If some alien called me up..."Hello, this is Alpha, and we want to know what kind of life you have,"—I'd say, water-based...Earth organisms figure out how to make do—without almost anything else.

The single nonnegotiable thing life requires is water.

Christopher McKay, NASA Scientist, Omni, July 1992

"Suppose the oceans dried up tomorrow. Why should I care? I don't swim. I hate boats. I get seasick. I don't even like to eat fish. Why should I object if some of them—or all of them—go extinct? Who needs the oceans?"

The questions were fired at me without pause by an impish young Australian standing along the shore near Melbourne. She thrust a microphone under my chin and smiled expectantly. I was a featured speaker at a 1976 conference about the oceans, and anticipated answering questions about what it was like to live underwater, meet sharks, dive on shipwrecks, or perhaps to tell about exploring unknown depths, about going where no woman—or man—had gone before.

Groaning silently, I thought, Good grief! Can she be serious? Suppose the oceans dried up tomorrow! What a concept! Who needs the oceans? Who doesn't need the ocean? I glanced at the rippled edge of the vast, sparkling blueness that dominates the planet, embraces islands and continents, shapes the character of climate and weather, and from the sunlit surface to the greatest, darkest depths seven miles down is home for most of life on earth. Then I said, with a sweep of my arms:

"Right, dry up the oceans. Think of all the good stuff lost at sea that you could just scoop up. The trouble is, there wouldn't be anybody around to do that. Without an ocean, there would be no life—no people, anyway." "Well, how so?" she prodded. "People don't drink saltwater." "Okay," I began. "Get rid of the ocean, and Earth would be a lot like Mars. Cold, barren, inhospitable. Ask those who are trying to figure out how astronauts can live there. Or, how about the moon. There's a place with no bothersome ocean. And no life. Or Venus. Yes, the beautiful—and lifeless—hor planet with no ocean. It doesn't matter where on Earth you live, everyone is utterly dependent on the existence of that lovely, living saltwater soup. There's plenty of water in the universe without life, but nowhere is there life without water."

I paused, looked back at the incoming waves, then added—hoping I was in tune with the reporter and her audience—"The living ocean drives planetary chemistry, governs climate and weather, and otherwise provides the cornerstone of the life-support system for all creatures on our planet, from deep-sea starfish to desert saguaro. That's why the ocean matters. If the sea is sick, we'll feel it. If it dies, we die. Our future and the state of the oceans are one."

The importance of the ocean to life on Earth seemed so obvious to me, a thoroughly academic but perpetually waterlogged marine scientist who had spent years at universities and research laboratories as well as at sea, and thousands of hours diving in the Atlantic, Pacific, and Indian oceans. That and weeks of living underwater in submerged quarters and many hours cruising the depths in small submarines were practical "fish-on" preparation for a career that would include starting and running a company to design and operate underwater equipment and traveling to more than thirty countries for lectures, research, and meetings on ocean policy.

In retrospect, the questions posed by the tongue-in-cheeky Australian were mild compared to later grilling by many who really did not see the relevance of the ocean to their everyday lives. Years later, as Chief Scientist of the National Oceanic and Atmospheric Administration (NOAA) from 1990 to 1992—where I was known to my friends as the US "sturgeon general," charged with looking after planetary health—I came into contact with a startling number of bright and influential people who seemed not to know or care that the sea is changing, and that the fundamental underpinnings of all that we hold dear as humans is jeopardized by such ignorance and indifference. I wondered what could jolt people from their complacency, could make them notice the dangers of overfishing, of poisoning the sea with toxic chemicals that return to us in intricate but inevitable pathways, and of blindly tinkering with Earth's life-support mechanisms.

I have tried to think of other responses to those simple-sounding questions about why the oceans matter. Sometimes, I try to imagine what intelligent aliens, viewing Earth from afar, might think about the sea. From their perch in the sky, they could immediately see what many earthlings never seem to grasp: that this is a planet dominated by saltwater! In fact, the ocean is the cornerstone of the systems that sustain us: every breath we take is linked to the sea. Clouds of freshwater are lofted from the sea surface to the atmosphere as vapor and return there, via the land, as fog, rain, sleet, and snow. Swirling hurricanes, billowing thunderheads, wispy cirrus clouds, are born in the ocean. This vast, three-dimensional realm, accounting for 97 percent of Earth's water, also makes up more than 50 percent of the biosphere, the planet's "living space." NOAA biologist Nancy Force-Pinard says it sustains life on Earth, "a marine habitat." Sometimes I try a poetic approach and describe how luminous, rainbow-colored jellyfish, starlike planktonic creatures, giant squid, translucent pink prawns, gray dolphins, brown lizards, spotted giraffes, emerald moses, rustling grasses, every leaf on every tree and all people everywhere, even residents of inland cities and deserts who may never see the sea, are nonetheless dependent upon it.

Often I quote the eloquent bard of science Loren Eiseley in The Immense Journey:

"If there is magic on this planet, it is contained in water...its substance reaches everywhere; it touches the past and prepares the future; it moves under the poles and waders slowly in the heights of air. It can assume forms of exquisite perfection in a snowflake, or strip the living to a single shining bone cast upon the sea."

Occasionally I draw upon Ogden Nash's "A Beginner's Guide to the Ocean":

"It is generally understood to be the source of much of our rain,
And ten thousand fleets are said to have swept over it in vain."

Sometimes, I am tempted to leave oceanography to Ogden, but thoughtful questions posed about the significance of the sea to human survival and well-being demand deeper probing. To do so, I touch familiar pillars of my understanding of how things are, and peer over the edge of many great unknowns. Common sense forces me to consider first the incredible sweep of time that preceded this moment and the ocean's great age, relative to the infinitesimally small fragment of time enjoyed thus far by humankind.

Life began in the sea more than 3.5 billion years ago and has prospered on land less than half that long. Our distant primate ancestors entered the scene about sixty-five million years ago, while our history as humans can be traced back only about five million years. The roots of modern human civilization are much more recent, starting as the last great Ice Age gave way to more temperate times about ten thousand years ago.

In this ten-thousand-year span our species has been successful, slowly increasing in number from thousands to millions. It took the entire history of humankind to produce, by 1800, a billion people. By 1930 there were two billion, and within fifty years that number doubled to four billion. Now nearing six billion, the rate of growth is slowing. At the present rate, this will occur early in the twenty-first century. Our soaring population may suggest success as a species, but the environmental price of modern civilization is high, and our prospects may be short-lived.

In the rush to "develop" and use the legacy 4.6 billion years in the making, we have struck the earth like a slow-motion comet, wielding powerful new forces of change, rivaling and compounding the impact of
natural storms, volcanoes, earthquakes, disease, fire—
even, it now seems, nudging the grand and gradual plan-
etary processes that cause ice ages to come and go.

At night, astronomers witness our cities glowing with
otherworldly light created by the squandering of mil-
ions of years of fossil wealth in a geological moment.
Highways crisscross the land, simultaneously forming
pathways and barriers. Complex, resilient, and naturally
productive ecosystems are disappearing in favor of geo-
metrically regular plots bearing vulnerable, single-
species crops. Cement and asphalt cover an increas-
ingly large percentage of life-giving land and water.
Other changes are less obvious: the removal of billions of tons
of living creatures from the ocean in the past century and
the addition of billions of tons of toxic substances.

For a species that prides itself on being "intelligent"
and capable of "anticipating the future," and of making
conscious plans that are in our best interest, what we are
doing to the earth is a stark contradiction. Our cava-
tilier attitude about the state of the sea is especially
egni-
matic, given the ocean's vital significance. Curiously,
no one really knows what the consequences will be of
ocean dumping, oil spills, whale kills, and thousands
of other thoughtless actions that chip and
gouge away at the healthy functioning of ocean sys-
tems. This much is certain: We have the power to dam-
age the sea, but no sure way to heal the harm.

How can we find out what's happening to the ocean?
Through observations from aircraft, satellites, and
manned spacecraft, the character of the sea surface is
increasingly well known, but what of that enormously
important life-filled space below? Despite the swift
advances in knowledge about the earth in recent years,
the fact remains that below the depth where most
divers can venture, about 150 feet, little of the ocean
has been seen, let alone explored. Instruments can be
dowered to obtain selected samples, a few small
submersibles can travel, briefly, to great depths, and once,
in 1960, two men spent half an hour at the deepest part
of the ocean, 35,800 feet down. Suppose the rest of
the planet were known from techniques now used to
explore the sea. Suppose knowledge of deserts and
forests were based on brief excursions limited by the air
supply carried around on the backs of the observers.
Or suppose information about trees, foxes, squirrels, bears,
ferns, and other terrestrial life had to be gleaned from
crushed and mangled samples obtained by blindly drag-
ging nets from somewhere high above. Imagine Jane
Goodall's frustration if in her study of chimpanzees she
were limited to present oceanographic techniques.

All things considered, it seems so reasonable that peo-
ple should care about the oceans and should be driven
by a sense of urgency about knowing more. One of the
great unsolved mysteries of the sea is why they don't. An
aquatic atmosphere covers most of the planet's surface,
embraces the continents, and provides a home for
most of life on Earth, yet it remains for humankind inac-
cessible and unknown, by and large ignored, over-
looked, or simply taken for granted. How is this possible?
I posed this question during a lunch in 1979 with that
wise and worldly woman Clare Booth Luce, a congress-
woman, playwright, former ambassador to Italy—and
also an avid scuba diver. I was meeting with her to talk
about our mutual interest in the fate of a vocal group
of Hawaiian winter residents: the singing, spouting—
and endangered—humpback whales. While we dis-
cussed ways to ensure their survival, it was natural to
consider the broader issues of human attitudes toward
the ocean.

"All the reasons for justifying going into space can be
applied to the ocean, from basic curiosity and the plea-
sure of being there to scientific, commercial, military,
and even lofty philosophical goals," I said. "You know,
finding answers to the big questions: Where did we come
from? Where are we going? How did life come to be?
What has kept humankind from exploring the sea?"
I asked. "Is it something basically human, such as the fact
that we are land-dwelling, air-breathing mammals,
blissed out with hungs, not gills, and feet, not flippers? Lack
of wings has not kept us from flying, but many seem
more comfortable with the idea of going to the moon or
Mars than descending into the depths of the ocean.
Why do you suppose this is so?"

Before answering, she gently lifted a large, pink
prawn from her salad (one of those extraordinary crea-
tures whose ancestry precedes ours by nearly half a bil-
lion years), paused, and looked out at the blue Pacific
beyond the shore of her stately beachside villa.

"Look, it's simple," she said. "I've thought about this a
lot and am quite sure that it relates to human culture
more than human nature." Casting her eyes toward a ra-
diant bank of fluffy white Hawaiian clouds she said,
"After all, Heaven is up there...and you know what's in
the other direction"

We laughed and began thinking of other everyday at-
titudes that serve to direct humans' interest skyward.
I said, "Yes, you often hear, Onward and upward!
Never...Onward and downward!"

Looking pleased, she said, "Nobody wishes on a starfish—"

It was my turn. "It's okay to feel as though you're fly-
ing—but who wants to be in over her head?"
Whatever the real reasons, we agreed that there is a
tendency for most people to be complacent about the
ocean and ocean life, and to regard the sea and all that
it provides as somehow not as relevant to our everyday
lives as terrestrial and freshwater environments. Al-
though some are aware of pollution problems, declin-
ing stocks of fish, and pressures on populations of dol-
phins and whales, for most people concern for the state
of the oceans is not a high priority.

This apparent indifference also may be related to the
widely held view that the ocean is so vast and resilient
that there is little reason to worry, either about what is put
in or about what is taken out. Nearly two centuries ago
Lord Byron expressed this view when he wrote a few
lines often quoted by those of us looking for ways to
emphasize the slow pace of change in the sea:

Roll on, thou deep and dark blue ocean—roll
Mark me the earth with ruin—his control
Stops with the shore.

No more. Although it is indeed impossible to control
the ocean any more than it is possible to dictate the
course of the world's winds, Byron would be shocked if
he could see the numerous changes that have occurred
in the seas since his time, especially in recent decades.

Two centuries ago, there were no forty-nine-mile-long
drift nets sweeping through the open sea, indiscriminately
taking everything in their path, from targeted tuna to frag-
ile jellyfish, turtles, and even whales. There were no
megatrawlers scraping entire ecosystems into giant
maws, no acoustic fish finders, no factory ships for pro-
cessing catches at sea, no global marketing and distri-
bution systems that make possible the appearance in Tokyo
restaurants of creatures still living, though taken from half
a world away. There also were no nuclear wastes, no
nerv-gas disposal sites, no oil spills, no plastic debris, no
pesticides nor herbicides nor fertilizer runoff from mil-
ions of acres of farmland, lawns, and parks, no sewage
sludge, and many other substances not known in all of
the preceding history of the earth.

Since the 1800s, numerous species and entire complex
living ecosystems many millions of years in the making
have been decimated or significantly altered, from popu-
lations of whales and other large mammals to dozens of
corals, thousands of different species of mollusks, all marine
nurseries, many sharks, and numerous small creatures including certain
krill, crabs, and shrimp. Worldwide, the living network of
microorganisms that shape the basic ingredients of the
ocean's "living soup" has been regimen, with unknown consequences. Far too little is
known about the earth's living processes to know or pre-
dict the specific consequences of our tinkering, but the
outcome is not likely to be favorable for humankind.

Curiously, those who claim to believe that the earth and
all living things were created by God in fact appear to
place greater value on human works and the judgment of
mankind. This alarming arrogance was laments more than
a century ago by the English scientist and philoso-
pher Albert R. Wallace, who even then was appalled at
the magnitude of extinction of living forms, which, as he said,"the progress of cultivation invariably entails." In 1863, he
wrote in the Journal of the Royal Geographic Society:

Future ages will charge us with having culpably
allowed the destruction of some of those records of
creation which we bad in to our power to preserve,
and while professing to regard all living things as
the direct handiwork and best evidence of a Creator,
yet, with a strange inconsistency, seeing many of
them perish irrecoverably from the earth, unca
cred for and unknown.

No one can say for sure what such disruptions may
mean. Great changes are clearly taking place, though
a global experiment is in progress, and we are in the mid-
dle of it, as a part of, not apart from, the rest of life on
Earth. Unlike most other participants, though, we have
the ability to alter the course of events, and we shall,
either through conscious decisions aimed at making a
difference, or by default, through inaction or ignorance.

This is a time of pivotal, magnified significance for
humankind. The fabric of life and the physical and
cultural nature of the planet have been significantly al-
terred through decisions already made by our predeces-
sors and those now living; what happens next depends
on what we do, or do not do, individually and collec-
tively, in the next few decades. Depending on choices we
make, our species may be able to achieve a viable, sus-
tainable future, or we may continue to alter the nature
of the planet that our kind will perish.

As a child I sometimes longed for a way to cruise
through time as described by H.G. Wells in his science-
fiction thriller The Time Machine. It was exhilarating
to imagine traveling into the past or future as easily as tak-
ing a trip to the beach, so I traveled among all marine
nurseries, many sharks, and numerous small creatures including certain
krill, crabs, and shrimp. Worldwide, the living network of

the beach at Ocean City where we went for vacations, and maybe even to great cities to see how people lived, what they are, and whether or not they would like to hear the latest news from the past.

I also dreamed of zooming back in time, to see the earth when dinosaurs abounded—and long before, when trilobites, early relatives of horseshoe crabs, cruised the ocean depths, and great nautilus-like ammonites jetted about in diverse profusion. Skipping closer to the present time, I wished to be able to see for myself what the world had been like when my grandparents—and parents—were young. My father described the Delaware River as a magical place ringing with the laughter of summer swimmers, a place filled with clear water and large fish that watched small boys with apparent curiosity. It did not sound at all like the Delaware River I knew as a child, a place already reeling from upstream pressures that forever changed the nature of that once immensely productive waterway.

My parents, born in 1900 and 1902, grew up on small farms still surrounded by woodland, where flocks of birds darkened the skies, spring and fall. They had twenty kinds of apples, seckle pears, garden corn, beans, and tomatoes every summer; fresh bread baked at home every day, hand-pumped well water, milk from their own cows, chestnut trees, and snow and rain that fell wondrously pure, without a deadly cargo of exotic hitchhiking chemicals. They witnessed the arrival and impact of domestic electrical service, indoor plumbing, automobiles, paved highways, aircraft, radio, movies, television, supermarkets, world wars, pesticides, herbicides, antibiotics, nuclear power, space travel, satellites, electronics, computers, and thousands of elements of everyday life that my children simply take for granted as a natural part of being a human being.

As alluring as times past and future are, and as much as I wish to be able to rush back to 1800 with urgent messages about the consequences of certain foolish decisions made along the way—or to leap ahead, to see what actually happens—on balance, if I had to choose the most interesting and important time in all of human history to live, it would be now. As never before, and perhaps as never again, the choices made in the near future will determine mankind's success, or lack of it. These are the “good old days” sure to be envied by those in the future.

Amazingly, the urgent messages I would take to those who lived long ago are precisely the same as the concerns I wish to make known today. They derive largely from thousands of unusual hours spent in places witnessed by few others, often under circumstances that cannot be repeated. In the chapters that follow, I want to share the exhilaration of discovery, and convey a sense of urgency about the need for all of us to use whatever talents and resources we have to continue to explore and understand the nature of this extraordinary ocean planet. Far and away the greatest threat to the sea and to the future of mankind is ignorance. But with knowing comes caring, and with caring, the hope that maybe we'll find the Holy Grail of understanding, strike a balance with the natural systems that sustain us, and thus achieve an enduring place for humankind on a planet that got along without us for billions of years and no doubt could do so again.

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