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Antarctica: Fact Sheet



Introduction

The continent of Antarctica is home to a uniquely beautiful and harsh environment that has changed little in the last 30 million years. The continent, approximately twice the size of Australia, lies mainly within the Antarctic circle and is surrounded by ocean. It is covered almost entirely by a sheet of ice and snow which has an average thickness of approximately 6,500 feet, comprising slightly more than 90% of the world's ice and 70% of the world's freshwater resources. This thick sheet of ice - also known as the ice cap - reflects most of the heat generated by the sun back into the atmosphere, leaving the continent with an annual mean temperature of -57° Fahrenheit. Antarctica is the world's coldest and most pristine environment. The continent is also the driest and windiest landmass on Earth; with winds reaching speeds of up to 200 miles per hour and areas where rain has not fallen in millions of years. Antarctica also is the highest continent on earth, with an average elevation of 7,380 feet.

Oil Exploration



Antarctica's serenely primitive wilderness faces an uncertain future as debate continues over the question

of tapping into the continent's wealth of mineral resources. Beginning in the early 1950s, scientists began to notice the value inherent in such an unusual and largely undiscovered continent and began establishing research stations there. By 1958, the International Geophysical Year (IGY) saw twelve countries establish over 60 bases, both on and around the Antarctic continent, with some countries claiming parts of Antarctica as sovereign territory. The countries initially involved in the scientific body known as the Scientific Committee on Antarctic Research (SCAR) included the United States, Chile, Argentina, Norway, France, Australia, New Zealand, the United Kingdom, South Africa, Belgium, Russia and Japan. SCAR now includes Germany and Poland as members of the organization which aims to coordinate a number of scientific and working group programs and to further facilitate the sharing and planning of scientific information relating to Antarctic research, such as Climate Change.

The successful establishment of SCAR and the IGY in Antarctica was due in large part to cooperation between the countries involved, and led directly to the signing of the Antarctic Treaty in 1959, which has administered Antarctic affairs since 1961 when it officially entered into force. The Antarctic Treaty, signed during mounting Cold War tensions, successfully banned all military activity, nuclear testing, and the dumping of radioactive materials on the continent. The 1991 Protocol on Environmental Protection to the Antarctic Treaty, also known as the Madrid Protocol, entered into force in 1998 and serves as an additional mechanism for ensuring the protection of the Antarctic environment. The Madrid Protocol goes further than the original treaty as it designates Antarctica as a natural reserve devoted to peace and science and places a moratorium on mining and drilling for oil for a minimum of 50 years. The Protocol sets forth basic principles and detailed, mandatory rules which apply to all human activities in Antarctica.

The call for an environmental protocol to the Antarctic Treaty came after scientists discovered large deposits of natural resources such as coal, natural gas and offshore oil reserves in the early 1980s. Antarctica is considered to be part of the theoretical super-continent known as Gondwanaland, which separated near the end of the Paleozoic era and consisted of South America, Africa and Australia. And, because it once was completely covered in vegetation, many scientists believe it may hold one of the last supergiant oil fields yet to be discovered. The continental shelf of Antarctica is considered to hold the region's greatest potential for oil exploration projects, and although estimates vary as to the abundance of oil in Antarctica, the Weddell and Ross Sea areas alone are expected to possess 50 billion barrels of oil - an amount roughly equivalent to that of Alaska's estimated reserves. However, Antarctica's extreme conditions make oil field accessibility in many areas economically problematic.

Nevertheless, following the energy crisis of the 1970s, several oil companies looked to Antarctica as a possible solution to future world oil shortages by announcing plans to exploit the continent's resources. The necessary conditions for economically-sound oil production projects were beginning to ripen along with high oil prices and demand, and improved drilling technology. The prospect that Antarctica's fragile wilderness could be tainted as a result of oil exploration and drilling activities resulted in the mobilization of several conservation groups who were intent on preserving the continent's status as the most pristine in the world.

On January 28, 1989 the *Bahia Paraiso*, an Argentine navy transport ship hauling supplies and tourists, ran aground approximately two miles off the coast of Antarctica in the vicinity of Palmer Station. Although no one aboard the ship was injured, the wreck proved to be a setback for the nearby coastal ecosystem, as a 30-foot gash in the ship's double-walled hull released some 250,000 gallons of diesel fuel and other petroleum products into the surrounding area. The effects from the fuel spill on the local flora and fauna were mostly limited to various sea bird, krill and moss populations, with few



populations seeing mortality rates greater than 20%. Because the *Bahia Paraiso* spill was reportedly the first known accident of its kind in the Antarctic region, the accident alarmed environmental groups, which viewed the incident as a foreshadowing of future accidents if trends in tourism and ship transport were to continue at their current pace along the continental fringe.

The devastating March 24, 1989 *Exxon Valdez* oil spill in Alaska's Prince William Sound two months later sent an even stronger alarm around the world to dozens of international environmental organizations for the need to protect Antarctica's unique environment from similar accidents. Although avoiding altogether the issue of sovereignty claims, the development of the 1991 Protocol on Environmental Protection to the Antarctic Treaty is viewed as a model for future environmental treaties which employ the precautionary principle towards natural resource exploration.

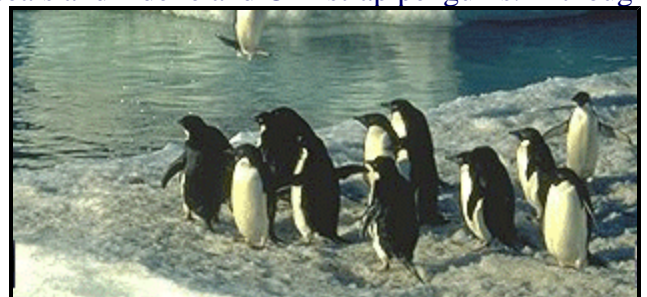
Climate Change

Because of its influence on world weather and climate patterns, Antarctica lies at the heart of the debate on climate change and has become the premier location in which to study the effects of global warming. Over the course of the past 50 years, Antarctica's average year-round temperature has warmed by about 3-4 degrees Fahrenheit - more than 10 times the average worldwide increase during that period. As a result of these increases in temperature (which are not necessarily the result of global warming), the Antarctic continent has experienced changes in its landscape and ecology. Scientists are also concerned that with such dramatic increases in the icy continent's temperature, significant rises in global sea levels could occur if Antarctica's thick polar ice sheet melts. The West Antarctic ice sheet alone, if melted, could raise average sea levels around the world by about 20 feet, resulting in the flooding of low-lying coastal zones.

Despite the numerous scientific research bases located on the continent, Antarctica produces negligible amounts of greenhouse gases and is not considered to be a significant contributor to the problem of global warming. In 1998, Antarctica produced 0.06 million metric tons of carbon, 100% of which came from the burning of petroleum fuel products. Carbon dioxide is the chief culprit among the greenhouse gases, which are blamed for contributing to a process called global warming. The theory of global warming states that as carbon dioxide and other 'greenhouse gases' continue to accumulate in the earth's atmosphere, the earth's natural warming process known as the 'greenhouse effect' is intensified, thus resulting in higher global temperatures.

The effects of climate change on Antarctica vary from migrations of seal and penguin populations to other parts of the continent to abrupt changes in the glacial landscape. In March, 2000 the Larson B ice shelf in northern Antarctica - an area the size of Delaware - broke away from the continent and retreated into the sea. Similarly, in January, 1995, the Larson A ice shelf calved away from the continent, disappearing into the sea and bringing with it part of an Argentine base camp. Ice shelf instability is created as a result of higher sea and air temperatures, and a number of northern ice shelves have displayed similar trends such as the Wordie, Muller and Prince Gustav Channel shelves.

Perhaps most vulnerable to the effects of Antarctic climate change are the continent's wildlife populations. Increasing temperatures, less ice, and more snowfall have altered the patterns and habitats of several Antarctic species, such as the southern fur and elephant seals and Adelie and Chinstrap penguins. Although the past 20 years have seen an increase in the numbers of Chinstrap penguins on the continent, the opposite is true for the Adelie penguin. As temperatures have increased, removing significant portions of sea ice, krill (a tiny shrimp-like crustacean) populations in certain areas have decreased significantly due to a reduction in the amount of their food source - algae - which grows on the bottom of sea ice. As krill is one of the



mainstays of the Adelie penguin diet, the Adelie penguin population has decreased by almost 50% in some areas. Rising Antarctic temperatures also have resulted in more snowfall on the continent; making breeding difficult for the ice-loving Adelie penguins. Seal populations, on the other hand, have benefited from the reduction in sea ice as they prefer breeding and feeding in open waters. Several seal populations in Antarctica have increased their numbers by over 300% in the last 20 years.

Energy Use in Antarctica

Approximately 4,000 scientists and researchers live in Antarctica during the austral summer, with about half of these being American. During the winter months, however, this number is greatly reduced to a total of about 500 people. Although the number of people living on the Antarctic continent remains quite small,



scientists have been blamed for pollution problems ranging from sewage leaks to oil spills. In July, 1995, approximately 21,000 gallons of oil were spilled in Argentina's Marimbo base as the result of a poorly constructed fuel storage system, which consisted of large rubber fuel bladders placed directly on the snow. Similar incidents have occurred on other international scientific bases, including Russia's Bellingshausen base (known to be one of the continent's more contaminated sites) and the United States' McMurdo Station. However, as more attention has been placed on the continent of Antarctica such spills are rare, and scientists have done much to

clean up and improve waste management procedures on the continent.

Antarctica in the 21st Century

Despite the 1991 Madrid Protocol's 50-year moratorium placed on the exploitation of Antarctica's natural resources, future economic and population pressures could pose significant environmental threats to the continent of Antarctica. An expected and dramatic increase in world demand for energy over the next 30 years may expose the continent to countries and markets looking for alternative petroleum supplies. If Antarctica is indeed eventually opened for oil exploration activities, which many believe it will be, the potential for oil pollution occurrences such as oil tanker spills, the dumping of waste oil, natural oil seeps and well blowouts will rise substantially.

However, the Antarctic Treaty system currently in place offers the internationally-owned continent an opportunity to temporarily avoid such premature exploration activities. The continent's usefulness as a scientific tool and international research station will continue to be taken advantage of and Antarctica will continue its important role in providing answers to the dilemma of climate change.