



ConWatch

The Garden Club of America
Fall 2019

OCEANS

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From the Editor

By Bennett Burns

Oceans are our largest ecosystem covering three-quarters of the earth. They are a place of great beauty, mystery and inspiration, but they are facing serious threats in many ways. The Intergovernmental Panel on Climate Change (IPCC) **special report** on the oceans released September, 2019 relayed the latest urgent message: oceans have been warming continuously since 1970 and the rate of warming has nearly doubled since 1993. The impacts of warming oceans are wide-ranging and they must be understood, so that effective mitigation tools can be developed and deployed.

This issue of ConWatch delves deeply into the impact climate change has on ocean health, coral ecosystems, acidification and sea level rise. We have invited experts such as Janis Searles Jones from the Ocean Conservancy and Dr. James Porter of the University of Georgia, along with other distinguished scientists, to better inform readers about these challenges.

There also are hopeful messages about opportunities to protect and restore our seas and about new developments that use seaweed to tackle the disposable plastic epidemic with biodegradable and edible packaging.

For me, one of the joys of ConWatch is to learn something new in every issue. I now know what reef-safe sunscreen to take on my diving trip to the Sea of Cortez where I will see, first-hand, the restoration work of the Seawatch team.

Join me in a deeper exploration of the Oceans by clicking on the imbedded links. Keep reading until the end to learn about our recent Conservation Study Conference in Kentucky. You will also find an inspirational profile about artist Zaria Forman, whose remarkable pastel drawings look just like photographs!

Nature is the first line of defense as our climate warms. The more we understand, protect and nurture our environment, the better chance we will have to overcome the challenges that lie ahead. ■

Bennett Burns, Portland Garden Club, Zone XII

1 *Editor, ConWatch*



News from the Conservation & NAL Committees

By **Lisa Ott and Elizabeth Waddill**

As we begin our terms as the Conservation and National Affairs and Legislation Committee chairs, we see the increasingly severe impacts of climate change all around us. We feel the growing reality of the need to act quickly to avoid irreversible damage to our oceans, agriculture, forests, ecosystems and communities. We understand we don't have 20–30 years, as originally thought, to reduce global greenhouse emissions. Rather, we must take meaningful action over the next 10–15 years.

Oceans provide a perfect example of the impacts and potential solutions. On the heels of the recent UN Climate Summit, **reports** were released detailing how climate change is putting the world's oceans and ice at risk. On a more hopeful note, another **study** demonstrates how oceans could deliver a fifth of the emissions reductions needed to limit global warming to 1.5°C by 2050. This would be accomplished by scaling up ocean-based renewable energy, restoring coastal ecosystems ("blue carbon") and decarbonizing shipping and marine transport.

The Garden Club of America, with its 100+ year history of environmental advocacy and 18,000 members, is in a unique position to effect positive climate action. With this in mind, the goal of our committee over the next two years will be to *Make the Connections*—between cause and effect, people and our actions,

GCA and its member clubs, and between clubs and their communities. Actions in our daily lives impact the people around us and the world at large.

Through education and effective communication, we hope to provide interested members with relevant information about the many impacts of climate change. Among them are rising waters, warming oceans, extreme weather events, migrating plants and animals and forest fires. We also aim to arm members with information about solutions—everyday actions we can take to mitigate the impacts such as reducing waste, curbing car emissions, saving and restoring land, utilizing better farming and forestry practices, and the use of native plants.

For more information about GCA actions to save our planet, log on to the **GCA website** and read the GCA Position Paper on Climate Change and the Fall 2019 Vice Chairman's Reports. These resources focus on the impacts of climate change as they relate to topics featured in GCA position papers and include helpful steps each of us can take to protect our planet. ■

Lisa Ott, North Country Garden Club of Long Island, Zone III

Chairman of the NAL Committee

Elizabeth Waddill, Magnolia Garden Club, Zone IX

Chairman of the Conservation Committee



The ocean has absorbed a staggering 93% of the excess heat from climate change



Our Ocean's Future: It's All-Hands-On-Deck

By Janis Searles Jones

Looking out at the Pacific Ocean from the rocky shores of my home state, Oregon, all looks well. But as CEO of Ocean Conservancy, I know these looks can be deceiving. A healthy ocean is both my personal passion and what guides the work of our over 100 staff members. And we are at an all-hands-on deck moment.

The ocean is the life support system for the entire planet, providing half the oxygen we breathe, influencing rainfall patterns around the world, and controlling the planet's climate. It is a significant source of protein for nearly 3 billion people. It is a source of endless wonder, for the ocean is home to the smallest of life (viruses and bacteria) as well as the largest animal to ever grace the planet, the blue whale (larger than even the largest dinosaur). But human activities now fundamentally threaten both what we love about and what we need from the ocean.

Most importantly, our continued reliance on fossil fuels is rapidly heating the ocean and fundamentally altering its chemistry, with drastic results for wildlife and people. The ocean has absorbed a staggering 93% of the excess heat from climate change and the resulting ocean "heat waves" are bleaching coral reefs (often called the gardens of the sea) so frequently they cannot recover; shelled animals like oysters, clams, mussels and a host of other important seafood cannot survive in increasingly acidic water. And, the accelerating impact of climate change is also exacerbating other human-driven stressors. Overfishing (catching fish faster than they can reproduce) continues globally despite the improvements in fishery management that Ocean Conservancy helped bring about in the United States. Plastic now flows into the ocean at a rate of 8 million tons per year, equivalent to one garbage truck dumped into the ocean per minute—every day—somewhere around the world. Scientists have documented that over 800 species of marine life are negatively affected by



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ingesting or being entangled in plastic. Plastic is now present throughout the marine food web, including in some of the fish we eat. “Dead zones” and toxic algae blooms—fueled by climate-driven warm water and record-high nutrient runoff from land—have quadrupled since 1950.

Make no mistake; the ocean is suffering. But at Ocean Conservancy, we know that we can turn the tide. There is no single solution, but with concerted action we can solve these problems. Each of us—regardless of whether or not we live by the coast—has a huge role to play. We can make “ocean smart” choices in our everyday lives that really matter: reduce our individual carbon footprints, purchase sustainable seafood, reduce our consumption of single-use plastic (take the ***Quit the Cutlery*** pledge), and minimize fertilizer and pesticide use.

But saving our ocean can’t be done by individuals alone. While we must vote for elected officials who support science and acknowledge the reality of climate change, we also need other elements of civil society to do their part. The private sector needs to take a larger and stronger leadership role in solving these global challenges. To confront climate change in the ocean, international climate negotiators must incorporate ocean considerations in the “nationally

determined contributions” which form the foundation of the global Paris Climate Agreement. Key issues like overfishing and nutrient pollution will require breakthroughs in international governance and novel public policy that explicitly incorporate ocean impacts of land-based activities. And while some members of the plastics industry like Starbucks and Coca-Cola have taken action to reduce their own plastics use, the global plastics industry must rapidly scale major changes to match the scale of the problem. At Ocean Conservancy, we are working on many fronts to bring about these systemic changes that the ocean, and therefore all of us, desperately needs.

Like the rest of the global ocean, my ocean backyard in Oregon is changing as humanity’s influence grows. It is increasingly clear that our ocean’s future will be determined by our collective commitment to protect that which sustains us all.

This is my mission. This is Ocean Conservancy’s mission. I invite you to be part of our shared ocean future. ■

Janis Searles Jones, CEO of Ocean Conservancy

Find her on Twitter at @InVeritas_Jones



In Hot Water: Climate Changes Impact Oceans

By Leslie Lee

Climate change is impacting nearly every aspect of our lives, and ocean health is no exception. In the past few decades as the planet has warmed, oceans have mitigated the effects of climate change by absorbing **93% of the heat trapped by greenhouse gas**. However, this has led to increasingly warm temperatures for oceans across the globe. Experts have found that the oceans are heating up **40% faster** than was estimated five years ago. While warmer water may sound great for swimming, the warming temperatures are disrupting the delicate balance of ocean systems and can, potentially, change life as we know it.

Ocean Circulation Impacts

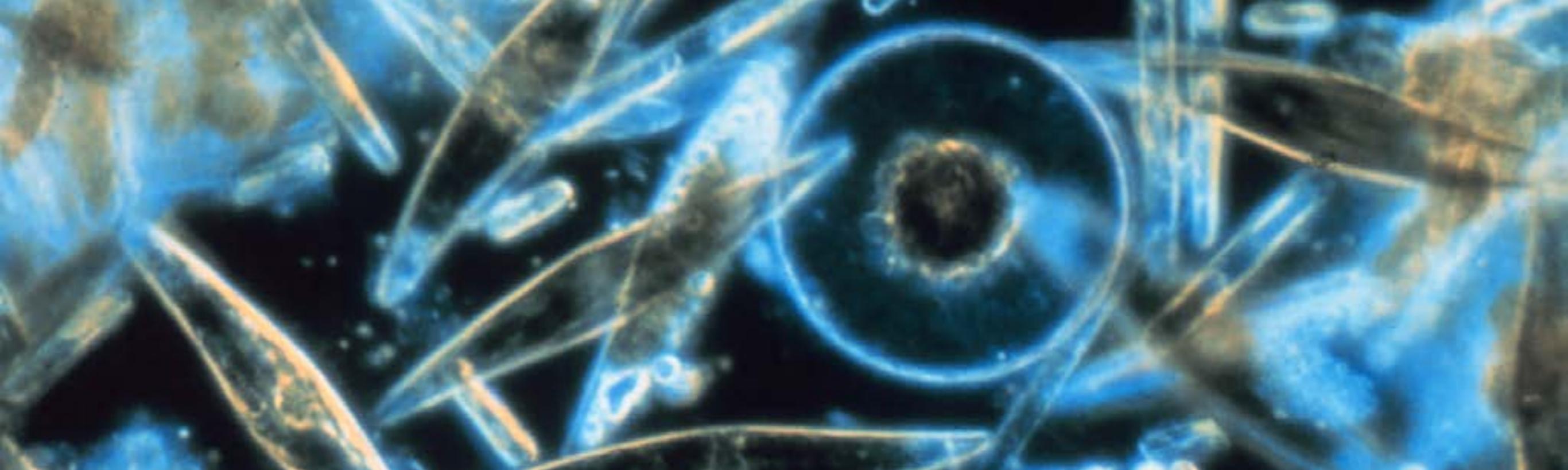
The Atlantic coast's Gulf Stream is slowing. Normally, as warm water flows northward it begins to cool. As it cools, the water becomes denser, saltier and then sinks. This thermohaline circulation creates the North Atlantic Current, which warms Europe and impacts the North Atlantic Deep-Water Current, which flows southward deep into the ocean, replenishing the circulatory system.

A warmer climate is expected to lead to rapidly increased "freshening" of the water in the North Atlantic as the Greenland ice sheet melts and its fresh water runs into the ocean. This freshening decreases the density of the water mass and slows the sinking that is necessary to drive the circulation system.

These changes are already being felt along the Northeast U.S. Shelf and in the Gulf of Maine, which has warmed 99% faster than the global ocean over the past ten years, increasing storm intensities, impacting distributions of fish and living marine resources in the region.

Oxygen Impacts

The combined effects of ocean warming and the slowing of the ocean's circulatory systems are changing the biochemistry of the ocean and leading to increased hypoxia or Oxygen Minimum Zones. In the open ocean, these Oxygen Minimum Zones have increased to roughly the size of the entire EU, quadrupling the volume of water devoid of oxygen.



Healthy oceans with normal phytoplankton rates produce **50% of the entire planet's oxygen**. However, with the impacts of changing circulatory patterns and hypoxia zones, the oxygen-producing phytoplankton on the ocean's surface have **declined by 40% from 1950 to 2010**, depleting oxygen levels in both the air and the water.

Sea Level Impacts

Global sea level has risen about 7 inches in the past century. Computer models suggest that climate change will cause an additional rise of nearly **19 inches by the year 2100**. Ten percent of the world's population lives in coastal areas that are at or only slightly above sea level. Two-thirds of the world's cities with over 5 million people are located in these low-lying coastal areas. Miami, Rio de Janeiro, Osaka, Shanghai and Alexandria are a few of the high-risk cities.

Maritime transportation along coastal rivers and ports will also be impacted. Ports are a critical intersection point of global commerce and are highly vulnerable to future increases in sea level rise and destructive storms. Much is

potentially at stake. Approximately 75% of all global trade by weight and **59% by value travels by maritime transport**.

Agricultural Impacts

Rising sea levels mean greater incursion of salt water into coastal groundwater, threatening existing ecosystems. When seawater reaches inland, problems related to salt contaminated soils will impact fresh water fish, birds and coastal plants. Wetlands are especially endangered by this salt intrusion, which impacts their role in filtering nutrients and improving water quality for the rest of the estuary and providing migratory habitats for waterfowl.

High levels of salt in agricultural soil or irrigation water make it difficult for salt sensitive rice plants and other crops to absorb water and necessary nutrients. As a result, plant growth is suppressed and crop yields are significantly reduced. According to the World Bank, it is estimated that increased soil salinity, both in coastal and inland areas, may result in a decline **in rice yield by 15%**. While rice

is the largest crop impacted by salt intrusion, numerous other crops including corn, onions, beans, lettuce and potatoes are also sensitive to increased salinity.

The Good News

The impacts to our oceans are daunting and this article has only touched on a few of the key issues. However, awareness of climate change and the need for carbon reduction is growing significantly across the globe. We can all do our part in helping to reduce carbon emissions and, thereby, helping to sustain our life-giving oceans.■

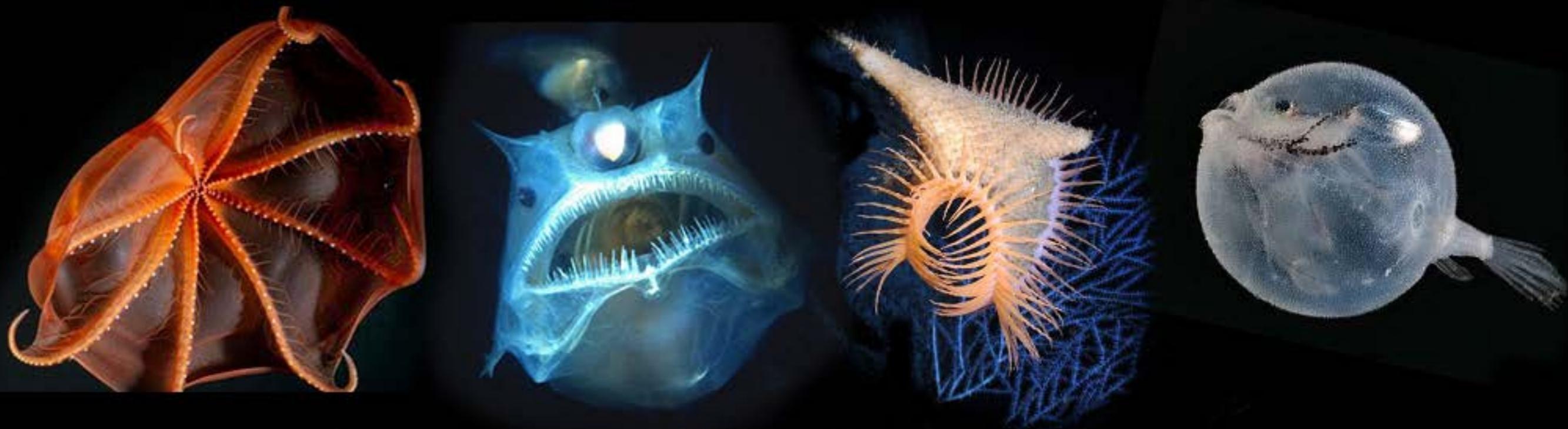
Leslie Lee, Greenwich Garden Club, Zone II

Current Vice Chair for Energy Sources, Former Vice Chair for Oceans, 2017–2019



TAKE ACTION!

- Check your **carbon footprint** which is the total amount of carbon dioxide a person contributes to the environment.
- Conduct a home energy audit and install Energy Star certified products when replacing appliances.
- Plant trees. Trees use photosynthesis to convert carbon dioxide (CO₂) into sugar, cellulose and other carbon-rich carbohydrates that they use for food. A typical tree absorbs 48 lbs. of CO₂ yearly.
- Choose a 100% renewable electricity provider. Your local utility is your distributor, but many offer the option to select power coming from solar and wind generation.
- Choose low fossil fuel-intensive family activities, i.e.: hiking vs dune buggies, kayaking or sailing vs powerboats, canoeing vs jet skiing.
- Drive an all-electric or hybrid car. Transportation is now the biggest sector in carbon emissions in the US, with cars and trucks making up 45% of that total.
- Support public transportation, encourage the creation of biking and walking paths and embrace alternatives to driving.
- Go solar, if your home is a good candidate for solar panels. Otherwise, consider investing in a shared solar program, where you get credit on your energy bill.
- Talk to your state/and municipality about changing their transportation fleet (buses, snowplows, official cars) to all electric or hybrid vehicles.
- Talk to your state about targets to decrease energy generated from carbon-emitting sources, such as coal and fossil fuels.



Unintended Consequences: Mining of the Ocean Floor

By Leslie Lee

Progress towards a greener future is being made in smart appliances, cloud computing, electric vehicles and renewable energy. But the rapidly increasing need for batteries to support our personal electronics, electric vehicles, and grid storage has created a skyrocketing demand for lithium, nickel, cobalt, copper, manganese and rare earth minerals, which are essential components in batteries.

The increased volume of demand for these minerals, combined with the fact that these minerals are either rare, single-country sourced or declining in availability has stimulated great interest in mining of deep seabed areas where these minerals have been detected.

Deep Sea Mining

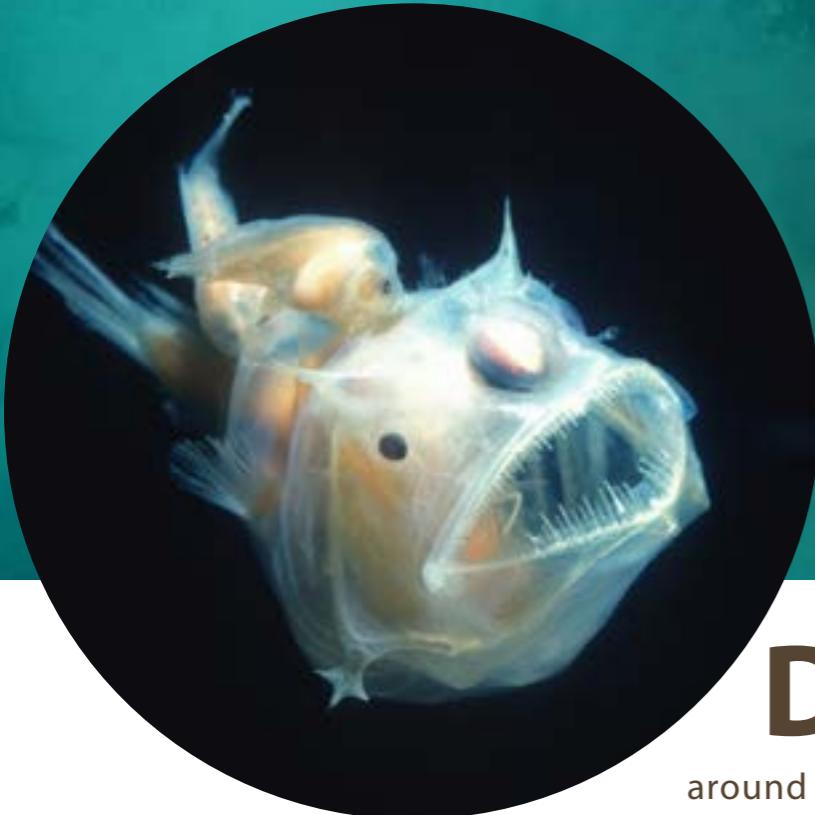
Deep Sea mining is the extraction of minerals and metals by stripping material from the ocean floor using remotely operated vehicles. The cut material is crushed and then sent to a processing ship on the ocean surface. There the

metals and minerals are removed from the cuttings. The tailings of rock dust and seawater are then returned below in sub-surface plumes of debris, which slowly resettle onto the ocean floor.

Ocean mining sites are usually around large areas of active or extinct hydrothermal vents deep below the ocean surface. The vents create cobalt-rich crusts and nodules.

■ **Polymetallic manganese nodules** are rocky lumps that vary from between 2–4" in size. The metals within—including nickel, copper, and lithium—hold commercial value for many technological applications. Removal involves scraping 2–4" off the top of the ocean floor.

■ **Cobalt-rich ferromanganese crusts** are hard, solid layers 4–10" thick. They contain cobalt, nickel, and some rare earth elements and could provide up to 20% of the global cobalt demand. These crusts are firmly adhered to the surfaces of seamounts, ridges, and plateaus.



In the quest for clean energy it will be important to take into account the potential destructive impacts on unique and fragile marine habitats.

Deep sea hydrothermal vents can be found around the globe. One of the most mineral rich parts of the ocean is the Pacific Prime Crust Zone (PCZ) which extends from the Hawaiian Islands to the border of the Mariana Trench. In the midst of the PCZ lie two protected National Marine Monuments—the Pacific Remote Islands National Marine Monument and the Rose Atoll National Maritime Monument. Former Interior Secretary Ryan Zinke recommended shrinking boundaries to allow commercial extraction in these protected areas.

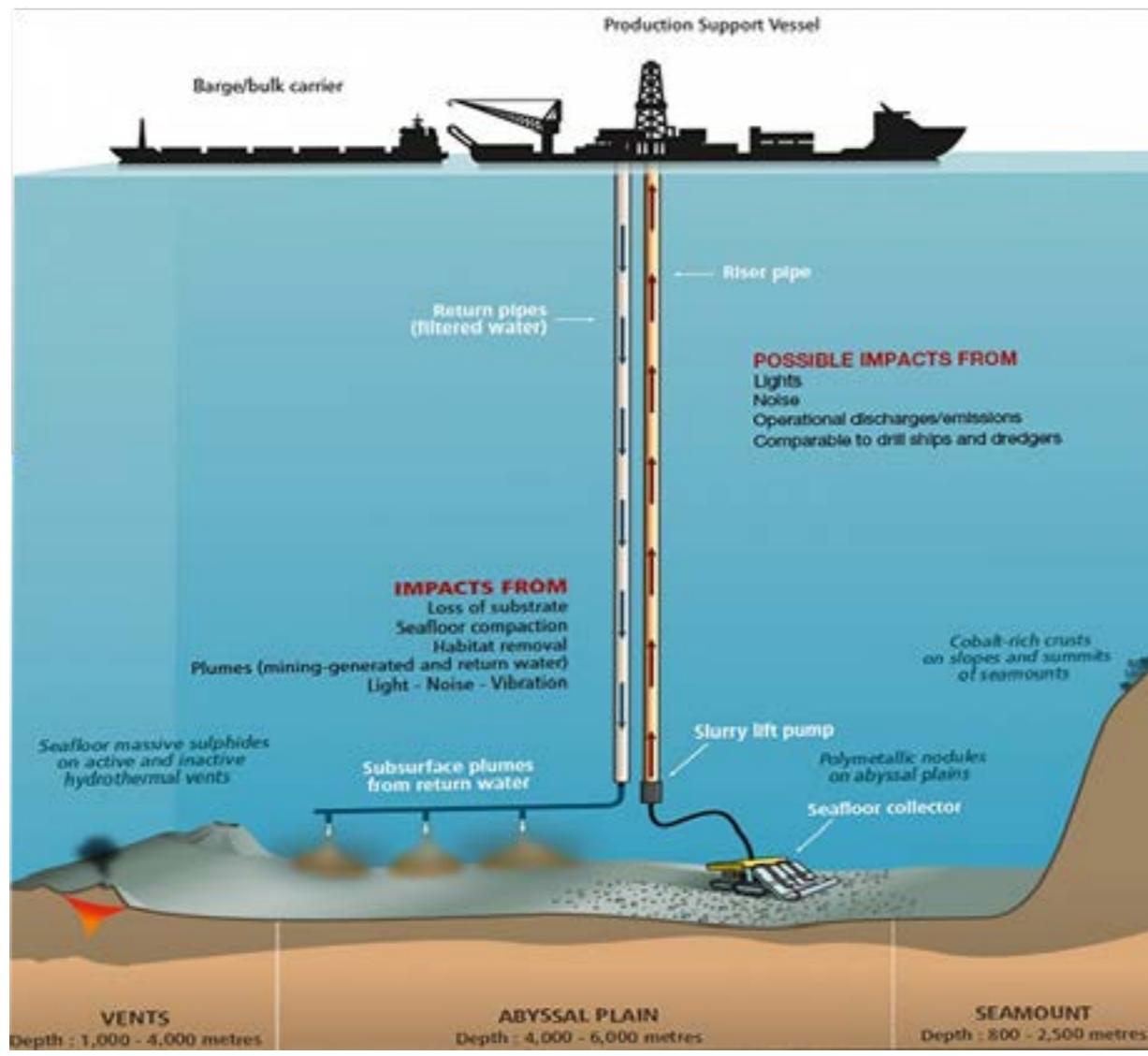
Environmental Impacts

Once thought to be a vast wasteland where few organisms could survive crushing pressures, perpetual darkness and freezing temperatures, marine scientists now understand the deep seabed is home to a diversity of distinctive life forms, where seabed bacteria synthesize minerals from the hydrothermal vents and provide nutrition to tubeworms, clams and other animals whose fragile habitats are among the areas targeted for mining.

A discovery in 2016 by the Monterey Bay Aquarium Research Institute found that hydrothermal vent fields spawn unique animal life based on the local geology and the chemistry of the fluids flowing through hydrothermal chimneys. The study showed that if a marine ecosystem reliant on one hydrothermal vent field is destroyed, its marine life will not necessarily be able to relocate to another vent field.

In addition to the impacts from mining the ocean floor, sediment plumes also have an environmental impact. Debris plumes can increase the turbidity of the water, clogging filter-feeding organisms, such as deep-water corals and sponges. Plumes also impact the amount of light penetrating the ocean and the health of zooplankton and other organisms.

Concerns related to the impact of mining, coupled with questions as to whether such activity could lead to the extinction of marine life found only in these unique habitats, led the European Parliament in 2019 to call for the support of an international moratorium on commercial deep-sea mining exploration licenses until the effects of mining on the marine environment and all possible risks are better understood.



US Drilling

In the United States, the current administration is moving ahead with plans to promote ocean mining. In 2018, the Department of the Interior listed 35 minerals, including cobalt, manganese and lithium, as essential to the country's economic and national security.

The National Oceanic and Atmospheric Administration (NOAA) has the primary responsibility for authorizing the exploration and commercial recovery of manganese nodules under the **Deep Seabed Hard**

Mineral Resources Act. Some environmental protection is integrated into NOAA regulations since permits cannot be issued if the actions result in a significant adverse impact on the quality of the environment. NOAA has not yet

completed the development of environmental regulations for deep sea mining. When the regulations are released, there will be an opportunity for public comment.

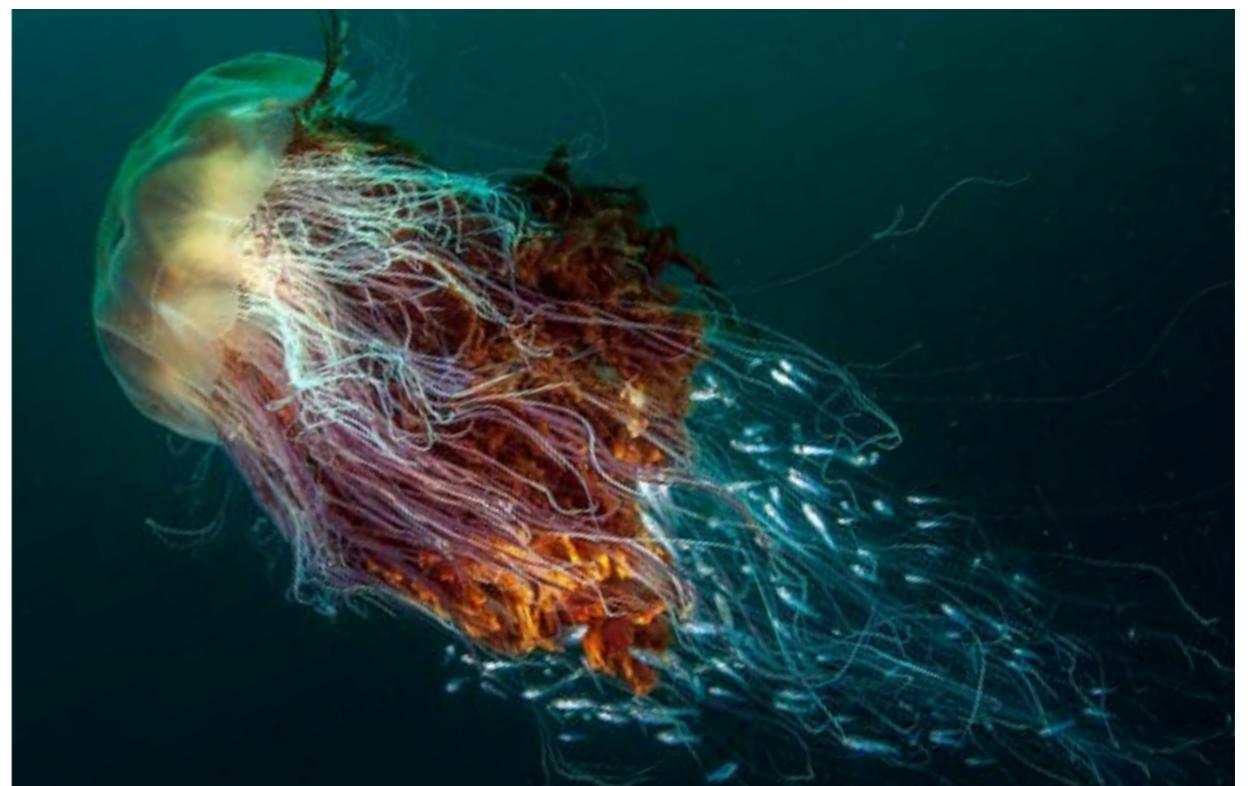
In the quest for clean energy it will be important to take into account the potential destructive impacts on unique and fragile marine habitats.

Take Action

- Take old personal electronics, phones and computers to special recycling facilities where their components can be removed and reused.
- Buy rechargeable batteries and a charger.
- Write the Department of the Interior asking that they maintain the current size and environmental restrictions for the Pacific Remote Islands National Marine Monument, the Northeast Canyons and Seamounts National Marine Sanctuary and the Rose Atoll National Marine Monument. These are prime targets for future mining operations. ■

Leslie Lee, Greenwich Garden Club, Zone II

Current Vice Chair for Energy Sources, Former Vice Chair for Oceans, 2017–2019





It's Time to Talk about Ocean Acidification

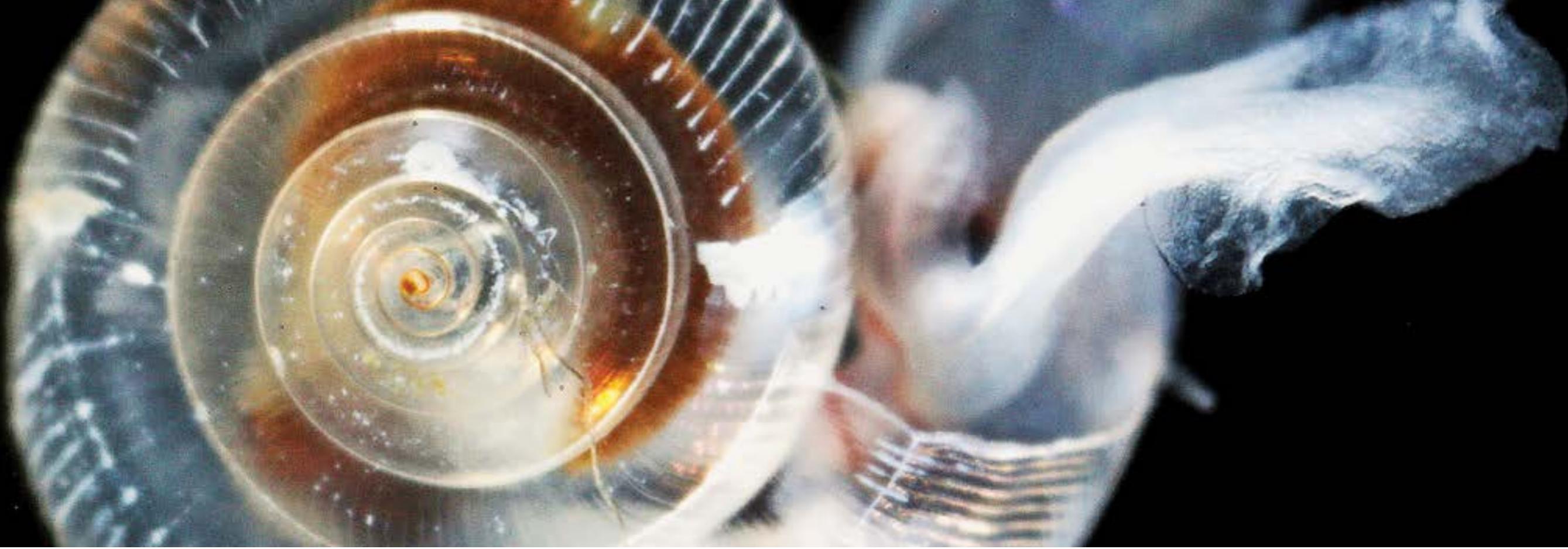
By Sarah Cooley

When you stand on the beach and look out at the ocean, you may not realize it, but chemistry is happening in front of your eyes. The ocean is full of chemicals, both natural and manmade, and they're constantly interacting with each other. But over the past couple of decades our ocean's chemistry has been changing and becoming more acidic—threatening corals, shellfish and other marine life. As Ocean Conservancy's Director of Ocean Acidification, Sarah is committed to telling more people about this invisible threat and how we can take action to protect the oceans.

Ocean acidification may sound complex, and while its impacts on the ocean definitely are, the process itself is the same chemistry that creates the bubbles in seltzer water. When the ocean absorbs carbon dioxide from the atmosphere, a chemical reaction occurs that creates an acid. Due to human produced carbon dioxide emissions, more and more of these chemical reactions are occurring, and the increasing acidity of the ocean is altering the baseline conditions for marine life. To date, the ocean has absorbed about 20-30% of the carbon dioxide humans have produced since the Industrial Revolution.

To be clear, the ocean isn't an acid and won't ever become one. On the pH scale most of us learned in high school chemistry, anything lower than a pH of 7 is an acid. The ocean's pH is higher than 7 and will remain so. But its pH is decreasing at a rate more rapid than the ocean has experienced in millions of years. And that fast change is what's so worrisome.

With ocean acidification rapidly changing the conditions that surround marine life, many of our ocean creatures are struggling to survive. Acidification hits corals and shellfish particularly hard because it makes it harder for them to build their shells and skeletons. Acidification also slows and hinders their development, making them weaker and more susceptible to damage and disease. An ocean without corals would be desolate. Roughly a quarter of all ocean species currently call reefs home and hundreds of millions of people rely on reefs for food, storm protection and jobs. Entire nations' tourism industries are built around coral reefs.



The ocean's unique ecosystems are not the only thing at risk. Shellfish hatcheries rely on seawater to keep their stocks alive and healthy.

Shellfish growers in the Pacific Northwest first felt the effects of ocean acidification in the mid-2000's when the more acidified water that hatcheries were pumping in to their farms was killing and slowing the growth of young shellfish. This resulted in drastic losses and near bankruptcy for many shellfish farmers. Even the enormous \$1 billion-dollar lobster industry could be threatened by ocean acidification. If we don't take action, this threat could seriously harm not only the ocean but also the communities that rely on it.

Thankfully our government decision-makers and each of us individually can take actions to limit the harmful effects of ocean acidification. Leaders at all levels need to first and foremost reduce carbon dioxide emissions. This will limit how much atmospheric carbon the ocean is absorbing and slow the rate of acidification while also mitigating the related threat of climate change. This

won't reverse the acidification that has already occurred, but it will slow the pace and give marine life a better shot at adapting to these new conditions.

On an individual level, we can help the ocean by reducing our own carbon footprint as well as thinking through our use of chemical products and fertilizers that will end up in our ocean as runoff. These extra chemical additions to our ocean can also drive the same chemical reactions as atmospheric carbon dioxide and lead to ocean acidification.

The ocean faces an unprecedented amount of change right now, from ocean acidification, to the effects of climate change, to the increasing amount of plastic debris floating in our ocean. But we can all make a difference through education, individual actions and advocacy for large-scale structural change.■

Sarah Cooley, Director of Ocean Acidification at Ocean Conservancy
Find her on Twitter at @co2ley



Coral Reefs: To Be or Not to Be

By Dr. James Porter

Although coral reefs are tropical shallow-water marine habitats and cover less than 1% of the planet, they have an outsized importance to both human beings and the natural world. For instance:

- 94 of the world's sovereign nations (roughly half of all countries) have coral reefs within their territorial boundaries.
- Most of these are developing countries desperately in need of the goods and services that coral reefs provide.
- 500 million people are dependent on coral reefs as their primary source of protein and income.
- Coral reefs generate \$9.9 trillion U.S.D. / yr. (roughly the GDP of Switzerland).
- On the Great Barrier Reef, 90,000 full-time jobs are directly dependent on the reef.
- Coral reefs have proven to be a marine pharmacopeia, yielding new drugs from the sea that can reduce the risk of heart attacks, cure certain kinds of cancer, and kill the A.I.D.S. virus more effectively than AZT.

In addition to their importance to human society, coral reefs are also of outsized importance to the history of life on Earth. Coral reefs are the oldest, most productive, and most biologically diverse of all marine communities and they are the only living things that can be seen from outer space. 25% of all marine

species of plants and animals live exclusively on coral reefs. These unique ecosystems are by far the most diverse environments on Earth. For instance, while tropical rainforests harbor only 8 animal phyla, coral reefs sport 30.

Most importantly, recent studies of the history of life on Earth show that 85% of the time that a New Family, Order, Class, or Phylum appears on Earth, it does so first on coral reefs. This makes coral reefs both a Cradle of evolution for their ability to generate radically new life forms, and a Museum for their propensity to retain species that have evolved there.

The destruction of coral reefs, therefore, does not just threaten global species diversity, but also the fundamental ability of life to generate new life forms. There are many forces that are contributing to the decline of these delicate species, including:

- The destruction of coastal zone habitats (mangroves and sea-grass beds) from rampant shore-line development.
- Overfishing on coral reefs, especially of large fish and top predators.
- Pollution from plastic particles, sunscreen, waste-water from coastal communities and runoff from agricultural lands.
- Invasive species, such as the Indo-Pacific lion fish that were released into the tropical waters of South Florida are now found everywhere throughout the Caribbean.



By far the biggest threat to coral reefs, however, comes not from these ancillary stressors, but from rising ocean temperatures. Corals already live close to their thermal tolerance limits. The addition of just 2° C will kill them.

An irony is that these tropical organisms live much closer to the high temperatures that kill them than to the low temperatures that kill them. In this respect, corals are like orchids: you can cool them down a little and they will survive, but you cannot heat them up. Elevated temperatures cause corals to lose the symbiotic algae which live inside them. When corals lose their symbiotic algae, they starve to death. These symbiotic algae also give corals their color (the colors of coral are from plant pigments, not animal pigments). When the algae die, you can see through the clear animal tissue to the bone-white lime-stone coral skeleton underneath, hence the term "coral bleaching."

There are three main actions needed to protect coral reefs into the future—and all are necessary:

- Reduce carbon dioxide in the atmosphere
- Reduce local stressors & increase recovery efforts
- Employ radical conservation & intervention techniques (such as assisted evolution to create 'super algae' and 'super corals'; assisted migration for corals and/or their larvae; and large-scale environmental engineering projects to reduce light stress and cool reefs in times of high heat stress).

Dr. James W. Porter, Josiah Meigs Distinguished Professor of Ecology, Emeritus, Odum School of Ecology, University of Georgia

This article contains excerpts from James Porter's keynote speech to the GCA's NAL meeting February 2019

CORAL MONITORING

Remote monitoring of coral reefs and developing actionable intelligence are critical for early detection, on-the-ground response, and future resilience planning to better protect these ecosystems from further degradation and loss.

In response to these concerns and to enhance coral reef resilience in a warming climate, NOAA established the Coral Reef Watch (CRW) program in 1997. For more than 20 years, NOAA CRW has utilized remote sensing and in-situ data to observe, predict, and report on coral reef environmental conditions worldwide. CRW's near real-time satellite products and modeled outlooks are management-oriented and have successfully and accurately monitored and predicted, respectively, the heat stress that causes mass coral bleaching. CRW provides the only global early-warning system of coral reef physical environmental changes. Its products help marine resource managers, scientists, decision makers and the public all over the world monitor climate change impacts to reef ecosystems; assess when reefs are vulnerable or resilient to climate change and bleaching; and prioritize resources to implement timely, effective, protective measures. This includes reducing local stressors in times of high oceanic heat stress, such as by closing major scuba diving and fishing areas. ■

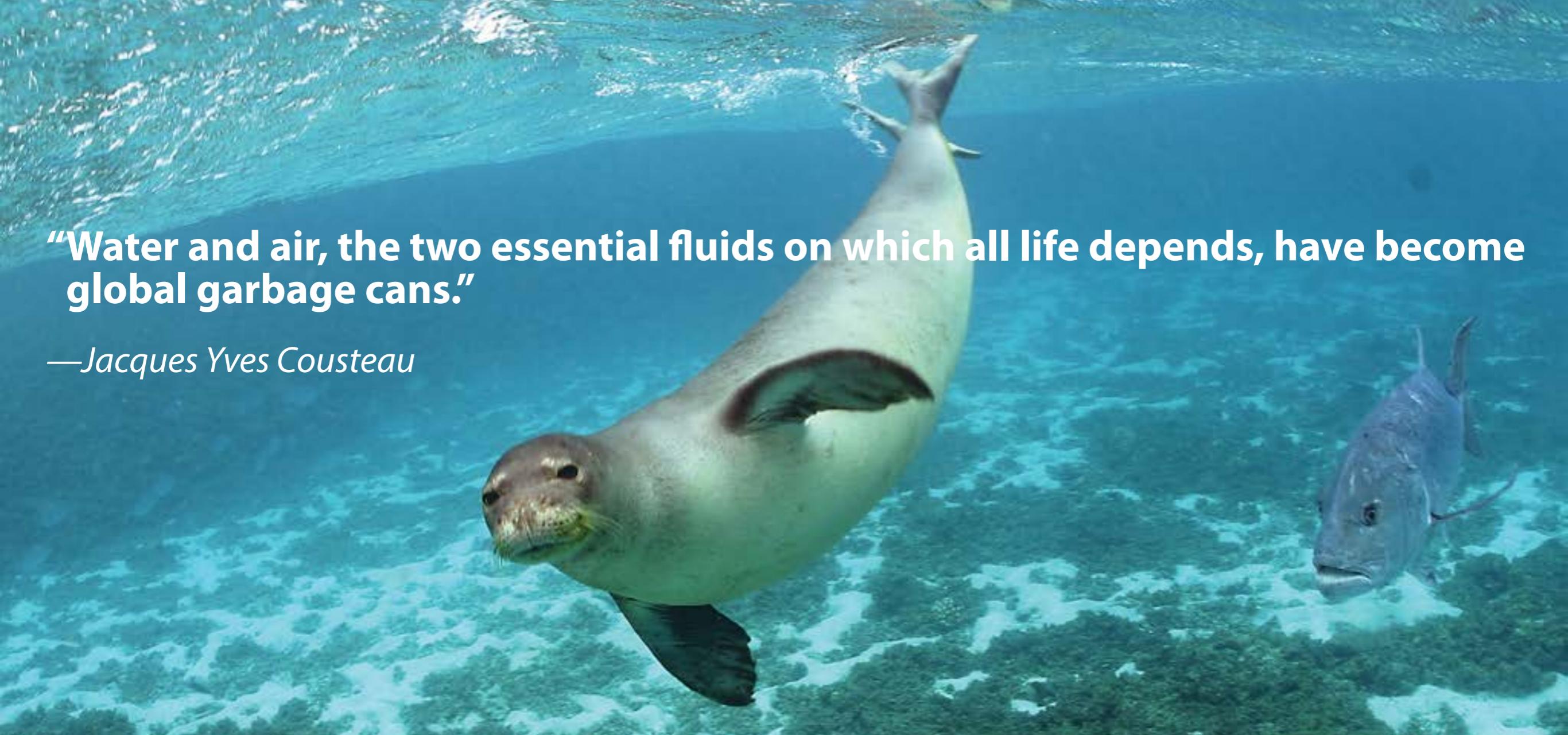
Jacqueline De La Cour, NOAA Coral Reef Watch Operations Manager.
Earth System Science Interdisciplinary Center/ Cooperative Institute for
Satellite Earth System Studies,
University of Maryland.

REEF SAFE SUNSCREEN

One key thing that each of us can do when we head to the tropics is to be cognizant about sun protection. It has been shown that many chemicals in sunscreen can damage coral reefs and aquatic life. While no sunscreen is guaranteed to be 100% reef safe, you can help the odds by checking the labels for ingredients known to be harmful to corals, in particular oxybenzone and octinoxate. Certain preservatives found in sunscreens are also toxic: parabens such as methyl paraben and butyl paraben, or phenoxyethanol, which was originally used as a mass fish anesthetic.

In 2015, it was estimated that around **14,000 tons of sunscreen** are ending up in the world's coral reefs, causing irreparable damage. While it is not our role to endorse certain products, we can recommend this excellent **article** that reviews and compares numerous sunscreen brands for their "reef friendliness" and effectiveness. You can learn more in this **article**, which includes links for purchase. ■





“Water and air, the two essential fluids on which all life depends, have become global garbage cans.”

—Jacques Yves Cousteau

Marine Protected Areas

By Carolyn Thayer Ross

Protecting, Maintaining and Restoring the Oceans

It has become clear that our oceans are suffering from the effects of climate change, overfishing and pollution. Fortunately, the United States and numerous other countries are responding to these growing threats by designating Marine Protected Areas (MPA's). In 1988, the **International Union for Conservation of Nature** (IUCN) called upon national governments, international agencies and the non-governmental community to create a system of marine protected areas

to “provide for the protection, restoration, wise-use, understanding and enjoyment of the marine heritage of the world”.

In the United States, MPAs broadly protect seas, oceans, estuaries and the Great Lakes with specific legal safeguards. Sanctuaries, coral reefs and “no-take” fishing zones are some examples of marine protected areas. Internationally, MPAs are sections of the ocean dedicated to the protection, maintenance and restoration



of ecosystems, biodiversity, natural resources and associated cultural resources. MPAs may have different goals depending on their location, including protection of seagrass beds, archeological sites, tidal lagoons, salt marshes, mangroves, the ocean floor or the open ocean. Almost all MPAs are within 200 miles of the shoreline.

Human activity restrictions in MPA's range from:

- **Fully Protected**—no human use or commercial extractive activities allowed
- **Strongly Protected**—no commercial activity and only minimal recreational activities allowed
- **Partially Protected**—multiple uses with some commercial or recreational human activities allowed, meaning fishing, boating, surfing, diving, and other recreational activities are acceptable. The majority of MPA's allow multiple uses. An example of a multiple use MPA is Acadia National Park in Maine.

More than 5000 MPA's have been designated around the world. In the last decade, there has been a surge in protection, resulting in 7.6% of the oceans in MPAs, approximately 2% of which are 'strongly protected'. The IUCN has set a global target of 10% of the ocean protected by MPA's by 2020 and 30% by 2030. In 2016, twenty-five countries joined together to designate the Ross Sea MPA in Antarctica, with 1.2 million square miles 'fully protected' from any extractive activities.

There are over **1700 MPAs** in the United States, covering approximately 41% of our marine water. More than 23 percent of these are 'strongly protected'. They are found in every region of the US, with some in estuaries and freshwater habitats, including the Great Lakes. The highest number of MPAs are in California, Oregon and Washington.

The most recent 'strongly protected' MPAs in the US include two marine national monuments, designated under the Antiquities Act of 1906 to receive the highest level of environmental recognition and conservation. The Northeast Canyons



and Seamounts Marine National Monument in the Atlantic Ocean was created in September of 2016. Located 130 miles off Cape Cod, this marine monument protects almost 5000 square miles of ocean and contains fragile, largely pristine, deep marine ecosystems and rich biodiversity, including important sea corals, endangered whales and sea turtles, other marine mammals and numerous fish species.

The largest 'strongly protected' area under US control is **Papahānaumokuākea** Marine National Monument, created in 2006 under the Antiquities Act and enlarged in 2016. This Pacific Ocean MPA in the Hawaiian Islands includes atolls, coral reefs, seamounts, banks and shoals. It encompasses 580,000 square miles, larger than all of the U.S national parks combined, and provides protection for fish, birds, marine mammals, diverse coral and other flora and fauna. **Papahānaumokuākea** is off-limits to any kind of resource extraction, with exceptions for traditional uses by indigenous peoples and scientific research. Other US marine monuments in the Pacific

include the Marianas Trench, Pacific Remote Island, and the Rose Atoll Marine National Monuments.

Research from The National Academy of Sciences in 2017 concludes that highly protected marine reserves have the ability to help oceans and society adapt to and recover from the effects of changing climate, including sea level rise, increased storm intensity, shifts in species distribution, decreased productivity and oxygen availability.

Taking action now to protect and enhance the health and resiliency of the oceans will be critical to its future survival. Marine Protected Areas offer an important tool in achieving these goals. ■

**Carolyn Thayer Ross, Chestnut Hill Garden Club, Zone 1
Current Vice Chair for Oceans**



SEAWATCH

DEDICATED TO A HEALTHY SEA OF CORTEZ

The Sea of Cortez in Mexico was once famously named “the world’s aquarium” by Jacques Cousteau due to its seemingly endless bounty of marine life, thriving reefs and rich biodiversity. It was a mecca for divers and sports fishermen from all over the world and brought wealth through tourism to the coastal communities of Baja California. But, over the last 40 years, with the increase in commercial fishing and the use of unsustainable and illegal

fishing methods, the reefs and dependent fish populations of the Sea of Cortez have declined at an alarming rate.

In La Paz, the capital city of Southern Baja California, a group of people concerned with this rapid decline in fish stocks in the Sea of Cortez formed the non-profit organization, **SeaWatch** in 1993.



Spearheaded by founder Mike McGettigan, one of the organization's early conservation successes was helping to secure protection for the Giant Pacific manta ray in the Revillagigedo Islands, 240 miles south of the Baja Peninsula, where the shark fishermen were slaughtering the mantas. With public pressure, the Mexican government decreed the islands a national biosphere in 1994, affording the mantas and other sea life permanent protection and creating a 10 million dollar a year ecotourism industry taking divers there to see the Giant Pacific mantas.

McGettigan also set in motion the acquisition of two confiscated and abandoned Chinese fishing vessels, with the idea to create artificial reefs in the shallow waters of **Espirito Santo National Park**. With help from the Mexican Navy, the ships were cleaned and sunk in the waters of the Espiritu Santo National Park, where today, 20 years later, they flourish as living reefs, enjoyed by thousands of divers a year.

In 2009, SeaWatch petitioned and secured federal regulations that prohibit any fish extraction while diving with compressed air. This outlawed the **unsustainable methods of fishing** that were removing 20 tons of reef fish nightly from the reefs around Espiritu Santo National Park and in the Bay of La Paz.

Despite the new law, this illegal and ecologically destructive, but economically lucrative, form of fishing continued unabated in the Espiritu Santo National Park. In response, SeaWatch and local stakeholders initiated a citizen-driven vigilance campaign to put a stop to the illegal fishing.

The campaign morphed into a non-profit organization called **Red de Observatorio Ciudadano** (ROC) that now monitors the waters around the park in patrol boats, captained by former illegal fishermen. It

has experienced great success, receiving national recognition from the Mexican government.

In 2017, ROC's patrol boats assisted federal fisheries authorities in the confiscation of 13 illegal fishing boats. And since April of 2018 there have been no boats found illegally fishing in Espiritu Santo National Park. As expected, fish populations have made a welcome comeback, especially the heavily targeted parrotfish.

While continuing to fund ROC, in 2016 SeaWatch initiated and continues to fund a local and very effective public communication campaign, "**Espirito Santo es parte de ti**" (Espirito Santo is part of you), working to raise public awareness and advocacy, promote community pride and good practices and eradicate illegal fishing in the park, with a focus on eliminating the market for parrotfish, a reef grazing species that is critical to the maintenance of healthy reefs.

Since it is not illegal to buy, sell or consume parrotfish in Mexico, the campaign is focused on educating and persuading the major **supermarkets** and local **restaurants** to stop selling or serving parrotfish. Vibrant reefs cannot survive without grazers like parrotfish, and without healthy reefs, the ecological health of Espiritu Santo cannot recover. This has been a very successful strategy with all 4 major supermarkets, including Walmart, and more than 50 restaurants in La Paz making the commitment to not sell or serve parrotfish.

Currently, the campaign is helping fund the work being done to gain "protected status" for all parrotfish species in the Sea of Cortez. In 2018, Espiritu Santo National Park was recognized by the **IUCN** as one of the best managed protected areas of the world—the first ever recognition of this kind in Mexico, and only the second in all Latin America.

Also in 2018, ROC won recognition by the Mexican Federal Government as one of the most important environmental organizations for nature conservation in marine protected areas. The Mexican Senate also recognized ROC as a model non-profit conservation organization.

But most important of all, local citizens and user groups are now engaged and actively involved in protecting Espiritu Santo National Park. Whale sharks arrive in ever greater numbers in the Bay of La Paz, along with thousands of **Mobula rays** and the orcas that feed on them. In 2018 Giant Pacific mantas returned after an absence of 15 years and hundreds of juvenile schooling hammerhead sharks were seen at the El Bajo seamount for the first time in over 20 years. Importantly, large schools of juvenile parrotfish and other reef fish species have returned to the **reefs of Espiritu Santo**. Such recoveries are interconnected and are proof that our collective community efforts make a difference. But with so much more to do, SeaWatch continues on its mission to work collaboratively for a healthy Sea of Cortez. ■

Lucia Corral, Director of *Espirito Santo es parte de ti* Campaign, La Paz, Mexico

Tamara Double, Volunteer, SeaWatch





Seaweed to the Rescue

By Suellen White

Our oceans are under attack. In this issue we have reported on ocean warming, acidification, current shifts and more. The birthplace of life on Earth, oceans now seem to be headed for the grave. It's hard to envision a simple solution. But seaweed may hold an answer. Researchers, farmers, innovators and entrepreneurs claim seaweed can:

- Remove CO₂
- Serve as biofuel
- Reverse acidification
- Create safe breeding sites for fish
- Replace plastics in product packaging
- Become the "next kale", enhancing food with protein and nutrients
- Become the TumsTM for cows

Demand for seaweed is growing, partially because it is chock full of nutrients, including sodium, potassium, magnesium, calcium, copper, zinc, chlorine, sulfur, and phosphorous. It's also widely recognized as an alternative source of protein.

Fortune Business Insights projects that the global seaweed market will grow from 11.5 to nearly 22 billion dollars over the next eight years.

Once a niche product in America, relegated to high-end restaurants and sushi joints, seaweed now is popping up everywhere. In Maine, **VitaminSea** is adding dried kelp flakes to baguette-style bread in order to deliver more fiber and potassium than regular bread. Another company, **AKUA**, markets a vegan kelp jerky snack and calls its products "sea greens" as opposed to seaweeds. Looking for kelp salsa, pickles or seasoning? Check out **Barnacle Foods**. Started by two Alaskans, Barnacle Foods grows, harvests and



forages for ingredients along the Alaskan coastline. How important is seaweed as a food source? Legendary functional medicine doctor Frank Lipman dubs it “the new kale.”

Biofuels

In addition to providing nutrition, seaweed may become an important energy source. Ocean Foresters, a research collaborative, is exploring how to produce energy from seaweed. Their process harvests seaweed and feeds it into a digester, which separates the carbon from the seaweed nutrients. The system returns the nutrients to the ocean to grow more seaweed. The separated carbon becomes a biomethane (natural gas). Scott Lindell of Woods Hole Oceanographic Institution says, *“Processing harvested seaweed to produce biofuels is a key step toward turning an ocean crop into a global energy source for the future.”*

The Advanced Research Projects Agency-Energy (ARPA-E) also is looking at kelp (brown seaweed) as a biofuel source. The idea is simple: Grow kelp on a large scale in offshore farms and turn it into biofuels that one day could power millions of homes and cars.

Deacidification and Methane Reduction

In addition to nutrition and energy, seaweed may help to de-acidify the oceans. Ocean acidity has increased 30% since the Industrial Revolution. Like all plants, seaweed absorbs carbon dioxide as it grows. Since seaweed grows some 30 to 60 times faster than land-based plants, the **Climate Council** calls it an ideal candidate for massive, long-term carbon sequestration.

Researchers studying seaweed and de-acidification may receive monies if the U.S. House of Representatives passes a bill known as **H.R. 265**. The bill would fund scientists from NOAA and the Departments of Agriculture and Energy to study a range of de-acidification solutions, including use of mangroves, kelp forests, seagrass meadows and tidal marshes.

Seaweed also may help clean the air. Indeed, seaweed can become an antacid for livestock. Field trials have shown that adding 1% seaweed to **livestock diets** decreases methane production by 58%. Alexander Hristov, a professor of dairy nutrition at Penn State, reduced methane emissions by 80% by adding red seaweed to dairy cow diets. A Connecticut company, **GreenWave** has partnered with **Elm Innovations** to explore open ocean farming trials of red algae to



provide consistent and scaled source of feed for cattle ranchers in California. Ongoing research results are promising.

Ocean Farming

Seaweed farms also may enhance fish farming. Typically, coral reefs are central to fish farming. As coral reefs decline, researchers are looking for alternatives. Researchers at The University of Western Australia, for instance, reported increased catches of rabbitfish in seaweed farms.

Similarly, Green Wave is promoting a **3D Ocean Farming** model. Named by *Time Magazine* as one of the 25 best inventions of 2017, the system grows seaweed and other species like oysters, mussels, clams, and scallops on ropes suspended vertically in the ocean. The column not only produces food, it also filters and cleans the surrounding water. This method is more sustainable than wild harvesting, which can lead to the clear-cutting of valuable ecosystems.

How Fast will Solutions Come?

Seaweed clearly has great potential for meeting the world's environmental problems. But growing and harvesting enough seaweed to fulfill that potential

is a serious challenge. Today's available technology is designed for small scale farms. Scaling up seaweed production will require new techniques and technologies.

Today, 99% of seaweed farming takes place in China and Southeast Asia. The rest of the world will need to invest in seaweed farming if it is to become a global solution. Additionally, current farming practices can have negative side effects. Farmers sometimes remove too many seagrasses, dig up coral reefs and even cut down mangroves. To harvest seaweed's immense potential will require new research and innovation.

In Norway, where unfavorable conditions devastated seaweed farms, a group of researchers discovered a new method—growing seaweed on shore instead of in the ocean. Creative minds dedicated to seaweed's immense potential give us reasons to hope.■

Suellen White, Garden Club of Denver, Zone XII

Vice Chairman of Native Plants/Pollinators/Endangered Species/Invasive Species

Designed to Disappear



Everyday Things: Bioplastic

You may be wondering "what are bioplastics and are they everyday things"? It is our hope that seaweed will become the new plastic of the future. Fifty years ago, the classic movie, "*The Graduate*" predicted that "the Future is Plastics." And they were right. Almost half the plastic ever manufactured has been made in the past 15 years and plastic packaging now accounts for almost half of all plastic waste globally.

The demand for plastic seems to be increasing every year. But to effectively combat our plastic pollution crisis, it will be important to move away from fossil fuel based plastics altogether by designing bioplastics that are compostable and economically competitive.

Fortunately, we are starting to see a host of new products that could replace single-use plastics such as utensils, straws, food packaging and more. And, seaweed is the star ingredient making it possible. These new products are 100% biodegradable and, in some cases, even edible. Here are some of the exciting new product developments:

By Jean Roth & Bennett Burns

■ **Ooho**, developed in London as a biodegradable, vegan seaweed container for drinks. Ooho was trialed at the 2018 London Marathon. By handing runners water in seaweed pouches, the event eliminated some 200,000 plastic bottles. Their website states: "Our goal is to make packaging disappear." Recent crowdfunding helped the team grow their product line beyond Ooho to other items such as sachets for sauces and liners for takeout boxes. In 2019, they named the material NOTPLA.



■ **Evoware** markets seaweed packaging specifically designed to combat plastic waste. Looking for a burger wrap or bread wrap? Instant noodle seasoning package? Evoware is a 100% biodegradable, zero waste product, with a shelf life of two years. Evoware collaborates with local seaweed farmers in Indonesia to produce its bioplastic packaging.

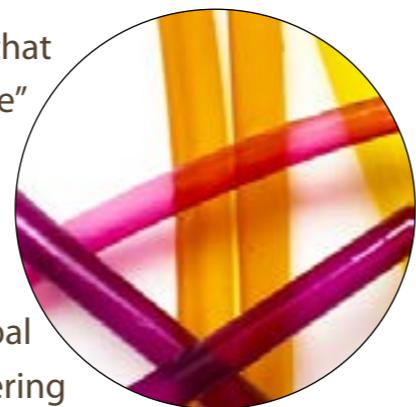




Edible Loliware glasses made from seaweed are biodegradeable

The company's stated goal is "to end plastic waste issues while improving the well-being of Indonesia's seaweed farmers." Evoware dissolves in warm water, works as a natural fertilizer for plants and is safe to eat.

- **Loliware** uses seaweed to create single-use items that are "designed to disappear". Their "Straw of the Future" looks, feels and acts like plastic, but is made from 100% food grade materials. It will disappear either through composting or natural processes.



Further on the horizon, there is a new global community coming out of design and engineering schools that is creating promising solutions. With institutional support and free-market capital, some of these innovators may be able to translate their prototypes into marketable products.

- **Marinatex**, a fully biodegradable and compostable material made of fish skin and red algae, has been designed as an environmentally-responsible replacement for plastic film used in a host of packaging, including sandwich bags. The designer, a 4th year product design student out of the University of Sussex states: "With Marinatex, we are transforming a waste stream into the main component of a new product. By doing so, we have created a consistent,

transparent and 'plastic-like' material with a more planet friendly and product appropriate lifecycle for packaging."

- **Algoteck**, based in Portland, Oregon, was started by three young innovators at the University of Oregon. They were Inspired by Ooho to come up with an algae-based bioplastic. Their product can be made in varying thicknesses, is biodegradable, and can be injection-molded to create single use items like ice cream tasters. They hope to start producing and licensing their ecoplastics this year.

- Young **Dutch designers** are creating a bioplastic made of algae, which they believe could completely replace synthetic plastics over time. They cultivate algae in their lab and then process it into a material that can be used to 3D print objects. The designers believe that the algae polymer could be used to make everything from shampoo bottles to tableware, eventually replacing plastics made from fossil fuels. The studio's ultimate goal is to establish a local network of biopolymer





3D printers, called the **3D Bakery**. They dream that there will be a shop on every street corner where you can “bake” organic raw materials, just like fresh bread. But instead of bread, it could be furniture, lamps, tableware or just about anything!

These inspiring examples are just the tip of the iceberg. Our generation of complacent consumption may have created the plastic revolution, but the next generation of innovators are well on their way to fix it. ■

Jean Roth, Portland Garden Club, Zone XII

Bennett Burns, Portland Garden Club, Zone XII, Editor, ConWatch





Connecting to Conservation Through the Lens of Human Health

By Elizabeth Waddill

"Somehow you just get led to where you're supposed to be, if you're willing to submit."—Wendell Berry

Ninety GCA participants were led to Louisville, KY for the very first Conservation Study Conference (CSC), where we gathered to take an intimate look at conservation in Louisville and experience Greening the Bluegrass, the theme of this year's event.

The overarching theme for our Conservation and NAL Committees this year is to see the connections in all areas of our work. We certainly connected to conservation issues in Kentucky thanks to the thoughtful planning of Jana Dowds. We looked through the lens of human health and how healthy air, water, and soil impact all of us and our communities.

For the first two days, the Conservation NAL Committees held meetings and ventured out to witness firsthand the challenges the region is facing. The first afternoon, we experienced the importance of the Clean Water Act up close as we canoed down Beargrass Creek, a tributary of the Ohio River and Kentucky's largest urban stream. We learned about the connection to storm water runoff and the health of urban watersheds and saw the impacts of combined sewer / stormwater outflows on water health.

The committee was treated to a sustainable farm-to-table dinner at the home of Christy Brown, GCA member of the Glenview Garden Club, community leader and founder of the ***Christina Lee Brown Envirome Institute***. The mission of Envirome is to understand how the human environment affects human health and to promote an understanding of environmental health



issues, both locally and globally. She inspired the group by saying that we are all part of the solution to effect positive change and emphasized the importance of the interrelation of all forms of health.

We visited **The Berry Center** and heard nuggets of poetic wisdom from Wendell Berry along with his daughter, Mary. The pre-reading for the trip was his book, *The Unsettling of America*, which focuses on the relationship between "big agriculture" and its ripple effects into our culture today. He talked about the importance of place and paying attention to the benefits of the natural world rather than to immediate "purchased" solutions. His Center focuses on helping young farmers thrive through education in agrarian thought and practice that is holistic and place-based.

We then toured Hermitage Farm and learned about the Olympic sport of carriage racing from owner Steve Wilson. That afternoon, the new delegates met us at Woodland Farm, the home of Steve Wilson and Laura Lee Brown. Their home is nestled on the banks of the Ohio River and is full of contemporary art from their lifetime collection. The farm-to-table dinner was the perfect welcome for our 45 new CSC delegates!

Wednesday morning the combined group of 90 gathered to hear an all-star lineup of conservation speakers. Peter Byck, environmental film maker (*Soil Carbon Cowboys, Carbon Nation, One Hundred Thousand Beating Hearts*) and

professor at Arizona State University, spoke to the delegates on "Soil Health, Farmer Wealth" as he compared the results of regenerative agriculture to conventional methods.

Other speakers included Shannon Fisk of Earthjustice presenting "Promoting Solar Energy and Cleaning up Coal Ash in Kentucky". David Phemister, Danna Baxley and Chris Chandler of the Kentucky Chapter of The Nature Conservancy discussed central Appalachian conservation projects, natural climate solutions and building healthy cities. GCA member Dr. Diane Lewis focused on how we can start in our own yards by not using pesticides, which end up in our water supply, and setting our intentions by taking the Healthy Yard Pledge on the GCA conservation landing page.

Dr. Ted Smith of the Envirome Institute at the University of Louisville spoke to us about the work of connecting healthy air, water and soil. He was followed by Dr. Aruni Bhatnager, a distinguished scholar in the Institute of Molecular Cardiology, professor of medicine, and a professor of biochemistry and molecular biology. His work has led to the creation of the new field of environmental cardiology.

After a day of immersion in conservation education and breakout sessions to brainstorm how to connect the messages with our clubs, we set out for Old Forrester Distillery to tour the bourbon making process and hear from Adam Edelen of Creative Energy Solutions, who conveyed

the advances of solar energy partnerships in Eastern Kentucky. He is currently working on the first large scale solar project on a mountaintop removal site that will put 600 former coal miners back to work in renewable energy.

Thursday morning the group took an environmental awareness tour of a neighborhood in Louisville known as Rubbertown. It gets its name from tire and synthetic rubber plants that were built there during World War II near existing refineries. Factories in Rubbertown now produce a wide variety of chemicals and materials. We heard about the effects to the health of the neighborhood and the struggles with balancing industry with human and environmental health.

We toured two city parks enhancing the quality of life for Louisvillians. The Parklands at Floyds Fork is a 20-mile 4000-acre addition to the Louisville Park System and is a natural and recreational asset to the city in the heart of the last major undeveloped part of Louisville. We ended the day at Waterfront Park, a vibrant greenspace that was formerly an abandoned industrial wasteland. The Waterfront Development Corporation has been dedicated to providing a first-class gathering space and bringing the Ohio River back to the people.

The grand finale was a trip to Churchill Downs and the Kentucky Derby Museum. As we sipped mint juleps, dressed in "derby attire", we watched the "*The Greatest Race*", the world's only 360° movie about horse racing and the derby.

This trip showed us the many facets of environmental conservation challenges, issues and successes and how healthy air, water and soil affects our health and well-being. The generosity of the Louisville community will live in our hearts and inspire us to connect the conservation dots in our corner of the country, as well as be a part of the solution. As Wendell Berry says, "*The only possible guarantee of the future is responsible behavior in the present.*" Let's get going! ■

Elizabeth Waddill, Magnolia Garden Club, Zone IX

Chairman of the Conservation Committee

Wendell Berry wrote this poem as part of his acceptance speech as the GCA Cynthia Pratt Laughlin Medalist in 2008. He read it to our group.

A SPEECH TO THE GARDEN CLUB OF AMERICA

Thank you.

I am glad to know we're friends, of course;

There are so many outcomes that are worse.

But I must add I'm sorry for getting here

By a sustained explosion through the air,

Burning the world in fact to rise much higher

Than we should go. The world may end in fire

As prophesied—our world! We speak of it

As "fuel" while we burn it in our fit

Of temporary progress, digging up

An antique dark-held luster to corrupt

The present light with smokes and smudges,
poison

To outlast time and shatter comprehension.

Burning the world to live in it is wrong,

As wrong as to make war to get along

And be at peace, to falsify the land

By sciences of greed, or by demand

For food that is fast or cheap to falsify

The body's health and pleasure—don't ask why.

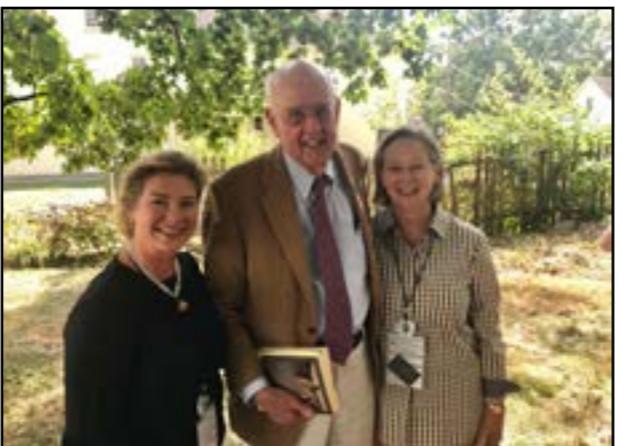
But why not play it cool? Why not survive

By Nature's laws that still keep us alive?

Let us enlighten, then our earthly burdens



By going back to school, this time in gardens
That burn no hotter than the summer day.
By birth and growth, ripeness, death and decay,
By goods that bind us to all living things,
Life of our life, the garden lives and sings.
The Wheel of Light, delight, the fact of wonder,
Contemporary light, work, sweat, and hunger
Bring food to table, food to cellar shelves.
A creature of the surface, like ourselves,
The garden lives by the immortal Wheel
That turns in place year after year, to heal
It whole. Unlike our economic pyre
That draws from rock a fossil fire.
An anti-life of radiance and fume
That burns as power and remains as doom,
The garden delves no deeper than its roots
And lifts no higher than its leaves and fruits.







NAL Issues to Watch: Save Our Seas 2.0 Act

By Karen Gilhuly and Carolyn Ross

Plastic pollution is pervasive in our oceans. It is found everywhere from our beaches to more than 35,000 feet underwater in the Mariana Trench.

As the crisis of marine and plastic debris in our oceans has become better understood, the Senate Oceans Caucus Co-Chairs, Dan Sullivan (R-Alaska) and Sheldon Whitehouse (D-Rhode Island) along with Bob Menendez (D-New Jersey) have co-sponsored a bill, ***Save Our Seas 2.0 Act (S.1982)*** to combat the marine debris that is threatening marine ecosystems and coastlines globally. SOS 2.0 builds on the success of the original SOS Act, which was signed into law in October 2018. S.1982 currently has 15 bipartisan co-sponsors, including 8 original co-sponsors. As Senator Sullivan said, “*The good news is that this is one environmental issue that is solvable, actionable, and measurable.*”

The original bill has been divided into three components, all of which address the reduction of plastic pollution in our oceans. Dividing the original into three

separate bills allows different, relevant senate committees to review the bills more effectively, and may increase the likelihood of the bills becoming law.

All three bills are making steady progress through the committee review process.

S. 2364: SOS 2.0: Enhancing the Domestic Marine Debris Response Act creates a “Marine Debris Response Trust Fund”, allocating \$2M for fiscal year 2020 and allowing for further funding through the Government and public and private sources. It creates a Marine Debris Foundation to support NOAA as it works to *“assess, prevent, reduce, and remove marine debris, address the adverse impacts of marine debris on the economy of the United States, the marine environment, and navigation safety”*.



It also creates a genius prize program to support advancements in packaging, materials, detection, cleanup, and other designs.

S. 2260: SOS 2.0: Improving Domestic Infrastructure to Prevent Marine Debris Act supports investment in improvements to our domestic waste management, water infrastructure and recycling programs to prevent marine debris.

S. 2372: SOS 2.0: Enhanced Global Engagement to Combat Marine Debris Act supports government outreach to, and collaboration with, other countries and foreign organizations to recover, manage, reuse and recycle plastic waste and to reduce marine debris, recognizing that international cooperation is necessary to rescue our imperiled

and shared oceans.

There is a companion bill in the House of Representatives (**H.R. 3969**) which currently has the bi-partisan support of nineteen co-sponsors.

GCA will be watching the progress of SOS 2.0 and the three component bills closely. To track the bills, you can visit [Congress.gov](https://www.congress.gov). As always, you can reach out to your elected officials directly to let them know you'd like to see this bill become law. The GCA's position paper on Oceans, can be found on the **GCA website** on the NAL or Conservation Committee pages. ■

Karen Gilhuly, Woodside-Atherton Garden Club, Zone XII
Vice Chairman of Legislation and Policy, NAL Committee



Artist Profile: Zaria Forman

By Harriette Brainard

Zaria Forman documents climate change through large-scale pastel drawings. She travels to remote regions of the world to collect images and inspiration for her work, which is exhibited worldwide. She has flown with NASA on several **Operation IceBridge** missions over Antarctica, Greenland and Arctic Canada; has delivered a **TEDTalk**; and was featured on **PBS** and **BBC**. Harriette sat down with her to learn more.

HB. It makes sense that your work is quite large given the scale of the glaciers that you are illustrating. However, it is still difficult for us to understand how you are able to draw these Glaciers so clearly from a small photograph. Can you help us to understand your process?

ZF. When I travel, I take thousands of photographs. Once I return to the studio, I draw from my memory of the experience, as well as from the photographs, to create large-scale compositions. Occasionally I will re-shape the ice a little or simplify a busy background to create a balanced composition, but 90% of the time I am depicting the exact scene that I witnessed, because I want to

stay true to the landscape that existed at that point in time. I begin with a very simple pencil sketch so I have a few major lines to follow, and then I add layers of pigment onto the paper, smudging everything with my palms and fingers and breaking the pastel into sharp shards to render finer details.

HB. Can you tell us a little of your mother, as she was such a pioneer, a female photographer of the Arctic. Do you have an idea where/when her passion emerged?

ZF. My mother dedicated her life to photographing the most remote regions of the earth. The cold and isolated landscape of the Arctic consumed her interest from 2001 until her passing in 2011. She always said that she had been a polar bear in a past life and watching her spend endless hours in the frigid winds, patiently and happily waiting for the moment when the light was right, gave me no doubts that this was true! She taught me the importance of loving what you do, and carrying out projects full force, no matter what obstacles lay ahead.



All drawings for this article courtesy of Zaria Forman

Her first encounter with icebergs was in Patagonia, Argentina, in 2001. I believe her obsession with cold, icy landscapes was born on that trip, but she always loved remote places. She loved the serenity, and meditative qualities of far off places without any human activity.

HB. In talking about your art, you mention the unexpected beauty and sound of the landscape, it moves your audience to want to share in this experience. It is so compelling. The Glaciers are similar to climate change itself in this way, so slow moving that we do not see it, yet we do with your art.

ZF. I would like as many people as possible to see my work, and to have a moment in which they feel transported to these remote places at the forefront of climate change. If they can experience these places that otherwise might seem disconnected from our everyday life but are in fact critical to our global climate system, perhaps they will be inspired to take action to protect and preserve this planet that sustains us, so future human generations may thrive. I hope my drawings can facilitate a deeper understanding of the climate crisis, helping us find meaning and optimism in shifting landscapes.

HB. Your work feels so emotional, and when you speak about climate change and its impact on your work, it has a very profound effect on your audience. Do you always have such a strong reaction from your audience?

ZF. I have dedicated my career to translating and illuminating scientists' warnings and statistics through an accessible medium, one that moves us in

a way that statistics may not. Psychology tells us that humans take action and make decisions based on emotion above all else. Studies have shown that art can impact our emotions more effectively than a scary news report. My drawings explore moments of transition, turbulence, and tranquility in the landscape. I choose to convey the beauty as opposed to the devastation of threatened places. If people can experience the sublimity of these landscapes, perhaps they will be inspired to protect and preserve them.

HB. Your work has truly drawn me to the movement and life within the Glaciers. How can others help you share this emotional connection?

ZF. Artists play a critical role in communicating climate change, which is arguably the most important challenge we face as a global community. That said, anyone could help spread awareness, and can be a part of the positive change that is happening everywhere. Most people finally believe in human-caused climate change, yet most don't think they are being affected personally, or that they even will be here in the next 20 years. But we are all affected by the climate crisis now, whether it's extreme weather, crop failure, or your flood insurance costs rising. If we can all share our personal stories about this global issue, it will help everyone connect and wrap their heads around something that is difficult for all of us to comprehend, and arguably the biggest challenge of our time. ■

Harriette Brainard, Stony Brook Garden Club, Zone IV

Assistant Editor, ConWatch

Errera Channel, Antarctica, Drawing by Zaria Forman

