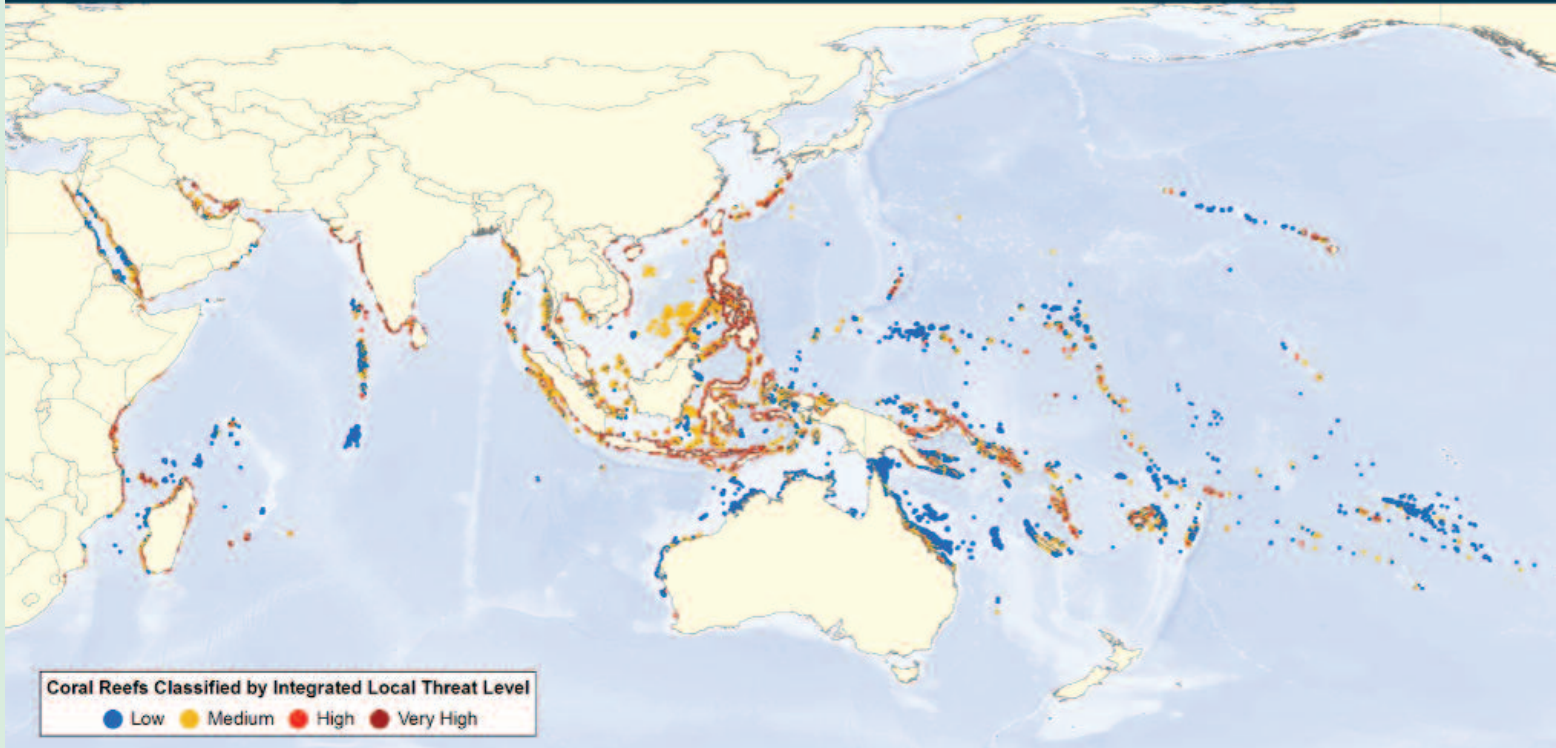


## CORAL REEFS OF THE WORLD CLASSIFIED BY THREAT FROM LOCAL ACTIVITIES



### Coral Reefs Face Increasing Stress from Local Human Activities, Warming Waters, and Ocean Acidification

By: Adrienne Sutton, PhD, NAUI 42005

The vast majority of our oceans' coral reefs are under direct threat from human activities—seventy-five percent of them, to be exact. That's the key finding of the new report *Reefs at Risk Revisited* by the World Resources Institute (WRI), written by an international collaboration of academia, government, and nonprofit organizations. Their conclusions are certain to be unsettling to the recreational diving community and those who care about our oceans.

A closer look reveals that sixty percent of the threat is driven by local stressors, including overfishing and destructive fishing, coastal development, and pollution. The threat jumps to 75 percent when global stressors are taken into account. Those include thermal stress and ocean acidification. The first *Reefs at Risk* report was published in 1998, and since then, the percentage of the world's reefs rated as threatened has increased by 30 percent. This is mainly driven by growing coastal populations and the deleterious fishing practices that come with it, which have increased a shocking 80 percent since 1998.

The findings of this report are robust. WRI assembled a staggering amount of data, including population distribution and growth, location of coastal infrastructure, and observations of coral bleaching. All this data was used to model estimated threat levels worldwide. The map above shows the world's coral reefs classified by current threat levels based on a combination of all the local human stressors alone. Not only is it clear where the biggest pressures lie, such as in Southeast Asia and the Caribbean, but it is clear that even remote reefs systems are threatened too.

Factoring in the impacts of global stressors—ocean warming and acidification—increases the overall threat level, especially when looking into the future. A stressor familiar to many divers is coral bleaching, which occurs when corals are exposed to unusually warm waters. Although reefs can recover

from infrequent and mild bleaching, the report projects that during the 2030s, half of reefs globally will experience thermal stress sufficient to induce severe bleaching in most years. By 2050, that percentage is expected to grow to 95 percent globally.

The other ubiquitous threat is ocean acidification. Carbon dioxide emissions are causing chemical changes in the ocean, including reduced pH and a reduction in the availability of dissolved carbonate, one of the building blocks of coral reefs. Corals live in a thin band around the earth in the tropical and subtropical regions of the oceans where water clarity, temperature, nutrients, and the availability of aragonite (the unique type of calcium carbonate mineral that makes up coral skeletons) are ideal for their growth. By 2030, less than half of the world's reefs are projected to be in areas where aragonite conditions remain ideal, and by 2050, that number is further reduced to 15 percent. These changes will likely impact the delicate balance between reef-building and reef-loss that takes place naturally on coral reefs.

Concerned? Me too. These observations and predictions are dire, and as scuba divers we need to be aware of them. In less than 20 years, WRI predicts that more than 90 percent of the world's reefs will be threatened by both local and global stressors—that's right around the corner. But I believe that the most important message of this report is that we can reduce these threats. Reducing the impact of thermal stress and ocean acidification will require a global effort to reduce carbon dioxide emissions. However, until that global effort exists in earnest, managing local stressors will make coral reefs more resilient to these global pressures. In Australia, where scientists, managers, and policy makers banded together to tackle coral reef conservation and management over three decades ago, coral reefs are escaping the severity of threats felt elsewhere. This example showcases how effective management can lessen our impact on valuable coral reef ecosystems.



Map courtesy of World Resources Institute.

Coral reefs provide habitat for a staggering 25 percent of the world's marine species. They supply seafood—a dietary staple—for millions of people. They protect shores from hurricanes and tsunamis. And support an extensive recreation and tourism industry, which is dependent on dive tourism in many areas. Coral reefs are critically important to many countries and territories, of which many are developing nations grappling with poverty, rapid population growth, limited natural resources, and fragile governments and economies. Countries whose people are highly dependent on these reefs, that have highly threatened reefs, and that lack the adaptive capacity to reduce the threats to reefs remain the most vulnerable to the consequences of coral reef degradation. WRI identifies nine countries that fall into this category: Haiti, Grenada, the Philippines, Comoros, Vanuatu, Tanzania, Kiribati, Fiji, and Indonesia.

My husband and I just returned from our honeymoon in Indonesia—the diverse systems of the Coral Triangle drew us to northern Sulawesi. We chose to stay at a resort that adhered to guidelines keeping environmental impacts to a minimum, employed locals, and supported the efforts of the marine park to conserve local mangrove and coral reef ecosystems. This meant there were only certain fish served at meals, that the towels and sheets only got washed every few days, and that the resort had no white sand beach but instead was surrounded by old growth mangroves. A few minor sacrifices for the local coral reef, but efforts as such help ensure there's a reef to visit in the future. As guests on the reef, scuba divers have a large role to play in the preservation of our beautiful and diverse coral reef ecosystems for the young divers that we are training today. Simple choices—like supporting dive resorts that employ these values and paying your marine park fees—can go a long way to preserving these systems our community cares so much about.

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Children of Pulau Bunaken, Indonesia. About 20,000 local inhabitants directly depend on the nearshore reef waters for their livelihood. Credit: John Meyer

## WHAT ELSE CAN YOU DO?

The following are specific actions you can take as recommended in the WRI report.

### If you live near coral reefs:

- Follow local laws and regulations designed to protect reefs and reef species.
- If you fish, do it sustainably, avoiding rare species, juveniles, breeding animals, and spawning aggregations.
- Avoid causing physical damage to reefs with boat anchors, or by trampling or touching reefs.
- Minimize your indirect impacts on reefs by choosing sustainably caught seafood and reducing household waste and pollution that reaches the marine environment.
- Help improve reef protection by working with others in your area to establish stronger conservation measures, participating in consultation processes for planned coastal or watershed development projects, and supporting local organizations that take care of reefs.
- Tell your political representatives why protecting coral reefs is important.

### If you visit coral reefs:

- Choose sustainably managed, eco-conscious tourism providers.
- Dive and snorkel carefully, to avoid physically damaging reefs.
- Tell people if you see them doing something harmful to reefs.
- Visit and make contributions to Marine Protected Areas to support management efforts.
- Avoid buying souvenirs made from corals and other marine species.

### Wherever you are:

- Choose sustainably caught seafood.
- Avoid buying marine species that are threatened or may have been caught or farmed unsustainably.
- Help to prioritize coral reefs, the environment, and climate change issues within your government.
- Support NGOs that conserve coral reefs and encourage sustainable development in reef regions.
- Educate through example, showing your family, friends, and peers why reefs are important to you.
- Reduce your carbon footprint.

The WRI report is available online as a downloadable pdf file or you can order a free hard copy for your dive shops, students, or your own personal use ([www.wri.org/publication/reefs-at-risk-revisited](http://www.wri.org/publication/reefs-at-risk-revisited)).

### For more information on ocean acidification:

[www.pmel.noaa.gov/co2](http://www.pmel.noaa.gov/co2)  
[www.who.edu/OCB-OA](http://www.who.edu/OCB-OA)  
[www.epoca-project.eu](http://www.epoca-project.eu)