Climate Gauge: Greenland

As it struggles to gain economic independence, Greenland's vulnerable geographical position puts it under global pressure, reports **Heba Hashem**.

Greenland's ice sheet covers 80 per cent of the country. The debate is ongoing what effect global warming is having and will have on the ice mass.

Fishing is a major source of income for Greenland.

Greenland's ice sheet is the subject of intense scientific study as it contains climate data going back 100,000 years.

Ten per cent of the world's fresh water is in Greenland. The government is busy issuing export licenses for this commodity.

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IT'S NOTHING NEW – THE world's climate has been changing over the past few decades, some areas getting warmer and others colder, but the effects of this transition are most evident in the Atlantic and Arctic regions.

Since the earth's climate and global sea level are closely linked, the recent increase in temperature engenders many consequences.

The US Geographical Survey (USGS) found that the earth's climate has warmed about 1°C during the last 100 years. Consequently, sea levels have been rising from one to two millimetres per year due to the reduction in volume of ice caps, ice fields and mountain glaciers, as well as the thermal expansion of ocean water.

Greenland's ice sheet, which covers 80 per cent of the country, has been the subject of many studies that continue to reveal clues about global atmospheric temperatures, sea levels, and even the extinction of the Norse colony in West Greenland. This ice sheet is of enormous interest to climatologists. By drilling 'ice cores' about a kilometre and a half down into the ice, they are able to retrieve climate data going back 100,000 years. The age of an iceberg can also provide researchers with a valuable way to estimate ice thickness, which in turn reveals the pace of ice melting.

As this year's summer ended, the USGS confirmed that under 15 per cent of the ice remaining in the Arctic was more than two years old, compared to 50-60 per cent during the 1980s. This means that there is none of the older ice (at least five years old) remaining in the Arctic region.

Moreover, based on their findings through satellites and long-term monitoring stations, scientists from Denmark and the University of Colorado said that the rate of ice loss in Greenland is accelerating and causing it to move up towards the northwest coast of the island.

An earlier study had also showed that within just seven years, between 2002 and 2009, Greenland's ice sheet shed roughly 1,605 cubic kilometres of ice, a mass loss equivalent to nearly 0.5 millimetres of global sea-level rise per year.

Some scientists are even predicting virtually ice-free summers to occur in the

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Arctic in the coming decades – with some forecasting clear shipping lanes within a few years. The reasons behind the recent patterns of ice loss are still being investigated, especially in regards to the immediate implications of a reduced ice sheet.

Since Greenland's ice sheet holds 10 per cent of the earth's fresh water, if melted completely, it would raise the global sea level by six to seven metres.

On the other hand, some environmental experts believe that the vulnerability of Greenland's ice sheet has been overstated, which gives new hope that the worst impacts of global warming, such as devastating floods, could still be avoided.

Jonathan Bamber, an ice sheet expert at the University of Bristol, told the Copenhagen Climate Congress in 2009 that previous studies had misjudged the so-called Greenland tipping point, at which the ice sheet is certain to melt completely.

"We're talking about a point at which it is 100 per cent doomed. It seems quite an important number to get right... we found that the threshold is about double what was previously published."

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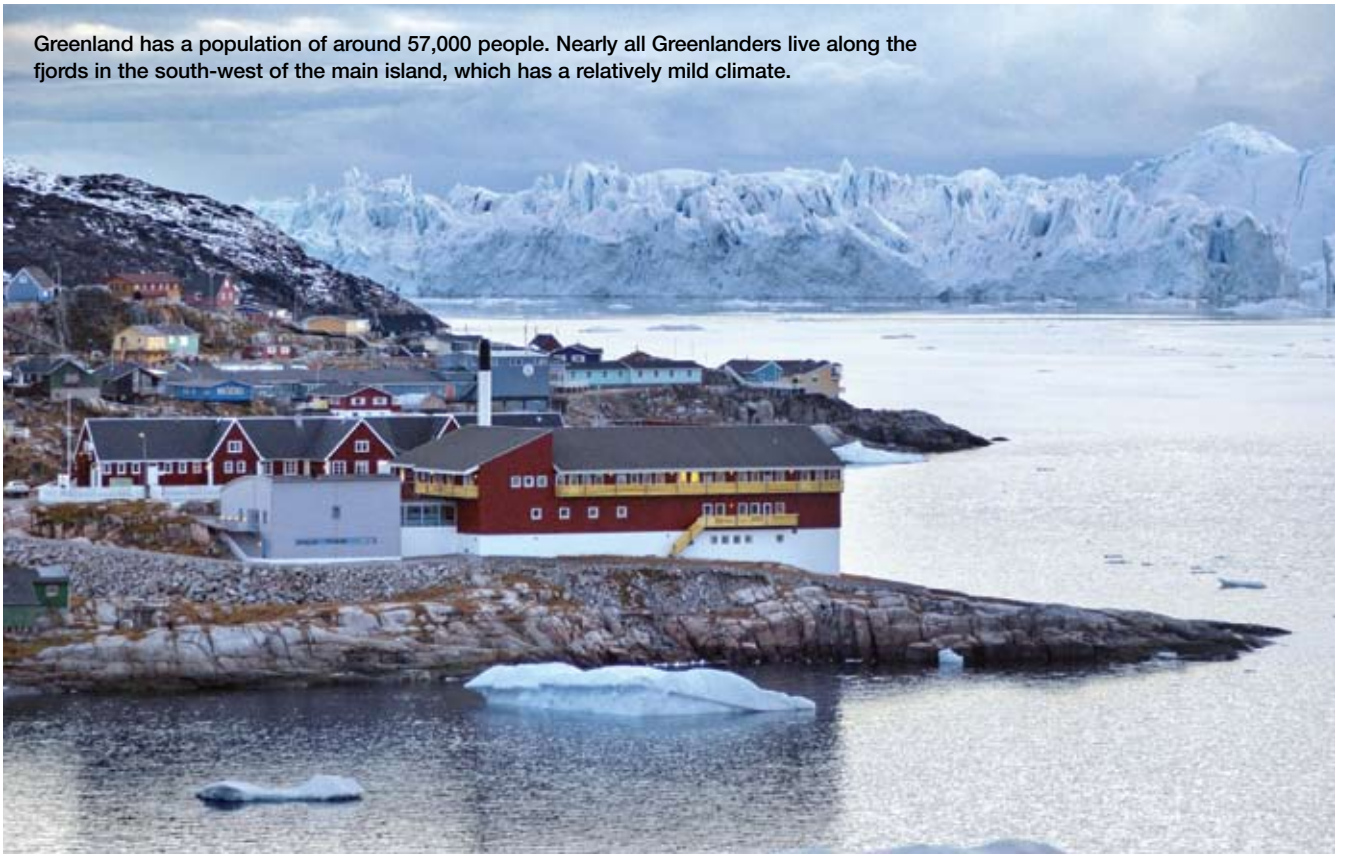
However, the most profound evidence against earlier predictions was the discovery of Greenland's survival in past climates of temperature rises higher than 3°C. An ice sheet about half the size is known to have persisted through the Eemian period, about 125,000 years ago, when temperatures were nearly 5°C higher than today.

Yet the new studies were only concerned with the tipping point at which melting becomes unstoppable. As Bamber pointed out, it does not mean that Greenland will not contribute to higher sea levels if temperatures increase by a few degrees. If the planet warms up, the ice will melt, he said.

NATURALLY, THE Arctic and Antarctic regions pose the biggest threats as they contain most of the world's ice mass.

In 2008, scientists also discovered that glaciers survived for hundreds of thousands of years during a warm era when crocodiles roamed the Arctic, indicating once again that the pessimistic predictions of sea level rises due to the melting of ice sheets by global warming may have to be reassessed.

Previously, it was thought that the earth was ice-free during the Turoniah period, between 89.3 million and 93.5 million



Greenland has a population of around 57,000 people. Nearly all Greenlanders live along the fjords in the south-west of the main island, which has a relatively mild climate.

Tourism, although small, has been growing steadily. Here a group of tourists walk on an ice cap in Kangerlussuaq.

years ago. Evidence proved this wrong, as findings of hothouse glaciers from this period were uncovered, mainly by studying tiny marine organisms found in organic carbon-rich sediments.

The international team of scientists behind this study concluded that large ice sheets did exist about 91 million years ago, during one of the warmest periods of the past 500 million years.

"Speculation about whether large ice caps could have formed during short periods of the Earth's warmest interval has a long history in geology and climate research, but there has never been final conclusive evidence," said Professor Thomas Wagner of Newcastle University.

"Our research from tropical marine sediments provides strong evidence that large ice sheets indeed did exist for short periods of the Cretaceous, despite the fact that the world was a much hotter place than it is today, or likely to be in the future."

Unless our planet is faced with a similar climate as in the Turoniah period, we can postulate from this evidence that the world's glaciers will neither melt away nor disappear at the rapid speed that various reports have suggested.

Meanwhile, Greenland's gigantic two-million-year-old ice cap has made it the holder of the world's largest fresh water reservoir.

Set amidst lush, mountainous woodland, the ice fields of today's glaciers come from fresh water, which has fallen as snow over the past 100,000 years, making Greenland a source of pure water that is highly sought after.

Illulisat Glacier, for example, is one of the fastest and most active glaciers on the planet, producing 10 per cent of all Greenland's ice fields, an equivalent to 35 billion tonnes of ice a year. Although the export of ice and fresh water began a few years ago, it still remains underestimated.

THE GOVERNMENT of Greenland believes the exploitation and export of ice and water will become a major industry for their country in the decades to come, and thus it has been investing resources in developing this new industry since 2005.

Preliminary investigations have been carried out by Greenland Home Rule and samples have been taken from glaciers, springs, lakes and rivers. The results of these investigations are published on Greenland's official 'Ice and Water' website.

Licenses for the exploitation of ice and water for exportation are also being issued by the Government of Greenland, to a maximum period of 20 years, which may be prolonged. Currently, the companies who have obtained this license are Greenland Spring Water ApS, Greenland Ice Water A/S, and Greenland Ice Cap Production A/S.

An ice-free region is being highly anticipated by Canada and Greenland, as well as other northern nations, as they rush to implement new transport regulations and strengthen international protocols in preparation for increased Arctic oil and gas development.

Relying on fish processing and mining resources such as iron, diamond and uranium, Greenland is the earth's largest island, as Australia is a continent.

The country joined the EU with Denmark in 1973 but left in 1985 due to the overly strict fishing quotas imposed. Greenland gained self-government in 1979 and achieved self-rule in 2008, which means that the country has assumed the political decisions and competencies that were previously issued from Denmark.

As of June 2009, Denmark took control of Greenland's foreign affairs, security policies, currency and finances in conjunction with the self-rule entity, as well as providing defence and military forces, as Greenland has none of its own.

Although Danish is widely spoken in Greenland, the nation's official language is Greenlandic, and it holds the legal rights and benefits to control its own minerals and potential oil fields in the future. ■