

DEVELOPING NATIONS SEEK A SHARE OF ANTARCTICA'S SPOILS



Image credit: Flickr/Austronesian Expeditions

Speed read

- Although highly protected, Antarctica has plentiful marine and mineral resources
- Nations are funding research to ensure they get a say on the continent's future
- There are also questions over how bioprospecting benefits should be shared

A growing interest in the continent's resources is fuelling a research and funding boom, reports *Paula Leighton*.

[SANTIAGO] With climate change causing Arctic sea ice to shrink to its smallest extent on record in 2012, opening up new sea routes and access to mineral deposits — including about 30 per cent of the world's unexploited gas and 13 per cent of its oil according to some estimates — the Arctic region offers a potential resource bonanza. As a result, countries are seeking geopolitical influence and their share in shipping, fishing and mineral exploitation rights there.

The rush for Arctic resources has seen more and more nations vying for a place at the table, with China, India, Italy, Japan, Singapore and South Korea all granted permanent observer status at intergovernmental forum the Arctic Council in May.

Meanwhile, at the opposite end of the planet, tensions are quietly rising regarding sovereignty over the Antarctic continent and the resources on and around it.

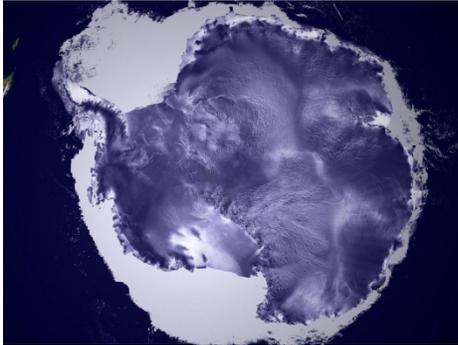
Abundant fisheries and rich marine biodiversity, as well as unexplored mineral reserves including natural oil and gas deposits, may turn the Antarctic into another global frontier in the hunt for new raw materials. Just last December, for example, scientists writing in *Nature Communications* identified a type of rock in Antarctica that is known to be a likely place to find diamonds.

A combination of climate change-driven ice melt and lower snowfall, together with new drilling technologies could open up this inhospitable continent to exploration.

Although the only form of exploration currently allowed in Antarctica is scientific — as the Antarctic Treaty, and the Protocol on Environmental Protection to this treaty, ban any other activities relating to the continent’s mineral resources — this may change in 2048 when the moratorium on exploration and exploitation is up for a review. [1,2]

Geopolitical manoeuvring

With that deadline in mind, more nations are keen to have a say in international decisions on what happens in Antarctica.



NASA The textured surfaces of Antarctic ice sheets. [Click here for original](#) Allocating a large budget to Antarctic research and hosting scientific facilities on the continent are considered suitable ways for a country to signal its presence in this territory, experts say such actions could aid future claims if access to fishing resources is expanded or access to mineral resources is ever granted.

“From 2048, only the consultative countries of the Antarctic Treaty will have the right to vote [on any proposed changes to the treaty],” says Marcello Melo da Gama, deputy secretary of Brazil’s Inter-ministerial Commission for the Resources of the Sea (CIRM), the national agency responsible for implementing the country’s Antarctic programme. Twenty-eight countries are consultative parties to the Antarctic Treaty because they were original signatories or now conduct substantial research in Antarctica.

“And countries need to have a presence in Antarctica and carry out scientific research there and even have a research base in order to become a consultative party — that is one of the political

and strategic reasons to have a base in Antarctica.”

As a result, several nations are building or hoping to build new research centres on the continent. This year, both Brazil and China will build research stations.

“The budgets for Antarctic science research are also geopolitical. They are not only for doing science, they are also a way to increase their presence, and that happens with all countries,” agrees José Retamales, director of the Chilean Antarctic Institute.

“The Antarctic is a political issue that has its daily expression in science activity. In order for a country to sit down at a table to make decisions about Antarctica, it needs to have science activities on the continent,” he says.

Twenty-nine nations operate 82 research stations on the continent, according to figures from the Council of Managers of National Antarctic Programs. Around 1,100 people work in these year round, going up to 4,400 in the summer season.

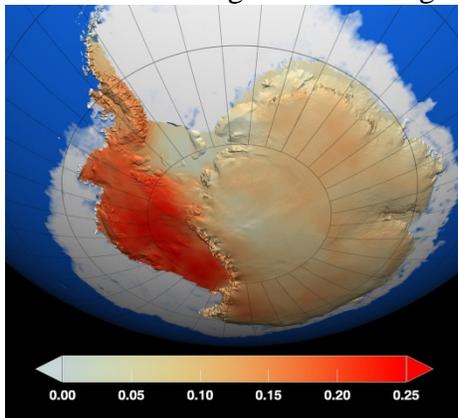
South American plans

Developing countries are no exception. Colombia is designing and implementing its National Antarctic Programme to deal with research, governance and environmental protection and plans an Antarctic expedition in 2014-2015.

Ecuador and Venezuela cooperate on Antarctic research and logistics, and share Ecuador’s research station on the South Shetland Islands. Colombia and Venezuela both recently started seeking science partnerships with other nations that are already involved in the Antarctic with the aim of becoming consultant members of the Antarctic Treaty — and getting a say at the annual meeting.

Argentina has six permanent and seven seasonal research stations, and Brazil plans to reopen its base Comandante Ferraz, which was destroyed by a fire in February 2012.

Chile’s science budget for Antarctic projects (around US\$24 million in 2013) has been growing, with funds coming from several governmental agencies.



Trent Schindler, NASA Antarctic temperature change per decade. [Click here for original](#)“Chile

has nine research stations and is an Antarctic research leader in South America. Almost all the eight Latin American countries with Antarctic programmes go there from Chile,” says Retamales.

Last month, Chile opened a base inside the Antarctic Circle, joining China and the United States as the only nations with one there.

Over the past ten years, eight other countries have built Antarctic research stations, and several others, including China, India, Iran and South Korea, have expressed an interest in creating their own or increasing the number they already have.

Reaping benefits

Chile may benefit from this growing interest in Antarctic science. Already, researchers from some 20 countries pass through the southern Chilean city of Punta Arenas each year on their way to the Antarctic Peninsula, where most research bases are.

Marcelo Leppe, head of the Chilean Antarctic Institute’s science department, says countries — particularly those far from the South Pole — could save money by working in partnership with Chile rather than having to send people and equipment over long distances.

“For the US Antarctic programme for example, it is nine times more expensive to send a researcher to Antarctica than for the Chilean programme to do the same with a national researcher. China is now building icebreakers and South Korea has just launched one. Those countries have to bridge the same huge gaps to work in Antarctica. Tightening cooperation with Chile could reduce those gaps by saving money in logistics.”

Leppe believes that Chile would also gain. “In regions such as Magellan, [the closest region to Antarctica] this could be a source of additional funds to shift from an economy based on oil exploitation to become a hub for polar science and technology,” he says.

Locked bounty

Coal, lead, iron, chromium, copper, gold, nickel, platinum, uranium and silver are among Antarctica’s natural richness. And the Ross, Weddell, Amundsen and Bellingshausen seas host large oil and gas deposits.

This has not escaped the attention of seven of the Antarctic Treaty’s signatory countries — Argentina, Australia, Chile, France, New Zealand, Norway and the United Kingdom — which have made submissions to the UN Commission on the Limits of the Continental Shelf to assert ownership rights over the sea bed offshore from their claimed Antarctic territories.

In 2011, at the 34th meeting on the Antarctic Treaty, Russia expressed an interest in strengthening its economic capacity “through the use of marine biological resources available in the Southern Ocean, and complex investigations of the Antarctic mineral, hydrocarbon and other

natural resources” by 2020. [3]

“If technology allowed Antarctica’s sources to be exploited without environmental damage, it’s likely that countries will discuss a convention on exploitation”

Antonio José Teixeira, CIRM

Yet, even if the legal barriers to commercial exploitation of mineral resources are eventually lifted, extracting mineral resources will be tough, says Retamales from the Chilean Antarctic Institute.

Unlike the Arctic, which largely comprises frozen ocean, Antarctica is a rocky continent covered by ice.

“The landmass is protected by a layer of two to four kilometres of ice. So far, this has been a barrier against the industrial exploitation of mineral resources,” Retamales tells *SciDev.Net*.

“It is almost impossible with current technology to drill through this thick ice. Therefore, if exploitation happens in the future, the most likely places will be in the sea, near the shore or offshore, where it is easier to set up an oil platform, although the sea freezes each winter. So exploiting Antarctic resources is likely to be an expensive enterprise.”

Nevertheless, ice retreat, a decline in seasonal snow cover due to climate change, and improved drilling technologies could change that in the next few decades.

“If, in the future, the mineral resources elsewhere get exhausted and the technology allowed Antarctica’s sources to be exploited without environmental damage, it’s likely that countries will discuss a convention on exploitation,” says Antonio José Teixeira, an advisor at CIRM.

A fragile balance

Some of the issues that may eventually emerge in the Antarctic are already seen through national bickering over the trade-offs between environmental protection and commercial interests in the Southern Ocean, where many countries have valuable fisheries, particularly for Patagonian toothfish and krill.

Among the member states of the Commission for the Conservation of Antarctic Marine Living Resources, which regulates fishing quotas, are those who favour stricter conservation and those who prefer to catch more fish.

Decade-long plans to create two huge marine protected areas to restrict fishing around Antarctica failed for a third time last November, as the commission members failed to reach a consensus.

Yet, according to managers of the Brazilian and Chilean Antarctic programmes, the drive for

conservation is still stronger than that for exploitation.

Teixeira, who is also a former executive secretary of the Brazilian National Committee on Antarctic Research (CONAPA), says that, because of the influence of global environmental movements, any government proposing to exploit the continent would damage its reputation.

Bioprospecting: threats and opportunities

But a less menacing, more high-tech prospect of benefiting from species richness off Antarctica is also taking shape.

Antarctica's unique range of species adapted to extreme conditions could make it a perfect place to discover organisms for use in biotechnology research and for commercial applications.

Bioprospecting could benefit humanity and generate additional funds to boost Antarctic research centres, says Leppe.

Chile's institutions already hold patents for an anticancer compound isolated from Antarctic grass, and for use in growing artificial skin from an Antarctic crustacean, among others.

The European and US patent offices already contain hundreds of references to molecules of Antarctic origin, including those with potential for wound healing, as well as antitumor components and antifreeze proteins to increase the shelf life of foods or prevent ice crystals from forming in ice cream.

The Antarctic Bioprospector, a database run by the United Nations University's Institute of Advanced Studies, has 185 records of research and commercial items from Antarctic species, including food and drinks, drug and cosmetics products, and applications for agriculture and environmental remediation. They come mainly from krill, micro-organisms, sponges, moss, and fish.

Leppe says: "Latin American research about [Antarctica's] microbiology and molecular biology has grown enormously, mainly in Chile, Argentina, Brazil and Uruguay. They are part of a search for biotechnological applications."

A lack of regulations

Unlike fishing and mineral extraction, there is currently no formal agreement on regulating Antarctic bioprospecting. The issue was first discussed within the Antarctic Treaty system in 1999, and has received attention — but no firm action — at meetings since then.

One main deterrent to regulation is the issue of who shares the benefits. Benefit sharing agreements that apply to other parts of the world, such as the Bonn Guidelines or the Nagoya Protocol, do not apply in Antarctica, where no one owns the territory and there are no indigenous populations to affect.

Kevin Hughes, from the British Antarctic Survey's environmental office, says this raises a lot of questions over defining who owns Antarctic biological material and how this relates to intellectual property rights resulting from its development.

“How would you decide what proportion of any commercial profits should be redistributed for the benefit of all mankind? Furthermore, who do you give any money to? Would the money go to the Antarctica Treaty parties, or some other body that represents all of the world's nations? There are many unanswered questions that apply to Antarctica,” he tells *SciDev.Net*.

While a decade ago many were afraid of an imminent threat to the Antarctic environment from bio prospecting, such fears have not materialized.

In the past, bio prospecting was aggressive, with ships taking vast amounts of material from the sea floor and living species, Leppe says. With technologies such as DNA amplification, however, only small amounts of organisms are needed, he says.

But Hughes warns that there are still risks with organisms such as Antarctic plants and marine invertebrates that cannot easily be grown in the laboratory and so need to be harvested.

“Since Antarctic species can be very slow growing, doing this on a large scale from the land or ocean could have a big impact on the populations and could do a lot of damage to the Antarctic ecosystem,” he says.

Source : <http://www.scidev.net/global/bioprospecting/feature/developing-nations-look-for-a-share-of-antarctica-s-spoils.html>