

20 January 1989

GLOBAL CLIMATE

I attach a clipping from a paper received today from Sir George Porter. The second sheet (highlighted in yellow), reports one school of thought which argues that sea level could actually fall in response to global greenhouse heating. This is not a frivolous view otherwise Porter would not have sent it to me. Indeed it reinforces my belief that we cannot formulate a robust policy on global climate until scientific advice is more consistent. The priority therefore continues to be more research, analysis and computer modelling.

In a separate recent conversation, Porter also suggested that a major benefit of genetic engineering might be the development of fast growing organic fuels, particularly vegetable oils. These would be formed by absorbing CO₂ from the atmosphere and converting the carbon into high calorific combustible oils. These would have smaller molecules than present vegetable oils, more akin to mineral oils such as petroleum and its distillates. We may hear more of this when he addresses ACOST under Item 3 of the proposed agenda.



GEORGE GUISE

- See p2 →

Will sea levels rise?

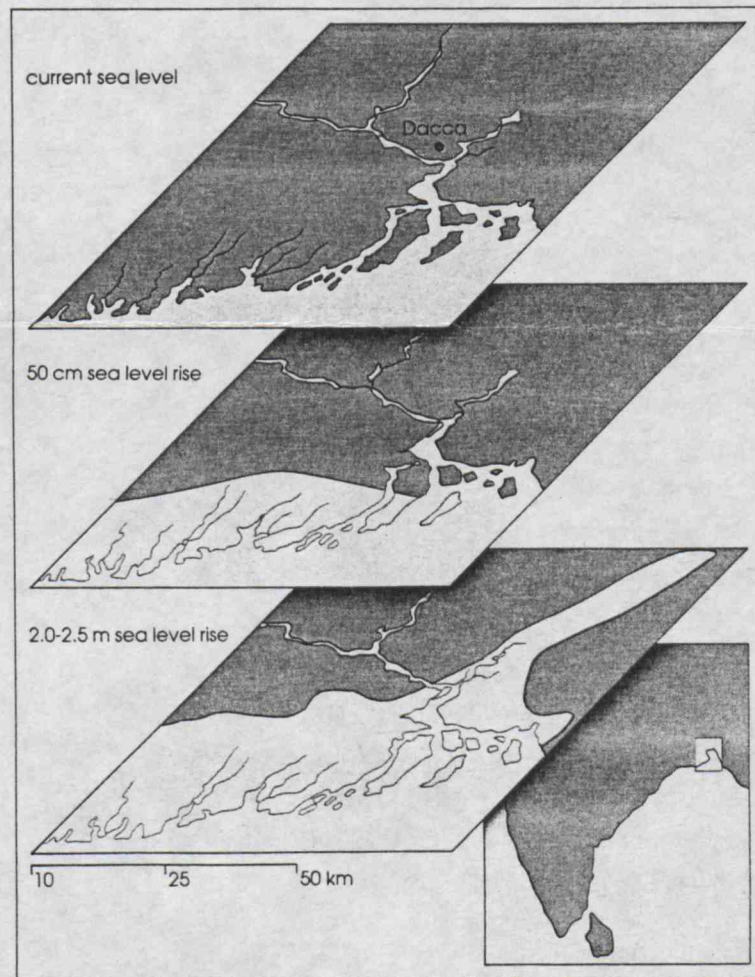
The effects of an increase in average temperature are likely to be felt more strongly in high latitudes than nearer the equator for one simple reason: the areas near the Earth's poles are white. As the Earth warms up, and more snow and ice melt, these areas will reflect less solar radiation and will therefore be subject to exceptional warming.

If this change were sudden and extreme, catastrophic results could ensue. The Arctic Ocean is covered by a layer of ice two to three metres that never melts except at its edges near continental coasts. Under this ice lies relatively warm and salt water. If the polar warming were sufficient to melt the Arctic ice, it is possible that as the deeper warmer water mixed with the colder water from which the Arctic ice is formed, conditions would change so much that the Arctic ice never reformed. No one knows what effects that might produce although weather patterns in the whole of the Northern hemisphere would certainly be disrupted. Disappearance of the Arctic ice would also have major strategic and economic implications as it opened up new sea routes.

The Antarctic land mass, of more than 13 million square kilometres, is covered by ice thousands of metres deep. The polar effect here is expected to be smaller than in the Arctic because the Antarctic pack ice round the continent breaks up every summer. However, were the Antarctic ice to melt, world sea levels would rise by an estimated 80 metres, flooding many of the world's major cities and all its ports. A less dramatic result might be if the glaciers on the mountainous western side of the Antarctic were to slide into the sea and melt. This alone would raise sea levels by about six metres, flooding many coastal cities and much productive farmland.

None of these events, it must be stressed, is at all likely in the near future. Melting of the Antarctic ice would take centuries and require temperature rises of the order of 20 °C. And, with only one exception, all climatic models suggest that the Arctic ice will not melt, although it will get thinner. And there are reasons for believing that the greenhouse effect could, at least initially, actually increase the volume of the Antarctic ice.

Figure 18 Even a 50 cm sea level rise would inundate large areas of Bangladesh. A 2.0-2.5 metre rise would reach nearly to the country's capital city



The Antarctic ice cap contains 90 percent of all the land-based ice on the Earth. Its volume is such that if even 1 percent of it were to melt, sea levels would rise by about 80 cm. However, several climatic models suggest that one possible result of a global warming would be to increase the volume of the ice rather than decrease it. This is because there will be increased precipitation in the Antarctic as temperatures rise, resulting in higher snowfall. Thus if temperatures increase by 3 °C and Antarctic precipitation rises 24 percent, the volume of ice in the Antarctic would eventually increase, by somewhat less than 1 percent, leading to a 50 cm fall in sea level. Whether this will happen is far from clear because current climate models are unable to predict events at the poles with any great accuracy.

Nevertheless, a slow rise in sea level is to be expected as carbon dioxide heating progresses. The cause will be not the melting of land-based ice or glaciers but the inevitable expansion of the world's oceans as they warm up. A global warming of 1.5 to 5.5 °C is estimated to

cause a sea level rise of between 20 and 165 cm, with a middle range temperature rise producing a sea level about 80 cm higher. Nearly one-third of all human beings live within 60 km of a coastline. A sea level rise of even one metre would be likely to have profound influences on habitation patterns, causing large-scale migrations from low-lying coastal areas. Such changes are, in effect, already underway because sea levels are rising by about 1 mm a year, or 10 cm a century.

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Interesting statistic

