### Coral Reefs Affirmative

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### Summary

Coral Reefs are remarkable natural occurrences which host nearly one quarter of marine life in the oceans. Coral is low nutrient areas of the tropics and provides a home for fish, invertebrates, mollusks and other sea life. Entire ecosystems spring up from the ocean floor. Unfortunately coral reefs are in danger as a number of factors make it harder for coral to grow and survive. Coral reefs are strained by rising ocean temperatures, increasing ocean acidity levels, pollution from human communities and overfishing.

This affirmative case outlines to advantages to preserving coral reefs. First, is maintaining the biodiversity of the oceans. Healthy coral reefs provide the basis of large and varied ecosystems that sustain life throughout the oceans. Additionally, humans who live near coral reefs depend on the sea life living on the reef for food and their local economy. Secondly, coral reefs are a source for medical discoveries. Coral reefs are homes to many rare species that could offer cures to diseases. Diseases kill millions yearly. HIV is one of the largest killers worldwide and new discoveries from coral have offered a possible way to prevent infection.

The affirmative plan is to build artificial reefs and the regrow reefs where possible. A new technology called Biorock allows for coral to be regrown on living coral reefs by using electrical currents to stimulate growth. Artificial reefs can also be used to mimic the benefits of coral reefs and restore biodiversity to areas that fish have left.

### Glossary

Biodiversity- the degree of variation of life. This can refer to genetic variation, species variation, or ecosystem variation within an area, biome, or planet.

Bioprospecting- the search for plant and animal species from which medicinal drugs and other commercially valuable compounds can be obtained.

Coral reefs are formed from layers of calcium carbonate deposited over time by colonies of individual corals. These reefs provide homes for tens of thousands of species of marine plants and animals, making them among the world’s most diverse and productive habitats. Nearly one-third of all fish species live on coral reefs,1 while other species depend on the reefs and nearby seagrass beds and mangrove forests for critical stages of their life cycles.

Ecosystem- community of living organisms in conjunction with the nonliving components of their environment, interacting as a system. These biotic and abiotic components are regarded as linked together through nutrient cycles and energy flows.

#### Where can reefs be found?



### Coral Reefs 1AC

#### Coral Reefs are dying now due to a variety of factors.

#### Human decisions are contributing to the rapid decline of coral reefs around the world. Their extinction is likely in the status quo and will occur in the next few decades unless action is taken.

Plummer, senior editor at Vox.com, 2014

[Bradley. “Caribbean coral reefs could disappear "within a few decades” 7/7/14 http://www.vox.com/2014/7/7/5876909/caribbean-coral-reefs-could-disappear-within-a-few-decades]

Coral reefs in the Caribbean are on track to "virtually disappear within a few decades," a major new report warns. But there's also a way to slow decline. Protecting just a single fish — the brightly colored parrotfish — could help save the reefs from doom.

There's little doubt that the Caribbean's coral reefs have declined sharply since the 1970s, under heavy stress from invasive pathogens, overfishing, coastal pollution, tourism, and now global warming that's heating up the oceans.

It's reached the point that many conservation groups have given up hope for the Caribbean and are shifting their attention to protecting coral reefs elsewhere.

But it may be too early to give up altogether. The new report, from the Global Coral Reef Monitoring Network, takes an in-depth look at the decline of the Caribbean coral reefs between 1975 and 2012. While the authors find that the situation is indeed bleak, they also outlines a series of steps that could halt the destruction.

Crucially, the report recommends new protections for the region's parrotfish, which has long played a vital role in eating up algae that threatens to overrun the reefs (the parrotfish's feeding habits also help replenish coral sand). In recent decades, the parrotfish has been a victim of overfishing — and coral reefs have suffered as a result.

Reversing that trend, the report notes, would be a crucial step, not least given the central role that reefs play in the region — from supporting tourism to nurturing fisheries to protecting against hurricanes and other storms.

### Coral Reefs 1AC

#### Coral Reefs are hosts of diverse life and biodiversity but delicate and susceptible to environmental tolls.

Agardy, Executive Director Sound Seas and PhD Biological Sciences, 2013

(Tundi, “America’s Coral Reefs: Awash with Problems”, Nove 27, Issues, http://issues.org/20-2/agardy-2/)

How can this be happening to one of our greatest natural treasures? Reefs are important recreational areas for many and are loved even by large portions of the public who have never had the opportunity to see their splendor firsthand. Coral reefs are sometimes referred to as the “rainforests of the sea,” because they teem with life and abound in diversity. But although only a small number of Americans have ever had rainforest experiences, many more have had the opportunity to dive and snorkel in nearshore reef areas. And in contrast to the obscured diversity of the forests, the gaudily colored fish and invertebrates of the reef are there for anyone to see. Once they have seen these treasures, the public becomes transformed from casual observers to strong advocates for their protection. This appeal explains why many zoos have rushed in recent years to display coral reef fishes and habitats, even in inland areas far from the coasts (such as Indianapolis, site of one of the largest of the country’s public aquaria). Coral reefs have local, national, and even global significance.

Even when one looks below the surface (pun intended) of the aesthetic appeal of reefs, it is easy to see why these biological communities command such respect. Coral reefs house the bulk of known marine biological diversity on the planet, yet they occur in relatively nutrient-poor waters of the tropics. Nutrient cycling is very efficient on reefs, and complicated predator-prey interactions maintain diversity and productivity. But the fine-tuned and complex nature of reefs may spell their doom: Remove some elements of this interconnected ecosystem, and things begin to unravel. Coral reefs are one of the few marine habitats that undergo disturbance-induced phase shifts: an almost irreversible phenomenon in which diverse reef ecosystems dominated by stony corals dramatically turn into biologically impoverished wastelands overgrown with algae. Worldwide, some 30 percent of reefs have been destroyed in the past few decades, and another 30 to 50 percent are expected to be destroyed in 20 years’ time if current trends continue. In the Caribbean region, where many of the reefs under U.S. jurisdiction can be found, coral cover has been reduced by 80 percent during the past three decades.

### Coral Reefs 1AC

#### The Case for preserving coral reefs.

#### First, coral reefs are necessary to support ocean life. Coral reefs are the rainforests of the ocean. They support life throughout the ocean, as well as humans who live nearby with food and jobs.

Peel, writer for Planet Earth Online, 2013

[Alex. “Scientists call for Global Action on Coral Reefs” Planet Earth Online, 8/13/13. http://planetearth.nerc.ac.uk/news/story.aspx?id=1507&cookieConsent=A)

“The balance between reef growth and reef erosion is changing as we alter the environment,” says Dr Emma Kennedy of the University of Exeter, who led the study.¶

“This means that increasingly, some reefs are breaking down faster than they can replace themselves—essentially they’re being worn away.”¶

 As corals grow they produce limestone skeletons which build up over time into vast reefs. They provide a natural breakwater and a complex three-dimensional habitat, making an ideal home for a vast array of marine species.¶

“Healthy reefs are the rainforests of the sea,” says Kennedy. “They provide habitat for over a quarter of all marine species, including many colorful fish and corals.” “They also provide a range of vital benefits to humanity, like food, jobs and protection from the sea. Globally, over half a billion people rely on reef services to some¶ extent.”¶

In the Caribbean alone, coral reefs are thought to be worth $3.1–4.6 billion every year. But serious local and global pressures are causing corals around the world to fall into ill health.¶

Locally, they’re suffering from nutrient pollution, overfishing and an influx of reef-smothering sediments from coastal developments.¶

Pacific reefs have also fallen victim to plagues of coral-eating starfish, whose larvae thrive in nitrogen washed into the sea from farms on land. Australian authorities estimate that 35 percent of the Great Barrier Reef ’s coral cover has been lost to crown-of-thorns starfish in the past 25 years. They’re warning that a new outbreak could be on the way this year.¶

### Coral Reefs 1AC

#### Coral Reefs provide the building blocks for life throughout the ocean. Loss of coral reefs threatens the health of the global oceans.

Craig, Associate Dean for Environmental Programs @ Florida State, 2003

(Robin Kundis Craig, “ARTICLE: Taking Steps Toward Marine Wilderness Protection? Fishing and Coral Reef Marine Reserves in Florida and Hawaii,” McGeorge Law Review, Winter 2003, 34 McGeorge L. Rev. 155)

Biodiversity and ecosystem function arguments for conserving marine ecosystems also exist, just as they do for terrestrial ecosystems, but these arguments have thus far rarely been raised in political debates. For example, besides significant tourism values - the most economically valuable ecosystem service coral reefs provide, worldwide - coral reefs protect against storms and dampen other environmental fluctuations, services worth more than ten times the reefs' value for food production. [n856](http://www.lexisnexis.com.proxy.library.emory.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1348077471187&returnToKey=20_T15565363878&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.167770.63840861383#n856) Waste treatment is another significant, non-extractive ecosystem function that intact coral reef ecosystems provide. [n857](http://www.lexisnexis.com.proxy.library.emory.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1348077471187&returnToKey=20_T15565363878&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.167770.63840861383#n857) More generally, "ocean ecosystems play a major role in the global geochemical cycling of all the elements that represent the basic building blocks of living organisms, carbon, nitrogen, oxygen, phosphorus, and sulfur, as well as other less abundant but necessary elements." [n858](http://www.lexisnexis.com.proxy.library.emory.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1348077471187&returnToKey=20_T15565363878&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.167770.63840861383#n858) In a very real and direct sense, therefore, human degradation of marine ecosystems impairs the planet's ability to support life.

Maintaining biodiversity is often critical to maintaining the functions of marine ecosystems. Current evidence shows that, in general, an ecosystem's ability to keep functioning in the face of disturbance is strongly dependent on its biodiversity, "indicating that more diverse ecosystems are more stable." [n859](http://www.lexisnexis.com.proxy.library.emory.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1348077471187&returnToKey=20_T15565363878&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.167770.63840861383#n859) Coral reef ecosystems are particularly dependent on their biodiversity. [\*265]
Most ecologists agree that the complexity of interactions and degree of interrelatedness among component species is higher on coral reefs than in any other marine environment. This implies that the ecosystem functioning that produces the most highly valued components is also complex and that many otherwise insignificant species have strong effects on sustaining the rest of the reef system. [n860](http://www.lexisnexis.com.proxy.library.emory.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1348077471187&returnToKey=20_T15565363878&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.167770.63840861383#n860). Thus, maintaining and restoring the biodiversity of marine ecosystems is critical to maintaining and restoring the ecosystem services that they provide. Non-use biodiversity values for marine ecosystems have been calculated in the wake of marine disasters, like the Exxon Valdez oil spill in Alaska. [n861](http://www.lexisnexis.com.proxy.library.emory.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1348077471187&returnToKey=20_T15565363878&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.167770.63840861383#n861) Similar calculations could derive preservation values for marine wilderness.

However, economic value, or economic value equivalents, should not be "the sole or even primary justification for conservation of ocean ecosystems. Ethical arguments also have considerable force and merit." [n862](http://www.lexisnexis.com.proxy.library.emory.edu/lnacui2api/frame.do?reloadEntirePage=true&rand=1348077471187&returnToKey=20_T15565363878&parent=docview&target=results_DocumentContent&tokenKey=rsh-20.167770.63840861383#n862) At the forefront of such arguments should be a recognition of how little we know about the sea - and about the actual effect of human activities on marine ecosystems. The United States has traditionally failed to protect marine ecosystems because it was difficult to detect anthropogenic harm to the oceans, but we now know that such harm is occurring - even though we are not completely sure about causation or about how to fix every problem. Ecosystems like the NWHI coral reef ecosystem should inspire lawmakers and policymakers to admit that most of the time we really do not know what we are doing to the sea and hence should be preserving marine wilderness whenever we can - especially when the United States has within its territory relatively pristine marine ecosystems that may be unique in the world.

### Coral Reefs 1AC

#### Loss of coral and diminished biodiversity has ripple effects through the ecosystem making it harder to adapt and recover from future crises like hurricanes and disease spread. Healthy coral is crucial to preserve healthy human communities.

Mittermeier et al, Ph.D. from Harvard in Biological Anthropology and serves as an Adjunct Professor at the State University of New York at Stony Brook, 2011

[Dr. Russell Alan. “Global Biodiversity Conservation: The Critical Role of Hotpots, Biodiversity Hotspots, Ed. Zachos & Habel, 2011. Pg 4-6. Available via GoogleBooks]

Extinction is the gravest consequence of the biodiversity crisis, since it is irreversible. Human activities have elevated the rate of species extinctions to a¶ thousand or more times the natural background rate (Pimm et al. 1995). What are the¶ consequences of this loss? Most obvious among them may be the lost opportunity¶ for future resource use. Scientists have discovered a mere fraction of Earth’s species¶ (perhaps fewer than 10%, or even 1%) and understood the biology of even fewer¶ (Novotny et al. 2002). As species vanish, so too does the health security of every human. Earth’s species are a vast genetic storehouse that may harbor a cure for¶ cancer, malaria, or the next new pathogen—cures waiting to be discovered.¶ Compounds initially derived from wild species account for more than half of all¶ commercial medicines—even more in developing nations (Chivian and Bernstein¶ 2008). Natural forms, processes, and ecosystems provide blueprints and inspiration¶ for a growing array of new materials, energy sources, hi-tech devices, and¶ other innovations (Benyus 2009). The current loss of species has been compared¶ to burning down the world’s libraries without knowing the content of 90% or¶ more of the books. With loss of species, we lose the ultimate source of our crops¶ and the genes we use to improve agricultural resilience, the inspiration for¶ manufactured products, and the basis of the structure and function of the ecosystems¶ that support humans and all life on Earth (McNeely et al. 2009). Above and beyond¶ material welfare and livelihoods, biodiversity contributes to security, resiliency,¶ and freedom of choices and actions (Millennium Ecosystem Assessment 2005).¶ Less tangible, but no less important, are the cultural, spiritual, and moral costs¶ inflicted by species extinctions. All societies value species for their own sake,¶ and wild plants and animals are integral to the fabric of all the world’s cultures¶ (Wilson 1984).

The road to extinction is made even more perilous to people by the loss of the broader ecosystems that underpin our livelihoods, communities, and economies(McNeely et al.2009). The loss of coastal wetlands and mangrove forests, for example, greatly exacerbates both human mortality and economic damage from tropical cyclones (Costanza et al.2008; Das and Vincent2009), while disease outbreaks such as the 2003 emergence of Severe Acute Respiratory Syndrome in East Asia have been directly connected to trade in wildlife for human consumption(Guan et al.2003). Other consequences of biodiversity loss, more subtle but equally damaging, include the deterioration of Earth’s natural capital. Loss of biodiversity on land in the past decade alone is estimated to be costing the global economy $500 billion annually (TEEB2009). Reduced diversity may also reduce resilience of ecosystems and the human communities that depend on them. For example, more diverse coral reef communities have been found to suffer less from the diseases that plague degraded reefs elsewhere (Raymundo et al.2009). As Earth’s climate changes, the roles of species and ecosystems will only increase in their importance to humanity (Turner et al.2009).¶

### Coral Reefs 1AC

#### Second, Coral Reefs hold the key to unlocking medical cures for a number of diseases. Cures and compounds are found in reefs that exist nowhere else in the world.

National Oceanic and Atmospheric Administration , 2011

(“Medicine”, <http://coralreef.noaa.gov/aboutcorals/values/medicine/>, 6/24/14, AVEN)

The genetic diversity found in coral ecosystems is unparalleled and this diversity has proven beneficial for humans through the identification of potentially beneficial chemical compounds and through the development of medicines, both derived from organisms found in coral ecosystems.**¶**

Many species found in coral ecosystems produce chemical compounds for defense or attack, particularly the slow-moving or stationary species like nudibranchs and sponges. Searching for potential new pharmaceuticals, termed bioprospecting, has been common in terrestrial environments for decades. [a] In fact, nearly half of the medicines in use today have their origins in natural products, mostly derived from terrestrial plants, animals, and microorganisms. [b] However, bioprospecting is relatively new in the marine environment and is nowhere close to realizing its full potential. [a] Creatures found in coral ecosystems are important sources of new medicines being developed to induce and ease labor; treat cancer, arthritis, asthma, ulcers, human bacterial infections, heart disease, viruses, and other diseases; as well as sources of nutritional supplements, enzymes, and cosmetics. [b] The medicines and other potentially useful compounds identified to date have led to coral ecosystems being referred to as the medicine cabinets of the 21st century by some, and the list of approved and potential new drugs is ever growing.¶

### Coral Reefs 1AC

#### For example, coral reefs offer a unique protein to prevent the spread of HIV.

Lamontagne, Member of American Society for Biochemistry and Molecular Biology, 2014

(Nancy, 4/29/14, EurekAlert!, "Coral reefs provide potent new anti-HIV proteins,"www.eurekalert.org/pub\_releases/2014-04/asfb-crp042814.php, 6/24/14, AF).

Researchers have discovered a new class of proteins capable of blocking the HIV virus from penetrating T-cells, raising hope that the proteins could be adapted for use in gels or sexual lubricants to provide a potent barrier against HIV infection.The proteins, called cnidarins, were found in a feathery coral collected in waters off Australia's northern coast. Researchers zeroed in on the proteins after screening thousands of natural product extracts in a biorepository maintained by the National Cancer Institute. "It's always thrilling when you find a brand-new protein that nobody else has ever seen before," said senior investigator Barry O'Keefe, Ph.D., deputy chief of the Molecular Targets Laboratory at the National Cancer Institute's Center for Cancer Research. "And the fact that this protein appears to block HIV infection—and to do it in a completely new way—makes this truly exciting."In the global fight against AIDS, there is a pressing need for anti-HIV microbicides that women can apply to block HIV infection without relying on a man's willingness to use a condom. Koreen Ramessar, Ph.D., a postdoctoral research fellow at the National Cancer Institute and a member of the research team, said cnidarins could be ideally suited for use in such a product because the proteins block HIV transmission without encouraging the virus to become resistant to other HIV drugs."When developing new drugs, we're always concerned about the possibility of undermining existing successful treatments by encouraging drug resistance in the virus," said O'Keefe. "But even if the virus became resistant to these proteins, it would likely still be sensitive to all of the therapeutic options that are currently available."The research team identified and purified the cnidarin proteins, then tested their activity against laboratory strains of HIV. The proteins proved astonishingly potent, capable of blocking HIV at concentrations of a billionth of a gram by preventing the first step in HIV transmission, in which the virus must enter a type of immune cell known as the T-cell."We found that cnidarins bind to the virus and prevent it from fusing with the T-cell membrane," said Ramessar. "

### Coral Reefs 1AC

#### HIV is the world’s leading infectious killer- without a way to stop infections, millions will continue to die.

#### US Department of Health and Human Services, No Date Given

(U.S. Department of Health & Human Services, “Global AIDS Overview”, <http://aids.gov/federal-resources/around-the-world/global-aids-overview/>, 6/29/14, ML)

35.3 million people worldwide are currently living with HIV/AIDS, including 2.1 million adolescents (10-19 years).HIV is the world’s leading infectious killer. According to the World Health Organization (WHO), an estimated 36 million people have died since the first cases were reported in 1981 and 1.6 million people died of HIV/AIDS in 2012. According to WHO, an estimated 3.34 million children worldwide are living with HIV. Most of these children live in sub-Saharan Africa and were infected by their HIV-positive mothers during pregnancy, childbirth or breastfeeding. Over 700 children become newly infected with HIV each day.

### Coral Reefs 1AC

#### To address these issues we offer the following plan

The United States federal government should create a system of artificial reefs that include live coral.

**Reefs can be rebuilt and restored.**

#### Artificial Reefs provide an easy way to create more coral reefs, restoring biodiversity in areas that fish had fled.

Environmental Protection Agency, 2014

(United States Environmental Protection Agency, “What Are Artificial Reefs and Where Are They Located in the Mid-Atlantic?”, <http://www.epa.gov/reg3esd1/coast/reefs.htm>, 6/25/14, AEG)

Reefs provide a home for fish and other ocean wildlife. Once an artificial reef is placed on the ocean floor, various encrusting organisms such as corals and sponges start covering the material. Then small animals take up residence, and as the small animals become abundant, larger animals are attracted. After a time it is hard to tell an artificial reef from a natural reef. Many different types of materials can serve as artificial reefs. The bodies of cars, trucks, subway cars, and military tanks have been used, as well as bridge rubble, barges, boats, submarines, planes, and large cable. In August 2001, New York City subway cars were slid off a barge into the Atlantic Ocean ten miles east of Rehoboth Beach, Delaware. The cars, positioned in approximately 80 feet of water, became an artificial reef. Dives by the EPA Mid-Atlantic Region [Scientific Dive Unit](http://www.epa.gov/reg3esd1/coast/scuba.htm) have confirmed that the cars are still intact, well covered by growth, and surrounded by fish such as flounder, tog, and shark. Because of the success of the 2001 program, additional New York City subway cars have been placed off the coast. For example, in November 2008, more than 40 subway cars were placed in the Atlantic Ocean approximately 10 miles southeast of Ocean City, Maryland. The cars will serve as artificial reefs, which are critical in supporting a diversity of species along the Maryland coast. This is the second time in the past six months where partners of the [Maryland Artificial Reef Initiative](http://www.dnr.state.md.us/fisheries/reefs/)(including NYC transit) placed subway cars in the Atlantic Ocean to create deep water artificial reefs. There are plans to create up to a 600 car matrix off of Ocean City’s coast. Members of EPA's [Coastal Science Team](http://www.epa.gov/reg3esd1/coast/team.htm) were consulted regarding the proper cleaning and removal of parts in the subway cars prior to placement. The national story was recently the focus of a [NBC Nightly News Special report (video)](http://www.msnbc.msn.com/id/3032619/#27858304).Artificial reefs are especially important in the marine waters of the mid-Atlantic. Years ago the natural bottom near shore had crevices in which fish could breed and hide. Today, however, widespread development has increased runoff from the land. This has resulted in large quantities of silt and sand being deposited into the water, making the near-shore bottom flat. Artificial reefs provide a way to bring fish and other ocean creatures back into an area.

### Coral Reefs 1AC

#### New technology allows for live coral to be grown on artificial structures and overcome the pollutants that kill natural coral.

Goreau and Hilberts, President of the Global Coral Reef Alliance and Sr. Research Scientist in Marine Sciences at University of Texas, 2005

[Thomas J. and Wolf. “Marine Ecosystem Restoration: Costs and Benefits for Coral Reefs” <http://www.globalcoral.org/wp-content/uploads/2013/04/WRR_Goreau_Hilbertz_2005.pdf>]

All marine ecosystems are being degraded by human activities. Destructive impacts include over-fishing, introduction of exotic species and parasites, new emerging diseases, chemicals with negative biological impacts, over-fertilization by nutrients from sewage, fertilizers, and wastes, deforestation and soil erosion, global warming, changes in ocean circulation driven by human induced climate change, and destruction of coral reefs and oyster reefs that create habitat for the richest marine ecosystems and wave-resistant barriers that protect coastlines. Coral reefs, the most vulnerable ecosystem to global warming and reduced coastal water quality, are rapidly vanishing worldwide, causing serious damage to biodiversity, fisheries, tourism, sand supplies, and coastal protection in over 100 countries. The sources of negative impacts are highly diverse, widespread, geographically remote from the ecosystems affected, and closely linked to population densities and fundamental economic activities (like energy use, industry, agriculture, land management, waste disposal, and fisheries). Unless they are all abated simultaneously there is little possibility for critical marine ecosystems and species to recover naturally. Therefore active global ecosystem restoration strategies are urgently needed to prevent crippling economic losses to marine biodiversity, fisheries, tourism, and coastal resources. Conventional reef restoration methods fail when water quality deteriorates or temperatures increase. Biorock electrolytic technology uniquely maintains healthy coral and fish populations under high temperatures and reduced water quality that are normally fatal. Low voltage direct electrical current provides calcareous substrate for corals (or oysters) to settle on and gives coral energy to grow it's skeleton, leaving the coral with more metabolic energy for growth, reproduction, and resisting environmental stress. Reefs can be restored in locations where they can no longer grow due to global warming and pollution, helping rebuild fisheries and protecting coastlines from erosion from sea level rise and increasing storm strength. Biorock methods are the best hope for preserving coral reef ecosystems, managing reef fisheries sustainably, and protecting tropical coastlines from erosion by accelerating global warming, sea level rise, emerging diseases, watershed erosion, coastal pollution, and eutrophication threats. Estimated costs for globally comprehensive emergency rescue operations are shown to be far cheaper than alternative restoration methods or "letting nature take its course".

### Answers to: Oceans not at Risk

#### [\_\_\_]

#### [\_\_\_] Loss of ocean biodiversity collapses ecosystems --- can’t adapt to changing conditions, like climate change

McCook et al, Ph.D. Manager, Research and Monitoring Coordination --- Pew Institute for Ocean Science, 2007

(Laurence J Ecological resilience, climate change and the Great Barrier Reef, http://www.gbrmpa.gov.au/\_\_data/assets/pdf\_file/0020/22592/chapter04-ecological-resilience.pdf)

Marine ecosystems with high biological diversity will generally be relatively resilient, largely because they will have more diverse responses and capacities available to them, which can provide the basis for adaptation to new threats such as climate change47. This diversity may be at a range of levels, including genetic diversity within species, diversity of species within guilds (functional groups, such as corals or herbivores), trophic diversity, and complexity and diversity of habitats. For example, genetic diversity within a coral species, or diversity of the symbiotic zooxanthellae within a coral population, may provide greater capacity for the coral population to survive diverse stresses, and increase the likelihood of some individuals surviving a particular bleaching event4. Different species and morphologies of coral have different susceptibilities to temperature-induced bleaching and to other threats; a reef dominated by a few coral types may be more vulnerable to widespread damage than a more diverse reef46. A reef with a diverse range of herbivores will have greater capacity to remove or prevent outbreaks of different types of algae6, and will be less vulnerable to events such as the disease outbreak that killed Diadema sea urchins in the Caribbean. Diversity of habitats within an ecosystem increases the likelihood of some habitats being less severely impacted by particular stresses or disturbances47. For example, shallow reefs are often more vulnerable to storm damage and to coral bleaching. Deeper reef areas or areas with more complex topography may provide refuges that can be a source population for repopulating damaged areas. Diversity within guilds has two aspects that underpin resilience: redundancy and response diversity. Redundancy74,70,6 describes the capacity of one species to functionally compensate for the loss of another within a functional group. Some species that seem unimportant may become critical for reorganisation when conditions change, whether slowly (eg increasing seawater temperature, accumulation of nutrients) or abruptly (eg crown-of-thorns or disease out-breaks, hurricanes, bleaching events). Thus, in the Caribbean herbivore example, the presence of sea urchins suppressed algal overgrowth, even when herbivorous fishes were overexploited. The critical importance of herbivorous fishes only became apparent when disease wiped out the sea urchins33, 8.

### Answers to: Biodiversity not important

[\_\_\_]

#### [\_\_\_] Coral reefs are uniquely important. The death of Reef Species- It causes a chain reaction that affects the whole ocean

Committee on Marine Biotechnology, 02

(Committee on Marine Biotechnology: Biomedical Applications of Marine Natural Products, National Research ¶ Council, “Marine Biotechnology in the Twenty-First Century: Problems, Promise, and Products”, pg. 88, AEG)

Despite a significant human dependence on and concerns for coral reef ecosystems, compelling ¶ scientific evidence indicates that current human use and allocation of reef resources are threatening ¶ both the ecological and the social sustainability of these ecosystems. Increased harvest pressure¶ is being placed on reef resources to supply subsistence fisheries as well as a growing international ¶ demand for reef species for food, traditional medicines, and ornaments. Unfortunately, few countries ¶ have sufficient knowledge, financial resources, or technical expertise to develop management plans ¶ for the sustainable harvest of reef species, and organisms are often extracted unsustainably for short-¶ term economic gains. Although several coral reef species have yielded potential therapeutic agents, ¶ concern about adequate supply for preclinical and clinical studies is a critical issue in the development ¶ of new biomedical products. Many of the suitable reef species have a limited distribution or occur at ¶ a low biomass. Also, individuals often contain only trace amounts of the desired compounds; the low ¶ yield requires the harvest of substantial biomass, which may lead to depletion of natural populations¶ (Creswell, 1995). Many species extinctions are predicted in the coming decades in response to ¶ increasing pressure from human activities and natural disturbances, and the pharmacological potential ¶ of coral reefs may be lost. The continued, largely unregulated, and unsustainable extraction of reef¶ species may have consequences that extend far beyond the overexploitation of these organisms, as ¶ their removal may also affect associated species and communities, ecological processes, and even ¶ entire ecosystems that are critical to the overall health of the oceans.

### Answers to: Biodiversity not important

#### [\_\_\_]

#### [\_\_\_] Low Biodiversity requires attention now-We are on a fast track to a very costly and more possibly, an irreversible effect.

Shah, Writer at Global Issues, 2014

(Anup Shah, 1/19/14, Global Issues, “Loss of Biodiversity and Extinctions”, <http://www.globalissues.org/article/171/loss-of-biodiversity-and-extinctions#globalissues-org> , 6/25/14, SJ)

If ecosystems deteriorates to an unsustainable level, then the problems resulting can be very expensive, economically, to reverse.¶ In Bangladesh and India, for example, logging of trees and forests means that the floods during the monsoon seasons can be very deadly. Similarly, many avalanches, and mud slides in many regions around the world that have claimed many lives, may have been made worse by the clearing of so many forests, which provide a natural barrier, that can take the brunt of such forces.¶ As the Centre for Science and Environment mentions, factors such as climate change and environmental degradation can impact regions more so, and make the impacts of severe weather systems even worse than they already are. As they further point out, for poor regions, such as Orissa in India, this is even more of a problem.¶ Vanishing coral reefs, forests and other ecosystems can all take their toll and even make the effects of some natural events even worse.¶ The cost of the effects together with the related problems that can arise (like disease, and other illness, or rebuilding and so on) is much more costly than the maintenance and sustainable development practices that could be used instead.¶ As an example, and assuming a somewhat alarmist scenario, if enough trees and forests and related ecosystems vanish or deteriorate sufficiently:¶ Then the oxygen-producing benefits from such ecosystems is threatened.¶ The atmosphere would suffer from more pollution.¶ The cost to tackle this and the related illnesses, problems and other cascading effects would be enormous (as it can be assumed that industrial pollution could increase, with less natural ecosystems to “soak” it up)¶

### Answers to Coral Reefs are Resilient

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#### [\_\_\_] Coral reefs can no longer be considered resilient – many have already died off, and the rest are in grave danger.

Agardy, Executive Director Sound Seas and PhD Biological Sciences, 2013

(Tundi, “America’s Coral Reefs: Awash with Problems”, Nove 27, Issues, http://issues.org/20-2/agardy-2/)

Government must acknowledge the magnitude of the crisis and fully engage the scientific and conservation communities in efforts to solve it. America’s coral reefs are in trouble. From the disease-ridden dying reefs of the Florida Keys, to the overfished and denuded reefs of Hawaii and the Virgin Islands, this country’s richest and most valued marine environment continues to decline in size, health, and productivity. How can this be happening to one of our greatest natural treasures? Reefs are important recreational areas for many and are loved even by large portions of the public who have never had the opportunity to see their splendor firsthand. Coral reefs are sometimes referred to as the “rainforests of the sea,” because they teem with life and abound in diversity. But although only a small number of Americans have ever had rainforest experiences, many more have had the opportunity to dive and snorkel in nearshore reef areas. And in contrast to the obscured diversity of the forests, the gaudily colored fish and invertebrates of the reef are there for anyone to see. Once they have seen these treasures, the public becomes transformed from casual observers to strong advocates for their protection. This appeal explains why many zoos have rushed in recent years to display coral reef fishes and habitats, even in inland areas far from the coasts (such as Indianapolis, site of one of the largest of the country’s public aquaria). Coral reefs have local, national, and even global significance. Even when one looks below the surface (pun intended) of the aesthetic appeal of reefs, it is easy to see why these biological communities command such respect. Coral reefs house the bulk of known marine biological diversity on the planet, yet they occur in relatively nutrient-poor waters of the tropics. Nutrient cycling is very efficient on reefs, and complicated predator-prey interactions maintain diversity and productivity. But the fine-tuned and complex nature of reefs may spell their doom: Remove some elements of this interconnected ecosystem, and things begin to unravel. Coral reefs are one of the few marine habitats that undergo disturbance-induced phase shifts: an almost irreversible phenomenon in which diverse reef ecosystems dominated by stony corals dramatically turn into biologically impoverished wastelands overgrown with algae. Worldwide, some 30 percent of reefs have been destroyed in the past few decades, and another 30 to 50 percent are expected to be destroyed in 20 years’ time if current trends continue. In the Caribbean region, where many of the reefs under U.S. jurisdiction can be found, coral cover has been reduced by 80 percent during the past three decades.

### Answers to Coral Reefs are Resilient

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#### [\_\_\_] Coral reefs react quickly to environmental changes like fertilizer dumping.

Swart, Professor of Marine Geosciences at University of Miami, 2013

(Peter, Nature Education, “Coral Reefs: Canaries of the Sea, Rainforests of the Oceans”, <http://www.nature.com/scitable/knowledge/library/coral-reefs-canaries-of-the-sea-rainforests-97879685>, 6/26/14)

Corals reefs are communities of organisms in which corals (members of the phylum Cnidaria) provide the dominant structural elements. They are known to need a range of specific conditions, such as clear agitated waters of normal salinity, free from sediment, and a temperature between about 18 and 30oC. Withinthe structure of the coral reefs, members of almost every phyla of plants and animals live and die, adding particles and organic material to the sediment, and contributing to the efficient functioning of the coral reef ecosystem. It is estimated that about 25% of all marine species are found in coral reefs. The paradox of coral reefs is that, although they are highly diverse ecosystems, contain an abundance of organic material, and are highly productive, they exist in essentially oligotrophic environments. The analogy is often drawn to tropical rainforests, which are also extremely diverse and exist in nutrient poor conditions. The key to the existence of coral reefs rests in the rapid recycling of nutrients between all the components of the community. If this balance is disturbed — for example by the addition of nutrients in excess from an outside source — the ecosystem frequently declines.

### Answers to: Bioprospecting fails

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#### [\_\_\_] Coral reefs are unique areas where intense pockets of biodiversity make searching for drugs effective.

**Bruckner, Ph.D. Coral Reef Ecologist, 2013**

(Andrew, 11/27/13, Issues, "Life-Saving Products from Coral Reefs,"issues.org/18-3/p\_bruckner/, 6/24/14, AF).

The prospect of finding a new drug in the sea, especially among coral reef species, may be 300 to 400 times more likely than isolating one from a terrestrial ecosystem. Although terrestrial organisms exhibit great species diversity, marine organisms have greater phylogenetic diversity, including several phyla and thousands of species found nowhere else. Coral reefs are home to sessile plants and fungi similar to those found on land, but coral reefs also contain a diverse assemblage of invertebrates such as corals, tunicates, molluscs, bryozoans, sponges, and echinoderms that are absent from terrestrial ecosystems. These animals spend most of their time firmly attached to the reef and cannot escape environmental perturbations, predators, or other stressors. Many engage in a form of chemical warfare, using bioactive compounds to deter predation, fight disease, and prevent overgrowth by fouling and competing organisms. In some animals, toxins are also used to catch their prey. These compounds may be synthesized by the organism or by the endosymbiotic microorganisms that inhabit its tissues, or they are sequestered from food that they eat. Because of their unique structures or properties, these compounds may yield life-saving medicines or other important industrial and agricultural products.

### Answers to: Bioprospecting fails

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#### [\_\_\_] Now is the time to explore corals’ healing properties—climate change disrupts ecosystems

The Nature Conservancy, 14 (Protecting Reefs for Human and Maine Health, <http://www.nature.org/ourinitiatives/habitats/oceanscoasts/explore/coral-reefs-and-medicine.xml>, 6/24/14, AVEN)

Climate change is already affecting the health of coral ecosystems. Microbial communities — where many new drugs could likely be found — are especially susceptible to these changes, and some are already beginning to decline or migrate. ¶ “An estimated 95 percent of the world’s oceans remain unexplored, so it’s possible that we might lose significant marine organisms without ever knowing they existed in the first place,” explains Stephanie Wear, a marine scientist on the Conservancy’s Global Marine Team. “A devastating loss of biodiversity could mean that fewer species will be around for future medicinal research and biomedical studies.” ¶ By protecting marine environments through the creation of marine protected areas and the development of adaptation strategies, the Conservancy is safeguarding marine biodiversity. People and nature are already benefitting in so many ways from these marine protected areas. Just imagine what medical benefits may still lay undiscovered beneath the sea.

### Answers to: Prevention Solves HIV

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#### [\_\_\_] Huge risk of HIV pandemic—drug resistant strains

Cooper, health reporter for the Independent, 14

(Charlie, 5/22/14, The Independent, “Drug-resistant HIV pandemic is a 'real possibility', expert claims,” http://www.independent.co.uk/life-style/health-and-families/health-news/drugresistant-hiv-pandemic-is-a-real-possibility-expert-claims-9420833.html, 6/25/14, SM)

A new HIV pandemic is “a real possibility”, one of the world’s leading authorities on infectious disease has said, warning that a rise of drug resistant strains of the virus could “reverse progress made since the 1980s” in combating the disease.¶ Professor Jeremy Farrar said that “the spectre of drug-resistant HIV” threatened to have “a huge impact” in the next 20 years, if drugs which have made vast improvements to the life expectancy of patients since 1990s become less effective.¶ His warning came as a coalition of scientists said that antimicrobial resistance (AMR) – the process by which bacteria and other microbes, including viruses, evolve to be immune to the drugs we use to combat them – should rank alongside climate change as one of the greatest threats facing humanity.¶ Professor Farrar, director of the leading research foundation the Wellcome Trust, said that it was “inevitable” that resistance to HIV would increase because it was a virus which could easily mutate.¶ Antiretroviral drugs currently used to treat HIV have been so successful that people living with the virus can expect to live healthy, active lives if they have access to the drugs and adhere to their regime.¶ While hailing the “incredible” progress made since the 1980s in treating HIV, Professor Farrar said that resistance to first resort drugs, and also some second and third resort, drugs had already occurred and that drug options for the virus were not “limitless”.¶ “It is not unreasonable that a HIV pandemic could return.” he said. “The possibility of a resistantly-driven HIV pandemic is quite real.”¶ He said it would be essential to use existing treatments “efficiently and effectively” to avoid further resistance developing.¶ “We [also] need to ensure we continue to develop new compounds rather than become complacent about the existing drugs we have,” he added. “A vaccine is also crucial to ensure we do not have to rely on our current prevention and treatment options. But an HIV vaccine will be incredibly difficult.”¶ In an article for the journal Nature published today, Professor Farrar and another leading figure, Professor Mark Woolhouse, have called for the establishment of a “powerful global organisation” similar to the Intergovernmental Panel on Climate Change (IPCC) to coordinate the worldwide response to the threat of anti-microbial resistance

### Answers to: HIV Declining Now

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#### [\_\_\_] The Infection rates of HIV is Rising Rapidly-Developing a vaccine is crutial to tens of millions of lives-The impact is mass global death.

Obijiofor, Professor at University of Queensland, 11

(Levi, 6/17/11, Nigeria Village Square, “HIV-AIDS: African mothers and babies face extinction”, <http://www.nigeriavillagesquare.com/levi-obijiofor/hiv-aids-african-mothers-and-babies-face-extinction.html>, 6/29/14)

The statistics on HIV-AIDS are uninviting. Across the world, 30 million people were reported to have lost their lives through AIDS and 16 million children have been turned into orphans. Still, about 33 million people are known to be living with HIV and for every new day, about 7,000 people are infected. That's not all the bad news. A report issued by the European Commission in 2009 stated that one in three people who were infected with HIV were unaware that they were carrying the virus. This is seen to account for a rapid rise in the rate of infection.

Nevertheless, in the struggle against the deadly virus, the development of a vaccine or cure remains a priority. Also, the cost of accessing antiretroviral drugs must be further reduced in order for more patients, particularly those in poorer countries, to access the medication. Healthcare deserves priority attention. And the battle against HIV-AIDS deserves even a higher consideration for the reason that a nation with a sick population is a deceased country. Unfortunately, rather than provide funds to uplift the poor standards of healthcare, African countries are quick to allocate huge sums of money to arms build-up to be used to defend autocratic leaders' grip on power and to suppress pro-democracy movements.

### Answers to: Too many coral killers

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#### [\_\_\_] Although they’re suffering, reefs can still be saved.

Science Daily, 2013

(Science Daily, 5/9/13, Science Daily, “Coral reefs suffering, but extinction not inevitable”, <http://www.sciencedaily.com/releases/2013/05/130509123414.htm>, 7/1/14, JW)

Coral reefs are in decline, but their collapse can still be avoided with local and global action. That's according to findings reported in the Cell Press journal Current Biology on May 9 based on an analysis that combines the latest science on reef dynamics with the latest climate models. "People benefit by reefs' having a complex structure -- a little like a Manhattan skyline, but underwater," said Peter Mumby of The University of Queensland and University of Exeter. "Structurally complex reefs provide nooks and crannies for thousands of species and provide the habitat needed to sustain productive reef fisheries. They're also great fun to visit as a snorkeler or diver. If we carry on the way we have been, the ability of reefs to provide benefits to people will seriously decline." To predict the reefs' future, the researchers spent two years constructing a computer model of how reefs work, building on hundreds of studies conducted over the last 40 years. They then combined their reef model with climate models to make predictions about the balance between forces that will allow reefs to continue growing their complex calcium carbonate structures and those such as hurricanes and erosion that will shrink them. Ideally, Mumby said, the goal is a carbonate budget that remains in the black for the next century at least. Such a future is possible, the researchers' model shows, but only with effective local protection and assertive action on greenhouse gases. "Business as usual isn't going to cut it," he said. "The good news is that it does seem possible to maintain reefs -- we just have to be serious about doing something. It also means that local reef management -- efforts to curb pollution and overfishing -- are absolutely justified. Some have claimed that the climate change problem is so great that local management is futile. We show that this viewpoint is wrongheaded." Mumby and his colleagues also stress the importance of reef function in addition to reef diversity. Those functions of reefs include the provision of habitat for fish, the provision of a natural breakwater to reduce the size of waves reaching the shore, and so on. In very practical terms, hundreds of millions of people depend directly on reefs for their food, livelihoods, and even building materials. "If it becomes increasingly difficult for people in the tropics to make their living on coral reefs, then this may well increase poverty," said the study's first author, Emma Kennedy. It's in everyone's best interest to keep that from happening.

### Answers to: Too many coral killers

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#### [\_\_\_] Artificial Reefs Dramatically Reduce Harms To Coral Reef Ecosystems

Schut, under The University Of Edinburgh, 2013

(Kaj, Nov. 2013, ERA, “A Comparative Analysis of Designed Artificial Reefs As Ecosystem Service Providers: Building Social-Ecological Resilience on Atoll Islands”, https://www.era.lib.ed.ac.uk/handle/1842/8362, 6/26/14, AEG)

Coral reef ecosystems are under increasing threat from climatic and anthropogenic pressures. Research has revealed that approximately twenty per cent of the world’s coral reefs have already been degraded and it has been predicted that an additional twenty per cent will be lost if no action is taken. This is particularly problematic for the inhabitants of atoll islands who depend greatly on the goods and services provided by coral reefs. This study suggests that the resilience of social and ecological systems can be strengthened by securing the provision of coral reef ecosystem services at all times and reducing the pressure of external disturbances on natural coral reef systems. Consequently, this study synthesises concepts that are associated with social-ecological resilience and presents a new framework for the evaluation of the coral reef restoration technique commonly known as ‘designed artificial reef’. The results suggest that the designed artificial reefs discussed in this study can contribute to the social-ecological resilience of atoll islands by providing additional provisioning, regulating and cultural services and should therefore be considered in future discussions on adaptation to climate change.

### Answers to: Too many coral killers

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[\_\_\_] Mineral accretion technology specifically overcomes natural threats to coral reefs.

Wells et al, Reef Restoration Project Manager for Turks and Caicos, 2010

[Lucy “Effect of severe hurricanes on Biorock Coral Reef Restoration Projects in Grand Turk, Turks and Caicos Islands”, http://www.globalcoral.org/wp-content/uploads/2013/07/Effect-hurricanes-on-Biorock-Coral-Reef-Restoration-Projects.pdf, October 2010]

Artificial reefs are often discouraged in shallow waters over concerns of storm damage to structures and surrounding habitat. Biorock coral reef restoration projects were initiated in waters around 5m deep in Grand Turk, at Oasis (October 2006) and at Governor’s Beach (November 2007). Hemi-cylindrical steel modules, 6m long were used, four modules at Oasis and six at Governor’s Beach. Each project has over 1200 corals transplanted from sites with high sedimentation damage, and are regularly monitored for coral growth, mortality and fish populations. Corals show immediate growth over wires used to attach corals. Growth has been measured from photographs using a software program and is faster at Governor’s Beach. After hurricanes Hanna and Ike (September 2008) the Governor’s Beach structure was fully standing since the waves passed straight through with little damage, the Oasis structures which were tie-wired rather than welded had one module collapse (since been replaced with a new, welded structure). Hurricane Ike was the strongest hurricane on record to hit Grand Turk. Most cables were replaced following the hurricanes due to damage from debris and high wave action. The projects lost about a third of the corals due to hurricanes. Most of those lost had only been wired a few days before and had not yet attached themselves firmly. These projects have regenerated corals and fish populations in areas of barren sand or bedrock and are now attractive to snorkelers. High coral survival and low structural damage after hurricanes indicate that Biorock reef restoration can be effective in storm-impacted areas. Rev. Biol. Trop. 58 (Suppl. 3): 141-149. Epub 2010 October 01.

### Answers to: Global Action Needed

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#### [\_\_\_] USFG Key- Has Immediate Access to the 3rd Largest Coral Ecosystem In The World

**Coral Reef Information System, no date given**

(Coral Reef Information System, “Florida”, <http://www.coris.noaa.gov/portals/florida.html#6>, 6/25/14, AEG)

Florida is the only state in the continental United States to have extensive shallow coral reef formations near its coasts. These reefs extend from near Stuart in Martin County on the Atlantic coast, to the Dry Tortugas in the Gulf of Mexico. The most prolific reef development occurs seaward of the Florida Keys. The most extensive living coral reef in the United States is adjacent to the island chain of the Florida Keys. The Florida Reef Tract which extends from Soldier Key, located in Biscayne Bay, to the Tortugas Banks possesses coral formations very similar to those found in the Bahamas and Caribbean Sea. The Florida Reef Tract is nearly 150 miles long and about 4 miles wide extending to the edge of the Florida Straits. It is the third largest barrier reef ecosystem in the world. All but the northern-most extent of the reef tract lies within the boundaries of the Florida Keys National Marine Sanctuary. The 2,800 square nautical mile Florida Keys National Marine Sanctuary (FKNMS), designated in 1992, surrounds the entire archipelago of the Florida Keys and includes the productive waters of Florida Bay, the Gulf of Mexico and the Atlantic Ocean. Discontinuous and less biologically diverse coral reef communities continue northward along western Florida shores to the Florida Middle Grounds, a series of submerged pinnacles rising to within 60-80 ft of the surface, about 100 miles northwest of St. Petersburg.

### Answers to: Global Action Needed

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#### [\_\_\_] Artificial reefs reduce coral pressures and increase marine habitats.

Lane, Writer at Discover5Oceans 2010

 (TS, 1/15/10, Discover5Oceans, “Artificial Reefs: The Good, The Bad, The Controversial”, <http://www.discover5oceans.com/2010/01/artificial-reefs-the-good-the-bad-the-controversial/>, 6/25/10, KM)

Artificial reefs have long been a part of coastal marine life. Whether to protect strategic areas from hostile weather, guard against attacking enemy forces or to improve fish stocks, man has thrown all kinds of objects imaginable – and some things that are unimaginable – into the water. ¶ Recently we’ve taken to sinking decommissioned ships at strategic locations with the hope of attracting fish, coral, and scuba divers. The promise is that over time, the submerged structures will decrease demand on over-used and over-stressed natural coral reefs. Florida lays claim to the world’s two largest artificial reefs with the intentional sinking of the USS Oriskany in 2006 off the coast of Pensicola and the sinking of the USNS Vandenburg near Key West in 2009. ¶ Man-made reefs aren’t only created for divers. For more than a decade, surfers have been catching waves breaking over artificial reefs at Cable Station Beach in Western Australia and Narrowneck on the Gold Coast of Queensland, Australia. The surfing ramps website provides insight into the goals and benefits of various projects in Australia, which include reduction of coastal erosion and increased marine habitat, as well as providing alternative destinations for surfers.

### Answers to: Artificial Reefs Hurt Existing Reefs

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#### [\_\_\_] Planned reef projects do not harm the environment, dumping projects are thing of the past.

Romano & Provenzani, under the GUE, No date given

(Global Underwater Explorers, GUE collaborates with a wide range of governmental and non-governmental organizations to explore and protect the aquatic realm, “Artificial Reefs”, <https://www.globalunderwaterexplorers.org/artificial-reefs>, 6/26/14, AEG)

In contrast, when an artificial reef is not accidental, but planned, materials suitable for extended submersion in a marine environment are normally used. Such materials are stable and environmentally sound, like, for example, cement or steel. Once the material is introduced into the marine environment, it acts as a natural rocky bottom, providing potential living space for a new reef community. Furnishing this “suitable space” is the only human intervention needed; once in place, nature quickly takes over and, soon thereafter, the structure begins to lose its artificial character. With each passing day, as numerous new living organisms begin to colonize the structure, what was once “artificial” now becomes a progressively intensifying reef ecosystem. In time, the steel and cement will disappear beneath a colorful blanket of undersea life.

### Answers to: Artificial Reefs Fail

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#### [\_\_\_] Artificial Reefs help promote biodiversity recreating ecosystems and Boosts the Economy by attracting tourists.

**Mauritius Marine Conservation Society, 2012**

(MMCS, “Artificial Reefs”, <http://www.mmcs-ngo.org/en/projects/artificial-reefs.aspx>, 6/27/14, AEG)

Importance of artificial reefs The creation of artificial reefs in the sea favours biological productivity, therefore enhancing the population of fish and invertebrates. These reefs have the power to attract marine life by offering a habitat. They not only constitute a shelter but are also a valuable reproduction reservoir, which can recreate a whole ecosystem in biological depleted zones. In Mauritius, the activities aimed at creating artificial reefs have been in development by the MMCS since 1980. The creation of such reefs mainly aims at: Increasing the marine population in the neighbouring reef areas An improvement in the fishermen's catch from these reef zones A study area for scientists A tourist attraction for divers A rehabilitation of the areas destroyed by natural forces or anthropogenic activities A creation of reproduction zones A beneficial use of solid wastes like old boats, tyres and automobile carcasses etc. What are artificial reefs? Artificial reefs are man-made habitats typically built to promote the growth of corals to develop reef systems and encourage marine life into the area. It mimics a natural reef. By immersing old deserted ships in carefully chosen sites, the MMCS and, since more recently, the MSDA and the National Coast Guard (NCG) have created 13 artificial reefs (see cartography). Other objects, like old worn tyres have also been associated to these wreckages. How do artificial reefs develop? The colonisation of artificial reefs is done progressively. In the beginning, devoid of any form of life, they are rapidly colonized by weed and animal classes like sponges, hydroids, bryozoans, bivalve shells, barnacles, acids, anemones, halcyons, gorgons and finally, after a few years' time, by corals with calcareous skeletons like Acropora, Montipora, Pocillopora and Pavonia. This encrusting fauna and flora provide food for sedentary and mobile animals like sea cucumbers, starfishes, sea urchins, crabs and squids as well as small fishes like Snappers (Madras), Butterflyfish (Papillon), Priacanthus (Fanal), Triggerfish (Bourse), Demoiselle, Sergent Major etc. In turn, these small fish attract pelagic and predator species such as hinds, morays, Laffers, kingfishes, mackerels, Capitaines, barracudas, etc.

### Answers to: Regrowing Reefs Fail

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#### [\_\_\_] Multiple technologies are being developed to regrow coral.

Vince, Journalist Specializing in Environment, 09

(Gaia, 8/16/09, The Guardian, "Sunken Steel Cages Could Save Coral Reefs," www.theguardian.com/environment/2009/aug/16/coral-reefs-regeneration-maldives-conservation, 6/25/14, AF).

Scientists are reporting encouragingly rapid coral growth on giant underwater steel cages – structures that they hope will help to regenerate battered reefs and improve protection of some vulnerable coastlines from rising sea levels. Coral reefs support a quarter of life on Earth and last month David Attenborough warned that carbon dioxide is already above the levels that will condemn corals to extinction. And while the metal cages, fed with electric current, are not a solution to the global problem of dramatically contracting reefs, they do appear to be providing promising results in small, local projects, and – in some cases – rescuing resorts where coral was vanishing fast. A team of researchers on Vabbinfaru island in the Maldives submerged a huge steel cage called the Lotus on the sea floor. The 12-metre structure, which weighs 2 tonnes is connected to long cable which supplies a low-level electric current. The electricity triggers a chemical reaction, which leads to calcium carbonate coming out of solution in the water and being deposited on the structure. Corals seem to find that irresistible, perhaps because they use the same material to grow their protective skeletons, and the Lotus has been so thoroughly colonised by coral that it is difficult now to make out the steel shape beneath all the elaborate shapes and colour. The idea was initially developed by an American architect, Wolf Hilbertz, who sold the concept to various resorts around the world. The Lotus is the largest and most successful of those, and has helped researchers to test the technique. The El Nino Pacific-warming phenomenon of 1998 killed 98% of the reef around Vabbinfaru, so the researchers there have been able to compare the growth rates for corals grafted on to concrete structures on "desert" patches of seafloor, and those stuck on to the Lotus. Abdul Azeez, who is leading the Vabbinfaru project, said coral growth on the structure is up to five times as fast as that elsewhere. The electric reef may also make the corals fitter and better able to withstand warming events, perhaps because the creatures waste less energy on making their skeletons. A smaller prototype device was in place during the 1998 warming event and more than 80% of its corals survived, compared to just 2% elsewhere on the reef.

### Answers to Trade Off Disdvantage

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#### [\_\_\_] Artificial Reefs Are A Cheap Form Of Replicating Coral Reefs While Creating Aesthetics

**NOAA, N/A**

(National Oceanic And Atmospheric Administration, “What Is An Artificial Reef?”, <http://oceanservice.noaa.gov/facts/artificial-reef.html>, 6/25/14, AEG)

An artificial reef is a manmade structure that may mimic some of the characteristics of a [natural reef](http://oceanservice.noaa.gov/facts/three-corals.html).In June 2002, the retired USS Spiegel Grove  was sunk in waters off Key Largo. At 510 feet (155.45 meters) long, the ship was, at the time, the largest vessel ever intentionally scuttled for the purpose of creating an artificial reef.

**Submerged shipwrecks are the most common form of artificial reef. Oil and gas platforms, bridges, lighthouses, and other offshore structures often function as artificial reefs. Marine resource managers also create artificial reefs in underwater areas that require a structure to enhance the habitat for reef organisms, including soft and** [**stony corals**](http://oceanservice.noaa.gov/facts/coralmadeof.html) **and the** [**fishes and invertebrates that live among them**](http://oceanservice.noaa.gov/facts/coral_species.html)**.**

Materials used to construct artificial reefs have included rocks, cinder blocks, and even wood and old tires. **Nowadays, several companies specialize in the design, manufacture, and deployment of long-lasting artificial reefs that are typically constructed of limestone, steel, and concrete.**In 1986, the Thunderbolt   was intentionally sunk in 120 feet (36.6 meters) of water four miles south of Marathon and Key Colony Beach in Florida. The ship’s superstructure is now home to colorful sponges, corals, and hydroids, providing food and habitat for a variety of sea creatures.

The [Florida Keys National Marine Sanctuary](http://floridakeys.noaa.gov/) contains several decommissioned vessels that were sunk in specific areas for diving or fishing opportunities prior to the area’s designation as a national marine sanctuary. One of the most famous is the U.S. Coast Guard Cutter [Duane](http://floridakeys.noaa.gov/shipwrecktrail/duane.html), which served on the seas for half a century before its final assignment as an underwater haven for sea life.

**Planned manmade reefs may provide local economic benefits because they attract fish to a known location and are therefore popular attractions for commercial and recreational fishermen, divers, and snorkelers**. However, the increase in illegal dumping for the purpose of creating habitat has led to significant poaching in the Florida Keys and subsequent high-profile arrests by [NOAA’s Office of Law Enforcement](http://www.nmfs.noaa.gov/ole/). [Marine debris](http://oceanservice.noaa.gov/facts/h/facts/marinedebris.html) continues to be an ongoing problem in these sensitive environmental areas, and [NOAA’s Marine Debris Program](http://marinedebris.noaa.gov/) has helped provide funding to remove debris in the Florida Keys.

### Answers to Trade Off Disadvantage

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#### [\_\_\_] No amount of money or jobs should be worth the risk of increasing the decline of one of our most precious resource; Congress agrees.

Latzman, Radio Anchor/Reporter - WLRN Program Host - Florida Correspondent, NPR at The Miami Herald/WLRN Radio 2014

(Phil Latzman, 6/26/14, SunSentinel, “Phil Latzman: Protecting coral reefs more important than extra $$$”, <http://articles.sun-sentinel.com/2014-06-26/news/fl-plcol-oped0626-20140626_1_reefs-port-everglades-panama-canal>, 6/29/14, JY)

To dredge, or not to dredge. That is the question facing port cities in the US and beyond trying to stay on the manifest for the next big shipment. But in Florida there's some extra delicate cargo under the sea that we must protect. Our irreplaceable coral reefs.¶ As if they weren't already endangered, the state's sickly reefs are about to get stomped in a vicious assault that is only just beginning. Like environmental serial killers with no conscience, dredging projects threaten to pour poison into existing festering wounds on the ocean floor. Florida has 15 deep water seaports frantically trying to reconfigure to accommodate the trade commerce of the future, several of them in negotiations for expansion, or already in progress to do so. Many of our leaders support such efforts.¶ Gov. Rick Scott has toured the state's ports advocating for more federal help to complete the projects. His wish was granted last week as Congress passed a law doing just that. U.S. Rep Ted Deutch, D-Boca Raton, lauded the bill's passage as necessary so that "South Florida economy does not miss the boat — pun intended — on the Panama Canal expansion."¶ So, it's a bipartisan lot of Republicans and Democrats alike that say the dredge projects are needed to keep Florida economically competitive in the game of international commerce. They claim they'll will lead to thousands of additional jobs and billions of dollars in additional income and tariffs to the region.¶ However, when the consequences are weighed, no amount of money or jobs should be worth the risk of accelerating the decline of our most precious natural resource.

### Privatization Fails

#### [\_\_\_] Private ownerships of reefs will fail. Owners will look after their own interests and not those of the larger environment the government is entrusted to protect.

Andrews , Fulbright scholar at the New Zealand Ministry of the Environment, 2008

(Katherine, July 2008, “Governing the Exclusive Economic Zone: The Ocean Commons, Cumulative Impacts and Potential Strategies for Improved Governance” <http://www.fulbright.org.nz/wp-content/uploads/2011/12/axford2008_andrews.pdf>)

Disadvantages Possible decrease in public good. If government relinquishes some of its decision- making power to the marketplace then the general public interest may suffer because no one is looking to protect it. A market-based regime works on the principle that everyone looking out for their own best interest leads to the greatest economic good overall—Adam Smith’s famous “invisible hand”.220 However, greatest economic good does not always equate to the greatest public good. Abrogation of trust responsibility. Granting extensive privatised rights in the marine resources of the EEZ may be an abrogation of the trustee responsibility for the resource the government holds under national and international law. Lack of comprehensive view. Even though the regime would allow for tradeoffs between sectors, each government ministry would continue to regulate the uses for which they were responsible. While the zoning regime would need some upfront strategic planning, the benefits of the market (such as adaptability, flexibility, innovation) are maximised if the market is allowed to work toward the greatest economic efficiency. This necessarily means that a comprehensive vision becomes difficult because it is the collective actions of numerous individuals that control the direction. Does not adequately account for non-use values. Non-use and non-market values fare poorly in a market-based system.221 There might be some incentives for conservation tourist zones, but the incentives would in all likelihood not result in conservation zones large enough to protect biodiversity To ensure that non-use values were protected, conservation, cultural or similar zones would need to be set aside as a first step in developing the zoning regime. High implementation costs. Creation of a new system of private property rights in the EEZ would be costly. A new law would have to be passed, likely against strong opposition.222 If the law passed there would be planning to be done, conservation zones to be created, numerous consultations with stakeholders, and then a processcreated to auction the zone rights. Creating an entire new market where one did not exist before would be a very large undertaking. Difficult to Undo. Once property interests are created and purchased, they can be difficult to rescind or buy back. If the government decided that they no longer wanted a private property regime for the EEZ they might not be able to roll it back. This strategy will make adaptive management more difficult because it is predicated on the zone rights holders making many of the decisions. Does not address some important issues. Zoning does not address non-spatial challenges, such as invasive species. Regulatory frameworks addressing those issues would still need to be maintained.

### Privatization causes inequality

#### [\_\_\_\_] Privatization leads to resource inequity protecting the haves while the have nots miss out.

Mitchell, -Professor and Department Chair Political Science University of Iowa, 2008

(Sara, “Ruling the Sea: Institutionalization and Privatization of the Global Ocean Commons, 1/1/08, Dept of Political Science Publications, <http://ir.uiowa.edu/cgi/viewcontent.cgi?article=1003&context=polisci_pubs>, HW)

While privatization is an attractive solution, its primary drawback is the potential for the creation and/or exacerbation of resource distributional inequities. It has been admitted that the formalization of EEZs as part of the UNCLOS agreement “has increased, rather than decreased, inequality among states, giving more to the already well-endowed richer states” (Borgese, 1995: 15). One of the most significant problems is that the subdivision of the commons is not homogenous. Merely allocating equivalent portions of the commons does not mean that all users will get an equal share. States may be tempted to seek larger shares of the commons to put more resources under their private control; a lack of information about the resource will also complicate negotiations regarding the distribution of a resource since a state risks getting a worthless share (Wijkman, 1982). In addition, the migratory nature of fish stocks and the interconnectedness of the ocean’s ecosystem mean that resources cannot be managed solely within the EEZ, leading to problems with fishing fleets pursuing migratory fish stocks just outside of other states' EEZs (Borgese, 1995; Bailey, 1996).7 Since some resources can move between EEZs, each state has incentives to exploit the resource before another does the same.

### Privatization hurts the environment

#### [\_\_\_] Private sector development produces environmental destruction not protection.

Pearce, environment writer and author of The Last Generation, 2013

(Fred, “Biologists call for part privatisation of oceans”, 10/16/13, NewScientist, <http://www.newscientist.com/article/dn24418-biologists-call-for-part-privatisation-of-oceans.html#.U7i92_mICQo>, HW)

But not all agree. The report comes just a week after a devastating analysis of the state of the oceans from scientists at the International Programme on the State of the Ocean (IPSO). "We should be extremely cautious about giving sole rights to wealthy individuals or industry to exploit ocean resources," says IPSO's chief author, Alex Rogers at the University of Oxford. Ecology rather than economics should be at the heart of ocean conservation, he says.

### Privatization hurts the environment- extension

#### [\_\_\_]

####  [\_\_\_] Privatization leads to overexploitation – government solutions key to promote sustainability

Clark, Munro and Sumaila, Professor of Mathematics at University of British Columbia, Professor of Economics at UBC and Director of the Fisheries Center at UBC, 2010

(Colin W, Gordon R, U. Rashid, “Limits to the privatization of fishery resources”, May 2010, Land Economics, Volume 86, Number 2, May 2010, pp. 219-244, Muse)

The orange roughy case allows us to ask what would happen if a fishery based upon such a resource was characterized by something close to pure open access. The answer has been provided to us through an experiment performed by history, in the form of the South TasmanRise orange roughy stock. It is now well established that, if a shared fishery resource is managed noncooperatively, the result can be akin to pure open access—the prisoner’s dilemma syndrome (Clark 1980; Sumaila 1997; Munro, Van Houtte, and Willmann 2004). The South Tasman orange roughy resource straddles the Australian Fishing Zone and the adjacent high seas. When the resource was discovered by Australia in 1997, it was believed that the only other state that might attempt to exploit the high seas segment of the resource would be New Zealand. Australia entered into a cooperative management arrangement with New Zealand at the end of 1997. The cooperative resource management arrangement did, however, prove to be flawed. The consequence was that cooperative management degenerated into noncooperative management. The economist’s theory of noncooperative management of shared stocks proved to have strong predictive power in this case. The resource was subject to extensive overexploitation (Munro, Van Houtte, and Willmann 2004). Just how severe the overexploitation was has recently been revealed. After the initial noncooperative management debacle, the two states reconvened to establish a new, and sounder, cooperative resource management arrangement in early 2000 (Munro, Van Houtte, and Willmann 2004). Initial harvests under the new cooperative resource management agreement were less than 10% of the total allowable catch (TAC) set under the first cooperative resource management arrangement in late 1997 (Munro, Van Houtte, and Willmann 2004). The government of Australia has recently informed the Food and Agriculture Organization of the UN that, in the spring of 2007, the two cooperating states agreed that the appropriate annual TAC for the fishery was 0 tonnes, and that this annual TAC of 0 tonnes should remain in place for an indefinite period of time (Rolf Willmann, FAO, personal communication). The authors would suggest that the South Tasman Rise orange roughy resource would fall well within the reasonable person’s definition of ‘‘depleted fully.’’