The Fraser River Plume

Martin Evans uses the example of a dramatic ocean phenomenon to show how all the elements of geography interact to shape the physical and human landscape.

The water cycle and the glacial history

The Fraser River drains the interior of British Columbia on Canada’s west coast with a catchment area over ten times the area of Wales (220,000 km²). In the spring the melting of snow and glacial ice in the mountains of British Columbia sends a pulse of meltwater down the Fraser.

The Fraser valley contains thick deposits of glacial sediments deposited at the end of the last ice age and mobilisation of some of this material in the spring flood produces high sediment concentrations in the river water. Deposition of these sediments at the interface of the land and the sea has created the Fraser Delta. Sediments which are not deposited in the distributary channels of the delta enter the Strait of Georgia to create the Fraser River Plume.

How geographical systems interact

The sediment flux from the Fraser River, conditioned by the past and present glacial history of the landscape, has a significant impact on the coastal system, influencing coastal geomorphology, the marine ecosystem, carbon cycling and human settlement. Understanding the processes underpinning the great natural spectacle of the Fraser River Plume reveals the complexity of the interacting landscape and coastal systems which define the geography of this region.

Human settlement

The flat oceanside land of the delta and the rich marine food resources have led to a long history of settlement by Canadian indigenous peoples. The first settlement here was up to 9,000 years ago. This was an important trading area for aboriginal peoples and is now the site of Vancouver (population 2.4 million) which is a major port city, trading around US$200 billion in goods annually.

The marine ecosystem

The fresh river water entering the strait has a lower density than the saline ocean, so the river water spreads out in a layer up to 10 metres deep across the surface of the ocean. The river water brings nutrients (particularly silica and iron) which promote growth of plankton and underpin the food webs which support rich biodiversity in the Strait of Georgia.

This primary productivity dominates the organic carbon budget of the strait (55% of carbon inputs) together with dissolved and organic carbon inputs from the Fraser River (35%). Most of the particulate carbon is buried in ocean sediments and most of the dissolved carbon (about 70% of the total organic carbon) is oxidised to carbon dioxide.

Sailing through the Fraser River Plume

If you take the Tsawwassen ferry from Vancouver to Vancouver Island during the summer you may find yourself sailing through a dramatic shift in the colour of the ocean surface. This is the boundary between ocean water and the less saline, more sediment-rich river waters from the mouth of the Fraser River. You are sailing through the Fraser River Plume.

Rich marine life in the Strait of Georgia

www.oceannetworks.ca/fraser-river-plume

Further reading

More about the Fraser River Plume: www.oceannetworks.ca/fraser-river-plume

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