

How should marine resources be managed?

Alert!

We have some breaking news from WPHO. Team GoNorth! needs your help.

It's gooey! It's black! It lives at the bottom of the ocean! Nope—it's not a creature from a horror movie. It's petroleum. And it's everywhere in our lives.

In fact, it's virtually certain that the clothes you're wearing, the chair you're sitting on, the screen you're watching, and the pencil you're chewing all required oil at some stage. We fuel our cars and factories with it. We turn it into plastic, a material we use in countless ways. It's hard to believe that the first commercial petroleum well is just 150 years old. Since that time, petroleum—oil and natural gas—has become one of the most important natural resources in the world.

And that can be considered a problem. The more uses we find for oil, the more oil we want—and the trouble is, oil is a finite, nonrenewable resource: We're starting to run out.

Oil, or petroleum, is formed when dead plants and animals that sink to the bottom of lakes and the ocean are covered up with rock sediment faster than they can decompose. Over thousands and thousands of years, these biomass deposits slowly cook down to become petroleum.

Nobody knows how much oil is on the planet, but we do know that the reserves deep in the earth, which we've drilled and relied on for the past century and a half, are drying up. Companies that drill the oil are on a desperate search for more reserves.

And lately they've been looking in the ocean. It's hardly surprising that we should look to the ocean for untapped oil. A hundred years ago, places like North America and Africa represented a vast storehouse of natural resources. Today, the ocean is truly the last unexplored region of earth. Humans have put a man on the moon—but we have yet to explore even a fraction of the ocean!

What we do know is that the ocean covers 71 percent of the world's surface and represents the world's most diverse and populous ecosystem. The tropical rainforest, teeming with thousands of species, is perhaps the most biodiverse ecosystem on land—but it pales in comparison with the biodiversity in the ocean. Scientists are discovering a new ocean species at a rate of one every six hours!

Technically, there's just one ocean, but geographers have subdivided it into five regions: the Pacific, Atlantic, Indian, Arctic, and Southern oceans. Among these, there are as many as 30 distinct eco-zones, ranging from the tropical waters of the equator to the ice-covered poles. Moreover, the ocean supports life at every depth, with light-loving fish and plants at the top and strange phosphorescent creatures in the unexplored dark depths.

Humans have always used the natural resources of the ocean to survive. Throughout human history oceans have been (and still are) essential, not only for food but for transportation, as most of the world's goods move by ship between seaports; and we are just beginning to explore the deep ocean for biomedical organisms with enormous potential for fighting diseases.

One-third of the world's 6 billion people rely on fish and other aquatic products for at least 20 percent of their protein intake; and for more than 400 million people in the poorest countries in Africa and

Asia, fish make up more than half of their essential protein and mineral intake. The employment of some 520 million people globally depends on fisheries. That fact, paired with marine locations that rely almost entirely on income derived from tourism, makes the ocean enormously important to the economy and well-being of communities around the world.

And then there's the oil. Since oil is formed underwater, geologists know that vast reserves of oil naturally occur under the ocean floor. Until recently, offshore oil exploration had to take place in shallow water. Now we can search up to 10,000 feet (3 to 4 kilometers) below the surface. Today, about 20 percent of the oil used by the United States comes from more than 4,000 offshore drilling operations in the Gulf of Mexico and off the coasts of California and Alaska.

On April 20, 2010, one of these drilling rigs exploded, killing 11 workers and unleashing the largest disaster in the history of oil exploration. Over the next 86 days, nearly 5 million barrels of oil were pumped into the fragile ecosystem of the Gulf of Mexico. Hundreds of miles of coastline, thousands of sea creatures, and the livelihoods of entire human populations along the coast were destroyed as a result. The full scope of the disaster will only be revealed in time.

Even when everything goes according to plan, offshore drilling can have devastating effects on ocean ecosystems and humans. In Beringia, Alaska's North Slope is a key oil-producing region. Team GoNorth! will travel through several Iñupiat communities there whose lives are affected by oil and oil exploration, for both good and bad.

For generations, these people have relied on marine mammals, especially the bowhead whale, to provide the raw materials for survival. However, the bowhead is afraid of the noisy oil-drilling rigs, and swims far off its traditional migratory path to avoid them. As a result, the Iñupiat's basic traditional survival is at risk.

Oil exploration poses risks to marine ecosystems—but perhaps even greater risk is posed by the refining and uses of petroleum after it has been harvested. Because it is made from ancient life-forms, and all life-forms are built from carbon, petroleum is a vast, concentrated storehouse of carbon. When burned—for example, to power a car—petroleum products release vast quantities of gaseous carbon dioxide into the atmosphere, where it traps the sun's heat, warming the planet. Carbon dioxide also makes the ocean more acidic, threatening the life-forms uniquely adapted to its natural pH.

Perhaps the most absurd threat to the world's largest ecosystem is simple plastic discarded on land and washed into the sea. One might not think that a little plastic would mean much in a vast ocean that covers nearly 140 million square miles (370 million square kilometers). However, the garbage gets concentrated into a handful of *gyres*, such as the Pacific gyre. This rotating ocean current alone contains a garbage dump that is estimated to be twice the size of Texas. And the plastic stays there—*forever*. Plastic never disappears or biodegrades; it just breaks into smaller and smaller chunks until it's the size of microscopic particles. Sea creatures eat them, then starve to death with bellies full of plastic. The chemical compounds in plastic are not found in nature, and they act as toxins in the ecosystem. The impact of an ocean poisoned by millions of tons of degraded, toxic cigarette lighters, plastic bags, and plastic beverage bottles is sobering.

So if oil is so bad, why do we keep drilling it? The answer is complicated. At its simplest level, the explanation lies in *supply and demand*. This economic principle states that the more people want something and the less there is of it, the more incentive there is for investors to find it and sell it. When supplies dwindle to such an extent that prices are driven sky-high, consumers no longer choose the product, and the bottom drops out of the market.

Human history is littered with examples of this cycle. Before the discovery of petroleum, for example, our primary source of oil was whale blubber. By the time the cycle of supply and demand had taken its course, whales were on the brink of extinction. A century later, whale populations remain depleted.

The trouble is that simple supply and demand fails to take into account the health of ecosystems and the long-term sustainability of our natural resources. As the world population grows, it becomes increasingly vital to learn new ways of meeting our basic needs while preserving our common trove of natural resources.

Team GoNorth! is traveling to Beringia, in part to learn about sustainable development from the Iñupiat of Alaska's North Slope. For 20,000 years, the Iñupiat have sustainably harvested the ocean's natural resources, which places them among the world's foremost experts on the topic!

On this mission, Team GoNorth! reports that they urgently need your help with three things. The first is to investigate marine ecosystems to discover their strengths and vulnerabilities. Second is to explore the sustainable economy of the Iñupiat and contrast that with the market economy of the industrialized world. And finally, based on your analysis of economic and cultural forces, we need you to help the team provide a recommendation for how to answer the important question: How should marine sources be managed?

Good luck, explorers!