



read

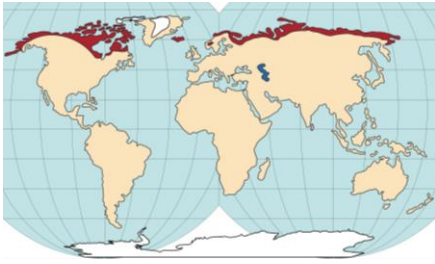
# THE LIVING WORLD

## Cold Environments

quiz



### Location



**Polar** – Antarctica and much of Greenland.

**Tundra** – Includes parts of Canada, Alaska, Northern Europe and Russia.



### Adaptations

#### COTTON GRASS

Small seeds that can be dispersed by the wind.



Low growing and compact to reduce moisture loss.

Shallow roots as subsoil frozen

Dark, narrow leaves to reduce heat loss and transpiration

#### Arctic Foxes and Arctic Hares

- have thick fur on their bodies and feet to keep them warm
- in winter their fur becomes white providing camouflage from predators

### Characteristics



**Climate** – P = Temp below freezing all year and precipitation low. T = High temp range. Snowy winter, rain in summer. Dark winter.



**Permafrost** – T = active layer freezes in winter and thaws in summer. Permafrost below.



**Soil** – P = mainly bare rock. T = Thin and lack fertility. Waterlogged in summer. Depth and fertility increase from Poles.



**Biotic** – Low level of biodiversity. Food chain and webs are very basic. Adaptations required.



**People** – No permanent settlements in polar. Indigenous people live in tundra esp. near coast.



### Biodiversity

Thousands of species of lichens, plants and insects.

Climate change threat

Species dependent on short, mild summers

**biodiversity**

Considerable biodiversity

Exploitation threat by humans

### Case Study - Svalbard



### Location



An archipelago (a large group of islands) located in northern Europe, halfway between Norway and the North Pole. It is one of the world's northernmost inhabited areas.

It has a permanent population of 2700, of which 2300 live in Longyearbyen, the administrative centre of the islands.



### Opportunities



**Mineral resources** – Svalbard has a significant amount of coal and coal mining is the main economic activity on the islands, once employing over 300 people.



**Energy** – A coal-fired power station meets Svalbard's energy needs. This and the need to fly frequently results in Svalbard residents having Europe's highest carbon footprint.



**Tourism** – Svalbard is a popular tourist destination and is visited regularly by cruise ships. Some 70,000 tourists visited in 2011, of which 30,000 arrived on cruise ships.



**Fishing** – The Barents Sea that surrounds Svalbard is home to some of the best fishing grounds in the world. Fishing is controlled, which means it is sustainable.

# Protecting Cold Environments



read

quiz



## Challenges



### Buildings and infrastructure –

Permafrost is difficult to build on. Roads are constructed on gravel beds so the permafrost does not thaw. Raised, insulated utility pipes protect services.



**Inaccessibility** – Svalbard is a very remote region, relying on transport such as planes and ships for access. Locals rely on snowmobiles and 4x4s in the winter.



**Temperature** – Winter temperatures can drop below -30°C in Svalbard. This, along with limited sunlight in the winter, makes working outside very challenging. In the winter the sea freezes and roads become very dangerous.



## What is a wilderness area?



**Wilderness areas** are remote, unspoilt parts of the world including deserts, mountains & cold environments. They are unspoilt by human development & remain natural. Many cold environments are considered wilderness areas due to their remoteness and physical conditions.



## Protecting wilderness areas

Cold environments need to be protected for a range of reasons:



They are fragile environments. Recovery from human impact can take significant time.



Indigenous culture depends on the preservation of the natural environment.



Cold environments are home to a range of unique species.



There is a global moral responsibility to protect wilderness areas.



Scientists need to study global processes in unspoilt areas e.g. climate change.

## Strategies to maintain cold environments



Stilts raise the insulated Trans-Alaskan oil pipeline above the ground to reduce the risk of thawing permafrost and disrupting animal migration.



Pumping stations enable the oil to flow over mountainous areas in the region.



Only allows the use of Antarctica for peaceful purposes, and military activities are forbidden.



Promotes co-operation among international scientists.



Strict controls on tourism and landing sites to reduce the impact of tourists.

*Technology can provide environmentally friendly solutions to some of the challenges faced by developing cold environments.*

*Antarctica is often described as 'the last wilderness on Earth'. It has remained undeveloped since the 1959 Antarctic Treaty.*

Technology

International Agreements

Maintaining Cold Environments

Action by Governments

Conservation Groups

*Since oil was found in Alaska in the 1960s, the US government has been involved in protecting the environment.*

*Conservation groups (e.g. WWF), work with governments, communities and businesses to protect Arctic biodiversity.*



Alaska's marine habitats and fishing have been monitored by the National Oceanographic and Atmospheric Administration (NOAA).



The Western Arctic Reserve has been set up in the north of Alaska, protecting the area from oil and gas extraction.



The WWF Arctic Programme was launched in 1992 to work with governments on issues such as climate change, polar bears, shipping and oil and gas including project such as:

- Scientific research into endangered species
- Promoting sustainable development
- Monitoring and protecting ecosystems