastal erosion, since coral reefs are known[4] to reduce 97% of wave energy that would otherwise impact shorelines. Additionally, loss of reefs would pose a financial threat to the tourism industry of many islands.

Telling our Pacific Stories

As a reporter or journalist, your role in communicating with the general public is vital, especially in informing communities and encouraging behavioural change.

Reporting on ocean acidification can be a difficult task, especially when translating the science for your audience.

How about trying some of the below?

- Easier said than done with such a scientific topic but **try to avoid using complicated words** in your reporting and media coverage, and when you can't avoid it make sure you provide short and simple explanations of scientific terms.
- **Tell the stories of the people in your community who are experiencing these impacts**. Use local examples of ocean acidification impacts in your community or country whenever you can. It is important to contextualise and also highlight the experience of Pacific people at every opportunity, to show the human face of climate change impacts.
- **Support stories that encourage the preservation of ecosystems** that naturally mitigate[5] ocean acidification. Highlight communities fighting back against coastal development, NGOs protecting coastal ecosystems that are known carbon sinks, and businesses promoting clean renewable energy.
- **Provide ways that people can combat ocean acidification and climate change impacts**. What can people change about their lifestyles that can help reduce carbon emissions and ocean acidification?

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2 Frommel, Andrea Y., et al. "Ocean acidification has lethal and sub-lethal effects on larval development of yellowfin tuna, Thunnus albacares." Journal of experimental marine biology and ecology 482 (2016): 18-24.

3 Bell, Johann D., Johanna E. Johnson, and Alistair James Hobday, eds. Vulnerability of tropical Pacific fisheries and aquaculture to climate change. SPC FAME Digital Library, 2011.

4 Ferrario, Filippo, et al. "The effectiveness of coral reefs for coastal hazard risk reduction and adaptation." Nature communications 5 (2014): 3794.

5 Aquatic vegetation like mangroves and seagrasses, for example, can sequester CO_2 thereby locally buffering nearby marine ecosystems against ocean acidification.

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OUR PACIFIC OCEAN, OUR STORIES

Sharks in the Pacific media

Sharks and reef fish, Solomon Islands © Stuart Chape

Sharks in the Pacific media

There are many reasons as to why sharks are important for our Pacific islands region, and if you haven't developed news items about them before, this factsheet may be a catalyst to do so – or it may help provide you with information if you are developing a news item that touches upon sharks in the Pacific.

Why do we need to save our sharks?

Sharks seem to have a bad reputation as predators, but as they reproduce slowly, they are more at risk from humans than we are from them. Like all species within an ecosystem, we need our sharks as they help maintain the health of marine life in the ocean, including the population of commercially important fish species.

Healthy shark populations indicate healthy ecosystems and marine environments. Our coral reefs in particular benefit from a healthy shark population as sharks maintain a balance in the marine food chain.

Along with their crucial role, contributing to our ecosystems, sharks are also important to the economy. Sharks are of more value alive, than dead. A study in Palau showed that an individual reef shark is estimated to be valued at USD 1.9 million over its lifetime to the tourism industry, and the shark diving industry contributed USD 42.2 million to the Fijian economy in 2011.[1]

Yet aside from this, sharks are also of cultural importance to Pacific Islanders. You can see them featured in our Pacific island legends, proverbs and songs.

1 GMS Vianna, JJ Meeuwig, D Pannell, H Skyes and MG Meekan (2011). The socio-economic value of the shark-diving industry in Fiji. Australian Institute of Marine Science. University of Western Australia. Perth (26pp).

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Sharks are threatened with extinction

Between 63 million to 273 million sharks are killed each year in commercial fisheries mainly to meet the high demand for shark fins.

One-third of species found in the global fin trade are threatened with extinction.[2] It has been estimated that more than 20 million blue sharks are caught annually and are the dominant species in the global shark fin trade.[3]

The International Union for Conservation of Nature (IUCN) estimates that 54% of sharks, rays and their relatives are threatened or near threatened with extinction.

What is the Pacific doing to save sharks?

When it comes to protecting sharks, the Pacific islands have shone a beacon of leadership on the world stage.

The EEZ's (Economic Exclusive Zones) of Cook Islands, Federated States of Micronesia, French Polynesia, Kiribati, New Caledonia, Palau, Republic of the Marshall Islands and Samoa have been legally declared shark sanctuaries.

This means a total estimated area of 17 million sq. km has been established as shark sanctuaries in our Pacific islands!

In 2016 Fiji, supported by Samoa and Palau led the successfully listing of nine species of mobula rays on the Appendix II under the Convention on International Trade in Endangered Species of Wild Fauna and Flora. They also supported the listing of thresher sharks, silky sharks and the nautilus that were all adopted for Appendix II listing in 2016.

In 2017, the Governments of Samoa and Sri Lanka successfully lobbied to place blue sharks on Appendix II under the Convention on the Conservation of Migratory Species of Wild Animals to help ensure their sustainability.

Country	EEZ Size	Sanctuary Declared
Palau	608,289 km^2	2009
Marshall Islands	2 million km^2	2011
Cook Islands	2 million km^2	2012
French Polynesia	4.8 million km^2	2012
New Caledonia	1.2 million km^2	2013
Federated States of Micronesia	3 million km^2	2015
Kiribati	3.4 million km^2	2015
Samoa	128,000 km^2	2018

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Telling our Pacific Stories

As a member of the Pacific media, you can also play a role in saving our Pacific sharks. Your role in communicating with the Pacific island people is vital, especially in informing communities so they know why we should be caring for our environment including our marine species.

Some tips for consideration:

Sharks are magnificent creatures, and they play a significant role in our Pacific Ocean's biodiversity, as well as our Pacific culture and heritage. Tracing their role within Pacific cultures may make for interesting feature stories.

Linking it all together. As a Pacific media worker you may highlight and report about environmental issues such as climate change, pollution, and habitat loss. How about linking the impacts of these issues with marine species, such as sharks?

Cinema and dramatisation of shark encounters have given sharks a bad reputation, but the global average of shark deaths per year is six.[4] This, in contrast with the number of sharks killed by humans annually, paints an extremely troublesome picture. By writing positive stories about sharks, and highlighting the threats and impacts they face, you can give a voice to a voiceless creature.

Telling the good stories. Sometimes people want to hear the good news, how about developing stories that encourage the preservation of ecosystems through positive eco-tourism, highlighting the beauty of our sharks and our ocean. Highlight any communities, individuals or groups who are calling for action against the shark-fin industry and other harmful human activities.

2 Fields, A.T., Fischer, G.A., Shea S.K.H., Zhang, H., Abercrombie, D.L., Feldheim K.A., Babcock, E.A., and Chapman, D. 2017. Species composition of the international chondrichthyan fin trade assessed by a retail market survey in Hong Kong. Conservation Biology.

3 Stevens, J. 2009. Prionace glauca. The IUCN Red List of Threatened Species 2009: e.T39381A10222811.

4 Florida Museum. International Shark Attack File. 2019. https://www.floridamuseum.ufl.edu/shark-attacks/yearly-worldwide-summary/

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OUR PACIFIC OCEAN, OUR STORIES

Tides and Extreme Tide Events

Samoa © Stuart Chape

More and more, Pacific media are writing about climate change and telling Pacific stories of Pacific people being impacted. With all of our Pacific islands surrounded by oceans, some islands and atolls in particular with extremely small landmass, knowing about tides may help enhance media reports.

As we face the stronger extreme weather events that are projected as an impact of climate change, knowing about tides can help provide the foundation for good stories. The more you are informed and share your knowledge in media reports, the more informed your audiences become.

The following is developed from the Tides and Extreme Tide Events factsheet produced by the Pacific Community (SPC) through the Climate and Oceans Support program in the Pacific (COSPPac).

All about tides

Tides are the daily rise and fall of sea levels, caused by the gravitational pull of the moon and the sun, and also by the Earth's rotation. There are many different types of tides that happen. In locations around the Pacific, we observe different types of tides and tidal events over the course of a day, month, or year.

Spring tides and neap tides

Spring tides and **neap tides** are part of the normal tidal cycle and occur regularly, usually twice per month.

Spring tides are very high tides and very low tides that occur during full and new moon phases, when the gravitational forces of the sun and moon combine to exert a stronger pull on the oceans.

During the moon's quarter phases each month, the sun and moon are at right angles, and the gravitational forces cancel each other out, resulting in lower high tides and higher low tides called neap tides.

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King tides

The term **king tide** is commonly used to describe an especially high spring tide. King tides occur a few times every year, when the gravitational pull of the sun and moon upon the Earth is the strongest. This happens when the moon is closest to the Earth in its monthly orbit. When this coincides with a spring tide, it will produce an especially high tide, or king tide.

In the Pacific, the highest king tides often occur during the months of November to March, when the Earth is also closest to the sun in its annual orbit.

What you should know

King tides are a natural part of the tidal cycle and are predictable. A king tide can cause coastal flooding, even on a clear, sunny day. When king tides coincide with cyclones, floods or storms, water levels can rise significantly, potentially causing damage to property and the coastline. The actual height reached by a king tide will depend on the local weather and ocean conditions on the day. It is also important to note that king tides have always occurred and are not a result of sea level rise.

LOW TIDE HIGH TIDE

Predicting tides

The time and approximate heights of tides are very predictable. They follow the laws of physics and can be calculated with mathematical formulas. By observing and recording tides at a single location over many years, we can gain a better understanding of tides and sea level changes over time.

The Pacific Sea Level and Geodetic Monitoring Project (PSLGM) has been recording sea level and weather statistics in 13 Pacific countries for more than 25 years. These observations tell a story about the sea levels at these locations: How high was the highest tide in Apia? What effect does El Niño have on sea levels in Kiribati? All of this information is also used to verify and improve tide predictions.

Tide levels can, however, vary from predicted levels for a number of reasons, including:

- **Geography:** The shape of bays and other coastal geography can magnify or otherwise influence water levels.
- **Weather:** Wind speed and direction, air temperature, barometric pressure and other weather conditions can greatly affect water levels.
- **Waves:** Both nearby and faraway events such as storms, landslides and earthquakes can create large waves that lead to coastal flooding.
- **Climate drivers:** El Niño or La Niña conditions in the Pacific can raise or lower sea level by as much as 50 cm.
- **Sea-level rise:** Through assessing observations and research, the Intergovernmental Panel on Climate Change (IPCC) concluded that global average sea levels have been rising at a rate of about 3 mm per year since 1993. Levels were 225 mm higher in 2012 compared to 1880. Sea-level rise can contribute to higher tides, but the rates are not the same at all locations.

More about the PSLGM

The PSLGM operates under the Climate and Oceans Support Program in the Pacific (COSPPac). It is a continuation of the 20-year South Pacific Sea Level and Climate Monitoring Project (SPSLCMP).

COSPPac is funded by the Australian Government and implemented by the Bureau of Meteorology. COSPPac partners with many other agencies to deliver the program including the Australian Government Department of Foreign Affairs and Trade, Geoscience Australia, the Pacific Community and the Secretariat of the Pacific Regional Environment Programme.

Telling our Pacific stories

What types of tides impact your Pacific communities? Linking these tides and sharing information about them by telling the stories that impact people helps raise awareness of tides and what we need to know to prepare for them.

Getting it right. Knowing about tides can help make sure your media reports are correct when and if you are linking the tides to impacts of climate change. Spend time with your national Met Services and other departments and agencies that can help tell you more about tides

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OUR PACIFIC OCEAN, OUR STORIES

Know your Ocean with the Pacific Ocean Portal!

Savaii, Samoa © Stuart Chape

How to find accurate and reliable information on the Pacific Ocean

There is a lot of information available on the web today, and it can be overwhelming and confusing, especially when you are reporting on issues relating to science. Scientific information is constantly being updated, and scientists and experts need to consistently research, review and fact check to ensure the information they are giving to their audiences is up to date and accurate.

This factsheet will introduce you to the Pacific Ocean Portal – a user-friendly, open access online tool, and the place to go for historical and near real-time Pacific Ocean data. It is based upon the Pacific Ocean Portal! Factsheet developed by the Pacific Community (SPC) through the Climate and Oceans Support program in the Pacific (COSPPac).

Data are displayed visually, as downloadable maps and graphs, and files are low bandwidth making them ideal for slow internet speeds. While the portal was developed for non-technical users, data are sourced from historical records streamed from satellites and obtained from ocean-based equipment and computer models.

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What can you find on the Pacific Ocean Portal?

The information available on the portal includes:

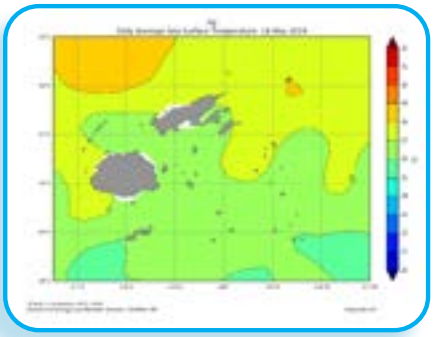
- Near-real time tide and weather observations from 194 locations
- Annual tide calendars for 23 locations around the Pacific
- Wave climate reports with a summary of wind and wave statistics for 200 locations
- Seasonal and long-term sea level trends
- Daily and forecast sea surface and subsurface ocean temperature
- Daily salinity and chlorophyll levels
- Forecast current direction and speed
- Forecast sea and swell wave height, period and speed
- Forecast wind speed
- Coral bleaching alerts
- Help files with details about the data and how to interpret the information

Anyone can use the portal – from students and researchers, to fishermen and fishing communities, as well as coastal communities and ship captains or crews and even tourism operators.

Journalists and the media can also use the portal to learn more about our ocean in order to cover stories and report back to the public. Coral reef bleaching outlooks are important and alert us when the reef is particularly stressed, so the media and journalism networks can warn fishing communities and large fishing bodies to reduce fishing in those high stress areas. And sea surface temperature forecasts can highlight likely fishing hotspots where fishermen can move to instead.

The portal can also produce maps and graphs of ocean conditions for a given date or location to help you research and find more about the story or issues you are covering, and ensure that your stories are based on accurate information and reliable facts.

Telling our Pacific stories with the Pacific Ocean Portal



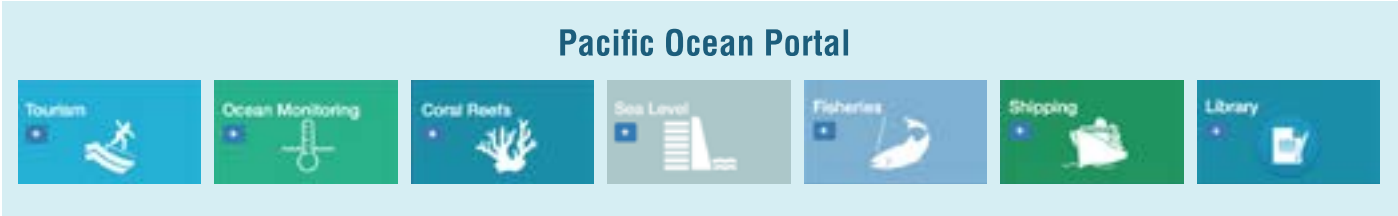
Reporting about stories, and connecting your readers to the real life people involved in the ocean issues you cover can be strengthened with information from the Pacific Ocean Portal.

The portal can produce maps and graphs of ocean conditions on a given date at a given location to inform your research. Maps and graphs can be used to accompany your webstories. There are also helpfiles which provide details about data sources, how to interpret the maps and graphs, and where to go to learn more.

If your media reports aim to share information for your fisherman the Pacific Ocean Portal contains actual and predicted tide, currents, wind and wave forecasts can help you plan fishing trips. Seasonal sea surface temperature forecasts can highlight likely fishing hotspots.

If you are unsure how to best interpret or use the information found on the Pacific Ocean Portal please work with your national Met Service for assistance and guidance. You can also email **oceanportal@spc.int**

Know your Ocean! Visit **http://oceanportal.spc.int/portal/ocean.html** to learn more or email **oceanportal@spc.int**



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OUR PACIFIC OCEAN, OUR STORIES

Understanding marine heatwaves and how they impact the Pacific

© Stuart Chape

The Pacific is the world's largest ocean, covering nearly one-third of the Earth's surface. It is our region's largest resource that helps define us as Pacific people, underpinning our livelihoods and way of life.

Although most Members of the Secretariat of the Pacific Regional Environment Programme (SPREP) have small populations and economies, they are Large Ocean Island States responsible for managing more than ten per cent of the planet's oceans. Approximately 98% of this area, totalling over 30 million square kilometres, is contained within the Exclusive Economic Zones (EEZs) of SPREP Members.

Our Pacific Ocean is home to many of the world's marine species, and supports Pacific island ecosystems with its diverse corals reefs, the deepest oceanic trenches and the healthiest and in some cases largest, remaining populations of many globally rare and threatened species such as whales, sea turtles, dugongs and saltwater crocodiles.

According to the Intergovernmental Panel on Climate Change (IPCC)'s Special Report on the Ocean and Cryosphere in a Changing Climate (2019), the future ocean will suffer from more damaging marine heatwaves:

"Marine heatwaves will further increase in frequency, duration, spatial extent and intensity (maximum temperature) under future global warming (very high confidence), pushing some marine organisms, fisheries and ecosystems beyond the limits of their resilience, with cascading impacts on economies and societies (high confidence)."

The scale of scientific confidence used by the IPCC:

Confidence Terminology	Degree of confidence in being correct
Very high confidence	At least 9 out of 10 chance
High confidence	About 8 out of 10 chance
Medium confidence	About 5 out of 10 chance
Low confidence	About 2 out of 10 chance
Very low confidence	Less than 1 out of 10 chance

Source: http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch1s1-6.html

What is a marine heatwave?

A **marine heatwave** can be described as when sea suface temperatures exceed a seasonally-varying threshold for at least five consecutive days. If the marine heatwave continues with gaps of two days or less, this is considered to be part of the same marine heatwave event. It is the result of a period of extreme warm near-sea surface temperature that persists for days to months and can extend over thousands of kilometres.

The IPCC defines a heatwave when the daily sea surface temperature is warmer than 99% of all recorded temperatures. These are extreme conditions.

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What are the impacts of marine heatwaves?

We have all heard that warming ocean temperatures are increasing stress to coral reefs. In particular marine heatwaves can cause serious impacts on reefs including:

- Large-scale coral bleaching
- Disease and mortality of marine species
- Loss of biodiversity and ecosystem services
- Harmful algal blooms
- Shifts in species ranges, including local and global extinctions of certain coral species.

Marine heatwaves and our Pacific islands

Physical changes as a result of marine heatwaves are very likely, and scientists have warned that impacts of marine heatwaves on Pacific marine life and human communities can be expected. But what does this mean for our Pacific islands?

- Our tropical islands will bear the brunt: the largest increases in the probability of marine heatwaves will occur in the tropical ocean, especially the western tropical Pacific.
- High temperatures can also combine with high nutrient levels to result in "dead zones" where the oxygen level in the water drops too low for fish and other animals to survive.
- While many species have temperature limits, certain species are more sensitive, and these species include many Pacific corals.
- Water temperature is a key factor determining where species live – *Gambierdiscus toxicus* that causes ciguatera poisoning is considered a warm-water species, and its range is growing as the ocean warms (Kohli et al. 2014; Bravo et al. 2015; Sparrow et al. 2017).
- The Pacific Ocean Blob, discovered by scientists in 2014, has been steadily growing and is now around the same size as Australia. The unnaturally warm water is killing corals and other marine life, and threatens to spawn a warm-water species that could decimate fish populations, threatening and endangering whales, orcas and sea-lions (Mandenberg, 2019).

What is more concerning, is that under 1.5°C to 2°C increase in global temperature, marine heatwaves are expected to be more frequent and severe in the tropics than they are currently, proof that Pacific islands are among the most vulnerable to climate change.

What does the science say?

- Recent marine heatwaves have been caused by anthropogenic temperature increase.
- Globally, marine heatwaves have already doubled in frequency since 1982 and have become longer-lasting, more intense and more extensive (*very likely*), and are more common than in the pre-industrial era.
- Even if warming is limited to 1.5°C, the number of heatwave days is expected to be approximately 16 times higher than in the pre-industrial era.
- However, at 1.5˚C, marine heatwaves are expected to cover a smaller area (25% of the area expected under 3.5°C warming) and last for fewer days at a time. This lowered risk would have significant impacts on Pacific species resilience and survival.

Under future climate change, marine heatwaves will:

- be more frequent,
- be more intense with higher maximum temperature,
- last for a greater number of days, and
- increase in area affected.

About the IPCC SROCC

The full title of the Report is the Special Report on the Ocean and Cryosphere in a Changing Climate. It is often referred to the SROCC, or the report on Climate and Ocean.

- 104 leading scientists who acted as Coordinating Lead Authors, Lead Authors and Review Editors prepared the Report
- The author team were from 36 different countries, 19 of these were developing countries or countries with economies in transition
- 6,981 publications are referenced in the SROCC
- Over 31,000 comments were received in the three reviews of the Report from governments, agencies, NGOs and academia from across 80 countries.

Our Collective Responsibility

Our Pacific Ocean is our collective responsibility, and reporting about stories that can connect your readers to the real life people involved can go a long way in the fight to protect our ocean and our environment.

It may be a challenge trying to translate news from this report into very real news stories for which people can relate to – you may wish to try developing news on your coral reefs, or marine species and speak to your Pacific Meteorologists or those with marine expertise, including that of traditional knowledge.

One impactful way to strengthen your reporting on ocean issues is incorporating scientific definitions, facts, and information. Wherever you can, tie the facts you have read from credible sources like the IPCC to the real life impacts your story is sharing, and the real life experiences of the people whose experiences you are highlighting.

Definitions

Seasonally-varying threshold: A seasonal variation is variation in a time series within one year that is repeated more or less regularly. Seasonal variation may be caused by the temperature, rainfall, public holidays, cycles of seasons or holidays. The threshold of a seasonal variation is the level or point we expect the seasonal variation to change.

Species ranges: area in which a species is found.

Anthropogenic: Resulting from or produced by human beings.

Pre-industrial era: the period of time before there were machines and tools to help perform tasks en masse (between 1750 and 1850).

This factsheet was developed with the Intergovernmental Panel on Climate Change (IPCC)'s Special Report on the Ocean and Cryosphere in a Changing Climate (2019).

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OUR PACIFIC OCEAN, OUR STORIES

Marine Protected Areas & Marine Managed Areas

Nu'ulua and Nu'utele Islands, Aleipata MPA, Samoa © Stuart Chape

Marine Protected Area (MPA) or Marine Managed Area (MMA)?

An MPA is a clearly defined coastal or ocean space, recognised, dedicated and managed, through legal or other means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

An MMA an area which was designed to protect or conserve a specific feature or component of biodiversity, such as shark sanctuaries. Area-based marine conservation contributes to marine conservation, but do not meet the formal definitions of an MPA. However, these smaller MMAs also play an important role in marine conservation.

MPAs restrict human activity for mainly conservation purposes, protecting natural resources, ecosystem services, biodiversity conservation, species protection, as well as sustainable economic growth.

MMAs may include marine reserves, fully protected marine areas, no-take zones, marine sanctuaries, ocean sanctuaries, marine parks, and locally managed marine areas.

Each type has management objectives which determine the levels of protection and activities allowed or prohibited within their boundaries.

Why do we need MPAs and MMAs?

Healthy marine resources require healthy, intact ecosystems. Well managed marine and coastal ecosystems are highly productive and deliver multiple goods and services that support communities and economies.

When MPAs are managed well, we can achieve sustainable use at multiple scales, boost the health of ecosystems, and even reverse the decline of marine biodiversity.

MMAs do not meet the formal definitions of a MPA, protecting a specific component of biodiversity, such as shark sanctuaries, rather than the total protection of an area. However, area-based marine conservation play a significant role in marine conservation.

Establishing networks of smaller MMAs may help to increase connectivity, supporting genetic diversity and migration, while maintaining conservation and fisheries benefits. The implementation of MPA networks that cover all major marine habitats and ecosystems will be a major milestone in restoring and sustaining the health of the oceans.

Effectively managed MPAs and MMAs contribute to food security and livelihoods through the sustainable managing of fisheries industries and biodiversity of the Pacific.

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Benefits of MPAs & MMAs:

- Support the maintenance and protection of biodiversity.
- Provide connecting habitat channels that support species as they grow through natural life cycles and boost genetic diversity of wild species populations.
- Protect critical habitats from damage by destructive fishing practices and other human activities and allowing them to recover.
- Provide areas where young fish can take refuge from predators, reproduce, and grow to adult size.
- Increase fish catches (both size and quantity) in surrounding fishing grounds
- Build resilience against damaging external impacts, such as climate change, by minimising stressors on keystone species that are not mobile in their adult stage, such as corals.
- Maintain carbon sinks, if the managed area contains key blue carbon ecosystems, such as mangroves and seagrass.
- Help to maintain the resources that support local cultures, economies, and livelihoods, including through sustainable wildlife tourism.
- Prevent overfishing and loss of key habitats that severely undermine long-term food security in the region: fisheries are one of the most important ecosystem assets benefiting the Pacific.

Pacific Marine Protected Areas

The Pacific is a world leader in large marine ecosystem protection. The combined MPAs of 14 Pacific countries provide protection of 3.1million square kilometres of the Pacific Ocean, with four countries provide more than 99% of the total MPA area; Cook Islands (64.40%), Palau (16.11%), Kiribati (12.83%), and FSM (5.84%).

With several MPAs in the development phase, the Pacific region has the potential to considerably increase MPA coverage figures in the near future. These include Marae Moana in Cook Islands, Niue Marine Protected Area, and Palau National Marine Sanctuary (due for finalisation in 2020), existing commitments which could see MPA coverage expand to around 18.5%, and Highly Protected MPAs to at least 10% of the EEZs of the 14 Pacific islands by 2030.

This is even before we include French Territories New Caledonia, Pitcairn Islands and French Polynesia. When including these three territories, MPA coverage in the region increases bringing the total regional coverage to around 27% of the combined marine estate.

Pacific Marine Managed Areas

The Pacific also has many examples of traditional boundary-based spatial and temporal management. Communities in the region, generally the customary owners of the land, inshore areas, and natural resources therein, are critical stakeholders to achieve wise resource use and management.

The Pacific Ocean contains over 15 million square kilometres of MMAs protected by SPREP members. To date, the Cook Islands, French Polynesia, Kiribati, New Caledonia, Niue, Palau, and Tahiti have put in place large MMAs, while the United States established the Pacific Remote Islands Marine National Monument. Together, these areas provide a 'blue belt' of protection against impacts on ocean health and marine species.

This includes the extensive network of locally managed coastal and marine areas which cover approximately 12,000 km^2. These community-based systems of marine resource management involve over 500 communities across 15 Pacific island countries and territories and contribute to livelihood and conservation objectives based on customary tenure, traditional knowledge, and governance.

Pacific Islands Protected Area Portal (PIPAP)

The **Pacific Islands Protected Areas Portal (PIPAP)** is a web-based resource managed by SPREP and supported by the EU-OACPS BIOPAMA Programme. The PIPAP aims to facilitate the sharing of resources and expertise among Pacific Islands Protected Area Practitioners, including anyone involved in administering or managing marine (and terrestrial) protected areas.

PIPAPs vision is "to provide a doorway through which Pacific Islands protected area practitioners can share expertise and benefit from opportunities."

The portal provides access to updated national data on marine protected areas, as well supporting tools, resources and up to date news from the region and around the world.

What role can we play?

Setting boundaries alone is not enough. The conservation of marine Biodiversity and the economic benefits that it brings must be supported by robust policies and underpin best practice that protect the ocean ecosystem and builds its resilience. Monitoring and enforcement are key challenges, particularly over vast ocean areas, although emerging technologies are demonstrating their value in this effort.

Find out more about your national and regional marine protected or managed areas. How big are the areas of coverage? When was it established? What species are protected if not all are protected? And what activities, including coastal or river clean ups can you get involved in? Or if there are no activities, organise your own and invite friends, family and community members to join you. It could be a lot of fun!

MPAs and MMAs are important and require a lot of maintenance, management, and resources to be effective. By boosting public awareness as well as community investment into these areas, we can help highlight their benefits, and support local and national government continue to fund support for MPAs and MMAs.

Glossary

Economic Exclusive Zone (EEZ) – a legally recognised area beyond and adjacent to a country which does not extend beyond 200 nautical miles (370.4 kilometres) from the baselines of the coastline of the country.

Marine Protected Areas (MPAs) – areas designed to conserve the totality of nature and ecosystems services within an area.

Marine Managed Areas (MMAs) – areas which are designed to protect a specific feature or conserve a specific component of biodiversity, such as shark sanctuaries.

Highly Protected MPAs – a subset of MPAs where only light extractive activities are allowed, and other impacts are minimized to the extent possible.

Shark Sanctuary – an area that forbids commercial fishing operations from targeting and retaining caught sharks, including their fins.

Carbon sink - any reservoir, natural or otherwise, that absorbs more carbon than it releases, and thereby lowers the concentration of carbon dioxide from the atmosphere. The two most important carbon sinks globally are vegetation and the ocean.

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Restoring coasts for ocean health

© D.McFadzien

What is coastal restoration?

We can restore the health, diversity, and functions provided by coastal ecosystems, including forests and wetlands. Because over one-third of global wetlands have been destroyed since 1970, restoration is needed alongside protection and conservation.[1]

Restoring an ecosystem means removing the pressures that caused the damage in the first place, like dredging or pollution, and supporting the ecosystem as its native inhabitants recover. Sometimes, we need to provide new seedlings or animals to help the recovery along, but we should only put in species that were already present in the past. Unlike a garden where we might plant whatever we want, wherever we want, a restored seagrass bed should have seagrass not coral, and vice versa.

1 *Global Wetland Outlook* (2021), Ramsar Convention

Coastal wetlands also store carbon

Did you know that seagrass beds store 18 per cent of oceanic carbon, at a pace 35 times faster than rainforests? But 7 per cent of seagrass beds are lost each year, the size of a football pitch every 30 minutes.[2]

Coastal marshes, mangroves, and coral reefs are also our allies in the fight against climate change and ocean acidification, even as they are affected by these changes.

2 *Out of the Blue: The Value of Seagrasses to the Environment and to People* (2020), United Nations Environment Programme with GRID-Arendal

Supported by the New Zealand Pacific Partnership on Ocean Acidification.

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How does coastal restoration fight against ocean acidification?

Ocean acidification is happening everywhere. Open ocean acidification is due to human carbon dioxide (CO_2) emissions, whereas coastal acidification is due to our emissions plus many other factors like nutrient inputs and pollution.

In addition to soaking up CO_2, coastal wetlands can also help us reduce nutrient pollution and some of the other drivers of coastal change.

For example, seagrasses are photosynthetic plants, which means that they absorb CO_2 and produce oxygen. By reducing the CO_2 load in the surrounding seawater, seagrasses may locally buffer ocean acidification. They do this while they keep the sediments stable, feed animals like sea turtles and fish, and so much more!

You can join #GenerationRestoration

The United Nations designated this the **Decade on Ecosystem Restoration 2021–2030** and created a **handy playbook** for anyone interested in joining along.

If you want to start your own restoration effort, expert guidance is available. SPREP has produced guidelines for **seagrass restoration** and **mangrove planting** in Kiribati.[3] In addition to SPREP resources, the Society for Ecological Restoration has international principles and standards, and the United States Environmental Protection Agency has published **principles of wetland restoration**.

3 These guidelines were produced through the New Zealand–Pacific Partnership on Ocean Acidification supported by the NZ Ministry of Foreign Affairs and the Principality of Monaco, in partnership with the Pacific Community (SPC) and the University of the South Pacific.

Telling our Pacific Stories

As a reporter or journalist, you play a role in keeping us accountable for actions on our coasts.

- **Share stories about positive coastal actions**. Highlight communities fighting back against poorly planned coastal development. Share stories that support the protection of coastal ecosystems that naturally mitigate[4] ocean acidification as well as stories that promote energy efficiency or clean renewable energy.
- **Ask if an action is restoring a site to the habitat that was historically there**. Challenge projects that make restoration claims while threatening other native ecosystems or that don't track project success into the future.
- **Ask for restoration of your local environment, including coral reefs, seagrass beds, marshes, and mangroves**. Learn to value natural systems around your home.
- **Demand protection and conservation before damage occurs**, in addition to restoration after harm has been done.

4 Coastal and aquatic vegetation, such as mangroves and seagrasses, can sequester carbon. The sediments underneath coastal wetlands are also important for carbon storage, just like soils on land in native landscapes and under regenerative agriculture.

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