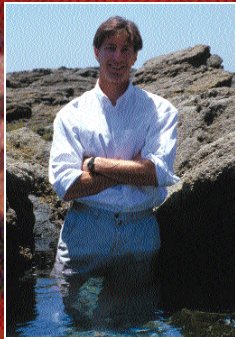


sustainability:

it's all about the beach

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Both Photos: Mozzen

What is it about the beach? People and the coast have gone together like.....well, like surf and sand. Today, it may be more like a grain of sand and an oyster; one gets a shimmering pearl, but only at the oyster's expense. Where metaphor fails, facts tell a real tale. Growing up in Laguna Beach, California, I thought I was pretty unique. Not exactly, it seems. The coast is the place where people live, work and play. More than 40% of the world's population lives within 60 miles of the coast. This is a deep reflection of the major role that the ocean and access to it play in our food, our transportation and our quality of life.

The ocean's role in people's lives runs even deeper than just being the biggest room in our global human house. The ocean is also central to a number of ecosystem services. Ecosystem services are not simply individual resources that we find and use in nature, things such as wood, water, metals, petroleum, etc. They are the sum of these resources, combined with the biological and geophysical processes that we typically call "nature." Ecosystem services are clean water, breathable air, a stable climate, fertile soil, our protective blue sky, medicinal compounds, food production, and many more. These are services that we typically take for granted. Their presence is as intuitive as breathing. We simply use them.

The ocean and our beaches play an enormous role in many of these life supporting services. The ocean is a

central player in the ongoing chemical symphony that makes up our planet's atmosphere—anyone who's escaped to the cool of the beach on a sweltering summer day knows this first hand. Plankton in the ocean has been estimated to provide at least 50% of the atmosphere's oxygen. The ocean also plays a complex role in the global carbon cycle, adding and removing CO² to the air we breathe. The oceans plays crucial roles in the movements of a wide number of elements, including nitrogen, phosphorous and iron, all key ingredients in the cycles of living things. As for the water we drink —and that makes up about ~65% of the stuff we call "us"— the oceans are the beginning, the end and a filter in between. Because the ocean is fluid and connected, it is also central to moving almost everything around the globe. In one sense the oceans are nature's warehouse and central transportation system and the beaches, nature's marketplace.

There's another ecosystem service that nature provides for us: It's called fun. Along the entire perimeter of the oceans is the beach and the coastal zone, the most used interface between people and ocean. Take your surfboard out on a glassy day, with a slight offshore breeze blowing and a 6 foot swell lining up. As you drop in, sliding down a smooth aquamarine bowl of clear water and feel the wave surge under your feet, thank nature for putting it all together—and, hey, go ahead and have some fun. Just try not to. Or, as you sink your feet into that cool layer of sand that hides

just under the sun scorched surface of the beach, look out at the surfer carving his name on a wave as the sun slowly sets, and thank nature again for the pulsing water that piled that smooth sandy beach right there for you to sink into.

Unfortunately, the oceans and our beaches—all of them—are under grave assault, and we are a big, the biggest, part of the problem. Just as the oceans and the beaches are central to the planet's life supporting services, they are impacted by most of what goes on around the globe. We are blasting the oceans on multiple fronts. We are taking too many of the living things from the sea (an estimated 70% of the world's fisheries and fishing areas are in decline). Marine habitat is being physically destroyed at a terrible rate (there are less than 10% of the wetlands left in California alone, not to mention trawling and drag fishing which destroy the very productive capacity of the oceans themselves). Because the oceans are the catch all for the planet, they are also under chemical assault, with 80% of the human inputs coming from those of us on land. This includes everything from persistent and toxic compounds like PCBs, dioxins and fossil fuels, to heavy metals and even nutrient pollution, such as nitrogen influx from runoff from agriculture or absorption from air pollution from our automobiles and power plants. The ecosystem services that we call a beach and a wave is under threat of becoming something we won't recognize as fun.

What should we do? How we are living today is a big part of the problem. Yet, by our very human and animal nature we need to be part of the ocean and the beach. Even more directly, because of the central role the oceans play in life supporting ecosystem services, we can't even separate where the ocean and human interplay begins and ends. The inescapable conclusion is that in so many ways when you talk about basic human needs, it all comes down to the beach.

In recognizing that connection between people and ocean, and using the best science, there may be some answers. Taking a big, systems view of the ocean might allow us to see simple themes underlying the complex interaction of people and ocean, or even people and planet. After all most of what we each do as a person, that is what you really spend most of your

time doing, which is just living, is not in itself inherently harmful to the ocean or the planet. Quite the contrary. Humans fit in as well as any other living thing into ecosystems and ecosystem services. We are part of the big, living picture too. There is a great chance that we can all be as big a part of the solution as we have been the problem. Interested?

What do we know about the system we live in, the planet? Let's take a 250,000 mile view from the moon to look down on our blue-green home. We can see it's a closed system for matter, but open for energy. That means that all the stuff that the planet is made of is what we have and that it stays here. The stuff of the planet doesn't go away and there's no more being dropped in from outside (with the exception of minor meteors). No matter how we bend it, heat it, mix it or mush it, it's basic constituents are still here. The sun adds energy to the mix, and lots of it. Photosynthetic plants, including the ocean's algae, use the sunlight and the stuff of the planet to make the food that we eat and the oxygen we breath. We can see that all of this happens in a large cycle with the plants making structure and us animals breaking it down, back into raw materials, using the combined work of the plants and the sun to fuel our own activities and building. Add small flows from the earth's crust in the form of some minerals and a few metals and we have a surprisingly useful picture of how people interact with the planet.

So then how do we stop our assault on the oceans and the beaches, and still have fun? We do what we're so good at. We can just do it, while still doing the things we want to do. Sound impossible? Pie in the sky? Maybe. But surprisingly, if we go upstream and combine our big picture of the planet with what we know about how the oceans and beaches are being battered, we can create some general rules that are pretty much universal:

1) We mustn't keep taking more out of the ground than naturally goes back in, like petroleum and rare metals. If we stop systematically taking these things out and spreading them around, the oceans and our beaches won't become toxic dump sites.

2) We mustn't keep systematically making compounds that the natural cycles, and the oceans, just can't handle,

things that don't break down naturally. If we quit doing this over time, the ocean will stop being the collection pool for things that never go away.

3) We mustn't physically and systematically destroy the beaches and the ocean faster than they can recover. Try the corollary of this one and see how far you get.

4) People need to be able to meet their basic needs, otherwise they just can't worry about the state of the beach and the ocean—or the planet.

These four principles set the bar pretty high and aim way upstream—a funny thing that to let the oceans work we need to look way upstream. Makes sense though. Rather than treating each crisis the oceans and beaches might face, let's get to the core of the problems and stop the crises before they happen. Impossible? Maybe, or maybe it's just a matter of taking baby steps and using the principles above as a guide. Some people are trying. A number of companies and communities have set out to raise themselves to this bar. You can even do this on your own. Ask yourself about the things you buy and the things you do. See where you are breaking the rules the ocean asks us to live by. Working with these oceanic, or planetary, guidelines makes winning the healthy beach and ocean game possible, not easy, but possible. Instead of thinking about what you can't do because of these principles, think about all that you can do. Don't just demand this of yourself; ask for help. Ask the producers of your cars, or your cleaning products, of your gardening products, your stuff, and your food to produce these things within the guidelines of the ocean. Just by asking you create an opportunity, for them, yourself, your family and the planet.

Keep in mind that the connection between you and the beach is as deep and as long as the history of the planet. It seems pretty clear that what's good for our oceans and our beaches is actually what's good for us.

Dr. Basile received his undergraduate degree in physics at the University of California, Irvine and his doctorate in biophysics from the University of California, Berkeley. He has advanced training in biophysics, cellular biology, molecular genetics, and education, and has undertaken research in numerous areas, including environmental toxicology, cancer, and aging. To learn more about The Natural Step, visit www.naturalstep.org.