THE OCEANS PROJECT

Lessons from the Endangered Seas

Hosted
by
Alexandra Cousteau

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A Six Part Series about the Health of the Earth's Oceans

Based on the book Ocean's End
By
Colin Woodard

Series Proposal
By
Christof Bove

Lawrence Bender Productions
8530 Wilshire Blvd., 5th Flr., Ste 500
Beverly Hills, California 90211

Walk out onto the ugly piers that line the Black Sea shores in Yalta and look into the water. You'll see them everywhere. Ubiquitous jellies of assorted shapes and sizes rising and falling in the rollers under the mountainous Crimean shores: undulating round jellyfish, ovoid comb jellies, finger-sized transparent creatures that feed on the specks of life that live in each drop of water.

Under your feet, bag-like comb jellies move about like automated vacuum cleaners eating anything in their path. There's one near the piling you're standing beside. It looks extraterrestrial, and it is in fact alien to the Black Sea. One end of the creature opens wide; its whole body convulses, refracting sunlight in the shimmering rainbow as it sucks everything in the vicinity into its formless insides. Larval clams, fish, and crabs, hapless juvenile moon jellyfish, and microscopic copepods—whole generations are falling before this endless alien herd.

You can see them from every pier and beach, each time you look over your ship's railing or wade in the murky surf. From the rainy shore of eastern Turkey to the dry headlands of Yalta you see them in countless multitudes, dotting the Black Sea like stars in the night sky.

They've grazed the sea nearly clean, these voracious comb jellies. Their numbers are unthinkably huge: a billion tons at last estimate, more than ten times the weight of all the fish caught by the fishermen in the world in a year. In a few short years they've all but conquered this ancient sea, starving out fish and dolphins, emptying fishermen's nets, and converting the web of life into brainless, wraith-like blobs of jelly.

How did this sea die? Is it a vision of our future?

The Cradle of Life

Seen from space, Earth is clearly an ocean planet, a bright blue ball swaddled in clouds of water vapor. Oceans cover over 71 percent of our planet's surface. The continents seem an afterthought, an irregular brownish-green matte in which to frame our world's great masterpiece: It is the oceans, not the land, that make our planet unique, setting it apart from the dozens of dead worlds in our solar system.

The oceans gave our planet life, coddled and nurtured it, and allowed it to colonize the hostile environment of the land. And it is upon the profusion of life within the oceans that all oxygen-breathing life forms depend on for survival.

The oceans are the cradle of life, but for most of human history this fact has eluded us. That's not surprising. Unable to explore and participate in the undersea realm, humans regarded it as a dark and threatening place, the lair of monsters and wrathful gods for whom men and ships were favored quarry. During ancient times, sheltered seas and coastal waters surrendered fish and fostered trade, but the oceans were a frightening desert, a formidable obstacle separating life-sustaining continents and islands.

The Ancients knew more about the stars and planets than they did about the undersea world, and so do we. We are better informed about the Moon and Mars than about the bottom of the ocean floor; we know more about the life cycle of stars than about those of the sperm whale, giant squid, and many of the creatures sought by the world's fishing fleets.

Such is the strength of our bias towards land that not until we started searching for signs of life on other worlds did we really begin to understand the significance of the oceans to life on Earth. Studies of Mars and Venus, whose atmospheres are almost entirely carbon dioxide, have made clear the life-sustaining role of Earth's nitrogen- and oxygen-rich atmosphere and a surface dominated by liquid water.

After 365 million years ashore, we are only beginning to explore the watery kingdom from which all life sprang. Sadly, those explorations are revealing that our power and ignorance are rapidly destroying the living oceans. We are polluting the seas back to prehistoric times.

The cradle of life is becoming a watery grave.

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The Series

This is a multi-part show about how the oceans touch every aspect of human life and how the deterioration of life in the oceans will affect us all. A vital and irreplaceable part of the living planet is being destroyed before we even begin to understand it. There is plenty of blame to go around. Politicians, developers, corporations, tourists, you and I all play a role. But the underlying problem is ignorance, a failure to comprehend that despite their scale, the oceans are as finite and destructible as the forests, jungles, rivers, and lakes of the continents. It is not too late to mend our ways. The oceans can and should be protected, and the effort would make our global economy more efficient, less wasteful, and better able to provide for a future world of 10 billion. First, however, we must understand what the oceans are and how we are causing them so much trouble. It comes down to one principle: We've put too much into the sea and we're taking too much out.

Our ignorance leads us all too easily to the fundamental mistake of believing that the seas are an ever-flowing, self-replenishing bounty. Over the course of six episodes, the show will take us around the world and under the seas. For the first time in one televised program, the interlocking pieces of the ocean's vital ecosystems will be explored. It will show us what they were, what they are and what they are becoming. Each of the episodes will examine not only what is wrong but also how we can make critical corrections. In a very important way, this is a show aimed at educating people about life beneath the sea, because we as a global people know so little about life beneath the ocean's infinite surface. Even though the seas of the world balance on a narrow and fragile precipice, it is not yet too late to take action to fix what we have broken.

We must learn from our mistakes and take critical action. This is a show about both.

The episodes will reveal the critical link between river runoff pollution, atmospheric pollution, over-fishing, river re-engineering, coastal development, garbage disposal, human waste management and tourism. These are the most volatile ingredients in the destruction of the earth's oceans.

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Episode Summaries

If life on Earth is a single, complex system, then Antarctica is its heart, the slowly beating pump that drives the world. The annual freezing and thawing of its vast halo of ice drives the oceans' currents and, in turn, the climate of the Earth. As the poles melt, the effects will be felt in ocean—and human—systems around the world, as basic oceanic conditions that have remained stable for eight or ten millennia are thrown out of kilter, altering sea levels, coastlines, and marine life. These are their stories, the stories of endangered seas.

1. **California – Polluted Back to Prehistoric Times**
   Toxic algae blooms are killing hundreds of mammals each year along the California coast and around the world. Deadly blooms of bacteria and other ancient microorganisms are breaking out all over the globe; some are toxic to humans causing rashes, boils and respiratory illnesses. These outbreaks of previously rare microbes are triggered by human activity like fertilizer, sewage, and industrial discharges – and are turning back the clock to a time when microscopic creatures – not tuna, sharks, and whales – ruled the seas.
2. **The Gulf of Mexico – A Giant Needle Shooting Filth into the Sea**
   The Army Corps of Engineers tamed the Mississippi with concrete and levees. The farmers of "America's breadbasket" tamed their farmland with drainage tiles and chemical fertilizer to maximize its yield. These actions have caused devastation to animals and humans alike. The Mississippi is now a hypodermic needle injecting tons of toxic gumbo into the Gulf of Mexico, killing everything in a 7000 square mile area. And this same re-engineered river caused the massive vulnerability exploited by Katrina.
3. **The Pacific Ocean – Drowning in a Sea of Plastic**
   Everyday tons of garbage flow into our oceans. 90% of it is plastic, which is a sponge for toxic oily chemicals like PCBs and DDT. This debris continues to float for as much as a century, and ocean gyres—giant eddies the size of Texas—are gathering it into vast debris fields hundreds of miles across. By filling the oceans with laundry baskets, Legos, plastic shopping bags, sneakers, toy soldiers, and soda bottles, we've contaminated the food chain with toxins, an ultimately suicidal act, as we are the apex predator.
4. **Belize – Rainforests of the Sea**
   We are burying, crushing, suffocating, dynamiting and poisoning one of the most essential ocean habitats: The coral reefs that form the foundation of undersea life in the tropics. Lose the reefs and the web of life will crumble, taking a great chunk of the human economy with it. Already we are on track to destroy over 30% of the world's reefs by 2020. Coastal development, over-fishing, aquarium harvesting, and chemical poisoning are killing the corals.

5. **Newfoundland – Strip Mining the Sea**
   Once the greatest fishing grounds the world has ever known, the Grand Banks of Newfoundland are now empty. Between 1960 and the 1990s, we exterminated the entire cod population. The tragedy of Newfoundland, which affects both marine and human life, is now being repeated around the world: We are fishing the oceans empty. The Grand Banks catastrophe is a sobering harbinger and a critical lesson.
6. **The Black Sea – A Vision of the future**
   Today the Black Sea is but a ghost of its former self. For millennia, the sea offered a vast and vibrant bounty to human civilization. After years of polluting and over-fishing, the sea is now choked with algae and alien jellyfish. It is a shocking example of how we are corrupting the Earth's vital seas.

A Change in Thinking

Colin Woodard continues to write about our oceans, their fates and ours. He writes about loss, and he writes about hope. Through it all is a simple, sobering axiom: These changes we cause in no way endanger the Earth itself; the planet cares little whether the animal biomass in the Black Sea consists primarily of anchovies or jellyfish. But the changes are a danger to us. We then are our only hope.

So what do we do? Answers are thankfully out there and in some places, actually being put into practice. The show will not only identify the problems, but also will tell the stories of the people, experiments, and technologies that could restore the seas, if they were more broadly embraced. The solutions sound like jargon – ecosystem-based management, sustainable aquaculture, marine protected areas – but behind each is a vivid, human, and thought-provoking tale of common sense, exploration, and discovery.

Never before has a single program brought together our endangered seas. This is what we will do.

Scientific Advisory Board

Dr. Sylvia Earle

Sylvia Earle, called "Her Deepness" by the New Yorker and the New York Times, "Living Legend" by the Library of Congress, and first "Hero for the Planet," is an oceanographer, explorer, author, and lecturer with experience as a field research scientist. She also is executive director for corporate and nonprofit organizations, including The Aspen Institute, The Conservation Fund, American Rivers, Mote Marine Laboratory, Duke University Marine Laboratory, Rutgers Institute for Marine Science and the Woods Hole Oceanographic Institution, National Marine Sanctuary Foundation, and Ocean Conservancy. Former chief scientist of NOAA, Earle is president of Deep Search International, and chair of the Advisory Council for the Harte Research Institute for Gulf of Mexico Studies. She has a B.S. from Florida State University, M.S. and Ph.D. from Duke University, and 15 honorary degrees. She has authored more than 150 scientific, technical, and popular publications, lectured in more than 60 countries, and appeared in hundreds of television productions.

Earle has led more than 60 expeditions and logged more than 6,000 hours underwater, including leading the first team of women aquanauts during the Tektite Project in 1970 and setting a record for solo diving to a depth of 1,000 meters. Her research concerns marine ecosystems with special reference to exploration and the development and use of new technologies for access and effective operations in the deep sea and other remote environments.

Honors include The Netherlands Order of the Golden Ark, the National Women's Hall of Fame, American Academy of Achievement, and medals from the Explorers Club, the Philadelphia Academy of Sciences, Lindbergh Foundation, National Wildlife Federation, Sigma Xi, Barnard College, New England Aquarium, Seattle Aquarium, Society of Women Geographers, and the National Parks Conservation Association.

Dr. Jane Lubchenco

Jane Lubchenco, Wayne and Gladys Valley Professor of Marine Biology and Distinguished Professor of Zoology at Oregon State University (OSU), is an expert on ocean ecosystems and the human/environment nexus, which includes biodiversity, climate change, sustainability science, ecosystem services, marine reserves, coastal marine ecosystems, the state of the oceans, and the state of the planet.

Dr. Lubchenco earned a B.A. in biology from Colorado College and an M.A. from the University of Washington and Ph.D. from Harvard University, both in marine ecology. With Dr. Bruce Menge, she heads the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO), a team of scientists from four institutions that studies near-shore marine ecosystems along the West Coast. Dr. Lubchenco is also involved in collaborative research in New Zealand, Chile, and South Africa to compare coastal upwelling ecosystems around the world. She is a founding principal of the Communication

Partnership for Science and the Sea (COMPASS), a collaborative project among academic scientists, communication and media specialists (Sea Web), and the Monterey Bay Aquarium Center for the Future of the Oceans.

Dr. Robert Steneck

Robert Steneck studies the ecology and evolution of plants and animals that dominate subtidal marine communities. His initial approach was to examine the functional anatomy and morphology of algae as a means of understanding how its properties mediate important ecological processes such as productivity, competition, and herbivory. Steneck extended this methodology and has taken similar approaches to studies of several animal groups, such as herbivorous snails, predatory crabs, lobsters, and urchins. Since the mid-1980s, Steneck has focused much of his attention on lobster and urchin research, conservation, and management in the Gulf of Maine.

He has been a professor at the University of Maine School of Marine Sciences, based at the Darling Marine Center, for nearly two decades. Previously he was as research associate at the Marine Systems Laboratory of the Smithsonian Institution. Steneck has also been a visiting professor at Catholic University in Santiago, Chile and Cape Town University in Cape Town, South Africa. He has written more than 50 peer-reviewed scientific publications on basic marine biology, ecology and geology as well as recent works on the science of managing marine resources.

Steneck is also an international expert on crustose coralline algae (Rhodophyta, Corallinales) which are among the most diverse and abundant organisms to occupy hard substratum within illuminated zones of the marine realm. Steneck has studied their taxonomy, ecology and evolution in the western North Atlantic (Maine), Caribbean, eastern North Pacific and the Great Barrier Reef. His evolutionary studies of corallines and their herbivores are based on what is found in their fossil record relative to what is known about their functional anatomy and morphology. This approach helps to reconstruct paleoalgal communities that are over 300 million years old.

Steneck is now focusing his energies in trying to apply ecological approaches to the management of coral reef ecosystems. This involves working with stakeholders, government officials and local NGOs in Bonaire. His research focuses on the links between fishing on coral reefs and the recruitment success of corals.

Dr. Laurence Mee

Dr. Mee is currently Director of the Marine Institute, School of Earth, Ocean and Environmental Sciences at the University of Plymouth. He received a PhD Chemical Oceanography from The University of Liverpool in 1977. Other distinctions include: "Investigador Nacional" (Mexico) 1984-87, Chartered Chemist (CChem) 1993, Fellowship of the Royal Society of Chemistry (FRSC) 1993, Academician - Full Member of the Ukrainian Academy of Ecological Sciences, 1995, Honorary Member of the Georgian Academy of Ecological Sciences, 1996, and Pew Fellow in Marine

Conservation, Year of the Oceans, 1998. Between 1998-2000 he was Visiting Professor, Plymouth Environmental Research Centre, Plymouth University. Senior Consultant, International Centre for Water Studies Ltd., Amersfoort, The Netherlands. 1993-1998 Coordinator (D2/1), UN Global Environmental Facility - Black Sea Environmental Programme. 1987-1993 Head, Marine Environmental Studies Lab., IAEA Marine Environment Laboratory, Monaco. 1977- 1987 Researcher (Investigador Assoc. C) and Senior Lecturer (Profesor Titular A) at the Marine and Limnological Sciences, Institute of the National Autonomous University of Mexico (in Mexico City and at the Mazatlan field station). 1975-1977 Honorary research associate at the Instituto de Ciencias del Mar y Limnologia, UNAM, Mexico. The work was partly funded by the UK Natural Environmental Research Council and partly by UNAM (through a project sponsored by the Comision del Rio Balsas) and in association with UNDP/UNESCO. He is a member of The Royal Society of Chemistry, UK, Oceanography Society, USA (charter member), and Estuarine and Coastal Sciences Association, UK, from 1988.

David W. Jourdan

Mr. Jourdan is the founder and president of Nauticos LLC, a company devoted to the exploration of the deep oceans.

His career of nearly 30 years has been devoted to the exploration of the deep oceans, concentrating in the areas of remote sensing, underwater navigation, and renewable energy applications.

During his commission as a U.S. Navy submarine officer and as a physicist at the Johns Hopkins University Applied Physics Laboratory, he became an expert in the exploitation of large undersea environmental data sets, specializing in information collected by U.S. Navy ocean research submersibles and associated development programs.

As leader of Nauticos for over 20 years, he has continued to support scientific, archaeological, and military programs. These include the development of oceanographic database systems for the Navy, development and use of Kalman Filter navigation analysis software for submarine inertial navigators, and support of autonomous underwater vehicle (AUV) test programs. More recently, he has worked on projects to develop the use of cold Deep-Ocean Water for fresh water production, cold agriculture, and other renewable energy applications.

In 1999 Mr. Jourdan was honored as Maryland's Small Business Person of the Year and awarded Ernest and Young's Entrepreneur of the Year in Science and Technology. He is an International Fellow of the Explorer's Club, and a member of the Sea-Space Symposium.