

CLIMATE → winters down to -20°C in Tundra, -50°C in Polar.

SOILS → frozen for most of the year as **PERMAFROST**

→ may thaw for a couple of months but very waterlogged due to frozen ground below.

→ some flowering plants e.g. bearberry

PLANTS → low trees & bushes in warmer areas
→ mosses & lichens on ground.

ANIMALS → not many → Polar bears, penguins and sea creatures such as whales in Polar.
→ Reindeer, wolves & arctic hares in Tundra.

→ animals have thick fur or insulating fat e.g. polar bear

ADAPTATIONS → many animals hibernate (e.g. Arctic Squirrels) or migrate away (e.g. Arctic terns).
→ plants are small to avoid wind, have thick bark to protect from cold, and only grow for 50-60 days during summer (e.g. Bearberry).

USE OF TECHNOLOGY → houses built either elevated or on gravel beds to stop melting

e.g. Alaskan oil pipeline carries 49°C oil across frozen Alaska.

- * raised so doesn't melt permafrost
- * allows caribou (reindeer) to migrate under it
- * able to slide during earthquakes.

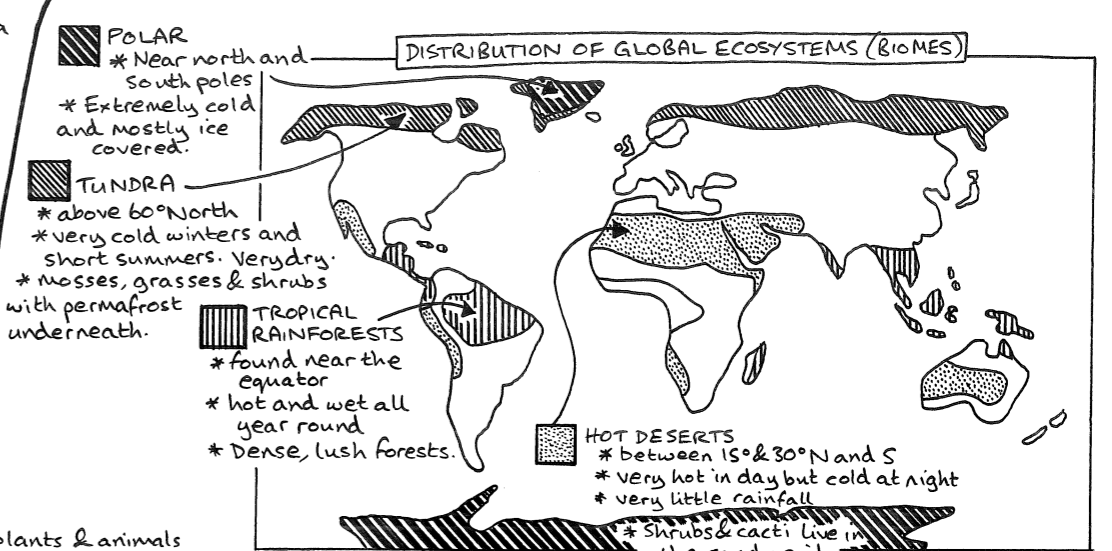
INTERNATIONAL AGREEMENTS → recognises fragility of area
→ promotes science
→ bans exploitation e.g. of minerals.

e.g. Antarctic Treaty

BALANCING ECONOMIC DEVELOPMENT AND CONSERVATION

CONSERVATION GROUPS e.g. WWF
→ work with companies & governments to provide research and protect wildlife.

ROLE OF GOVERNMENTS
→ set up wildlife reserves such as Western Arctic Reserve, 9 million hectare wilderness home to range of species.
→ National Environmental Policy Act ensures oil is extracted in a protective way for environment and local people.



\$10 VALUE OF COLD

→ value is as **WILDERNESS AREAS** or **FRAGILE ECOSYSTEMS**

- ↳ important habitats
- ↳ valuable for science
- ↳ frozen ice stores huge volume of water to avoid global sea level rise.

Biodiversity

→ very low (particularly in Antarctica)
→ since there are so few species, any slight change can be catastrophic, as plants and animals rely on each other. global warming is a serious threat.

ADAPTATION → a feature that a plant or animal has evolved to help live in their specific environment.
e.g. drip tips in rainforest.

NUTRIENT CYCLING → the movement of chemicals used by plants and animals. Nutrients come from rain or weathered rock.

INTERDEPENDENCE → the way that all plants & animals in an ecosystem rely on each other for survival.

BIODIVERSITY → the range of plants & animals in an ecosystem

FOOD CHAIN → series of plants & animals, showing which eats which.

FOOD WEB → network of connected food chains showing movement of energy and nutrients through an ecosystem.

BIOME → the large ecosystems on a global scale, e.g. rainforest, desert, polar.

BIOTIC COMPONENTS → living parts of ecosystem

ABIOTIC COMPONENTS → non-living e.g. soil

DEFINITIONS

ECOSYSTEM → natural system of plants, animals & their environment. Can be small as a tree or large as a continent.

PRODUCERS → green plants that convert sunlight into energy and plant matter

CONSUMERS → animals that eat other living things to survive.

DECOMPOSERS → things that break down dead plants & animals back into the soil e.g. earthworms or mushrooms.

PRIMARY eat plants.

SECONDARY eat other animals.

COLD ENVIRONMENTS

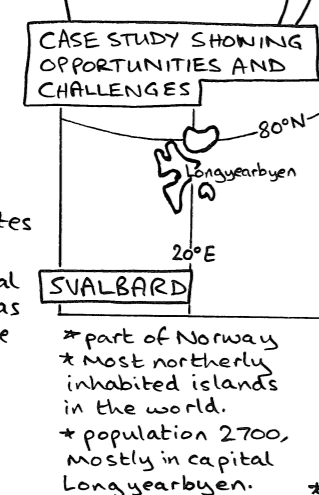
OPPORTUNITIES

MINERAL EXTRACTION
→ Coal is the main industry in Svalbard, employing 300 people
→ controversial due to environmental damage

ENERGY
→ Coal-fired power station in Longyearbyen generates all power for Svalbard
→ Could tap into geothermal like Iceland have done as also on mid-Atlantic Ridge

FISHING
→ Barents Sea is a rich fishing ground with 150 species including cod.

TOURISM
→ provides 300 jobs
→ 70 000 visitors in 2011 (30 000 on cruises)
→ Adventure tourists → hiking, snow mobiles etc.
→ Northern Lights.



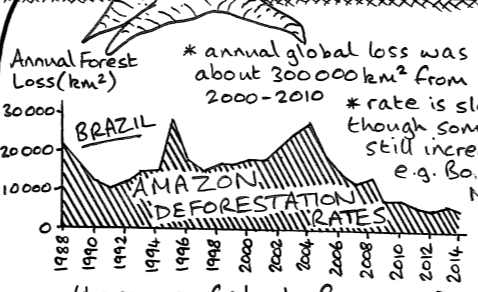
CHALLENGES

EXTREME TEMPERATURES
→ dangerous to be outside without correct clothing.
→ -30°C in winter.

INACCESSIBILITY
→ only accessible by plane or ship.
→ only 50km of roads, mostly in Longyearbyen.
→ Many smaller settlements only accessible by snowmobile.
→ More snowmobiles than people.

PROVISION OF BUILDINGS & INFRASTRUCTURE
→ most construction is done in summer when it is warmer and there is light.
→ must prevent permafrost from melting so many services e.g. water & sewage are in overground pipes to avoid melting.
→ roads are basic dirt or gravel as they are easy to maintain.

LIVING WORLD



Biodiversity → the range of plants & animals in a certain area

→ extremely high in rainforests

→ 50% of world's plant, animal & insect species.

→ some have evolved very specific niche conditions so won't respond well to change.

→ deforestation likely to reduce biodiversity.
→ in 1989 there were 218 extinct species in Brazil → 628 by 2008.

CAUSES

- SUBSISTENCE FARMING** → small-scale farming for their own use
- COMMERCIAL FARMING** → large-scale farming for money e.g. cattle ranching
- LOGGING** → often illegal logging.
- ROAD BUILDING** → opens up previously inaccessible areas, therefore very bad.
- MINERAL EXTRACTION** → Mining e.g. gold/iron ore
- ENERGY DEVELOPMENT** → hydro-electric dams
- SETTLEMENT/POPULATION GROWTH** → increasing populations means towns are spreading.

DEFORESTATION

Soil Erosion from soy farming leads to loss of 55 million tonnes of topsoil each year. (no trees to hold soil together).

→ lots of money & jobs through economic development:
→ 2008 Brazil made \$6.9 billion from cattle
→ Brazil second biggest exporter of soy beans.
→ mining creates jobs e.g. Buenaventura Mining in Peru employs 3100 people.

SELECTIVE LOGGING AND REPLANTING
→ only some trees removed, so reduces damage to others.
→ removal by horse or helicopter e.g. Sarawak in Malaysia.
→ replanting leads to more rapid recovery.

DEBT REDUCTION
→ poor countries can cancel or reduce debts to rich in exchange for conservation
→ Peru reduced debt to USA by \$25 million in 2008 in exchange for rainforest conservation

VALUE OF RAINFORESTS

- * High biodiversity provides range of products
- * potential new medicines from undiscovered plants
- * reduce global warming by absorbing CO₂.
- * regulate climate and water cycles e.g. by absorbing water to stop flooding.

CAUSES in the AMAZON

- 70% cattle ranches
- 20-25% subsistence farms along Trans-Amazonia Highway
- government scheme to help poor people.

IMPACTS on the AMAZON

→ world's largest rainforest at 8 million km²
→ 750 000 km² destroyed since 1978. (3x size of the UK).

Amazon stores around 100 billion tonnes of CO₂ → deforestation leads to this being released → climate change!

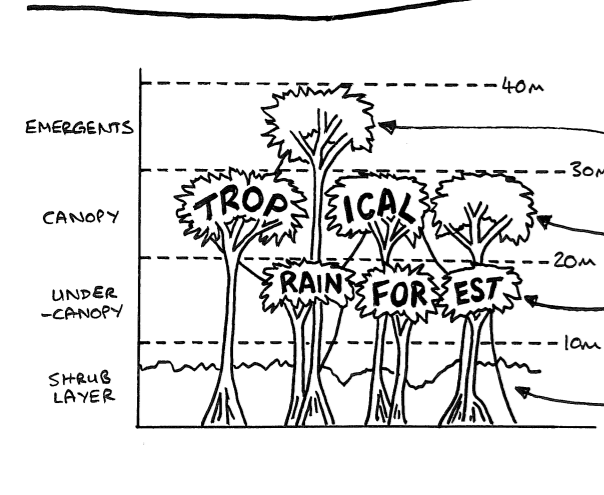
SUSTAINABLE MANAGEMENT OF RAINFORESTS

EDUCATION & CONSERVATION
→ educate the world about value of forests so they buy sustainable products
→ educate locals about value to they don't do e.g. illegal logging

→ set up nature reserves e.g. Central Amazon Conservation Complex in Brazil (25 000 km²) - World Heritage site
→ train locals in sustainable economies e.g. ecotourism.
→ Foreign countries support funds e.g. Norway paid \$1 billion to Amazon Fund.

INTERNATIONAL AGREEMENTS ON HARDWOODS
→ Forest Stewardship Council make their logo onto sustainable timber

ECOTOURISM
→ small numbers, sustainable construction, locals employed.
→ largest income source in Costa Rica.



CLIMATE → hot and wet all year
→ around 2000mm rain annually.

SOILS → very poor as all nutrients are either absorbed rapidly by trees or washed out by rain (leaching).