

## Threats to the taiga

The taiga is under direct threat from commercial development. Commercial development happens when resources in an area are used to make money. **Some types of commercial development have bigger impacts than others**, and the more commercial development there is, the bigger the impact. We can think of threats to the taiga (boreal) forests in three categories:

1. Direct threats through logging. This is intentionally and directly removing trees.
2. Indirect threats through mining minerals, fossil fuels and HEP potential. They are indirect because the forest is threatened by the **side effects** of these activities, such as oil spills or flooding
3. Other environmental issues, like acid precipitation, forest fires and pests/diseases

We will cover all three this lesson.

### Direct commercial threats: logging for softwood, pulp/paper production

Between 2000 and 2013, 40% of all deforestation was in the taiga. This was MORE than in the TRF. (But, because the biome is so vast, it's still more intact than the TRF – only 8% of it has

Taiga trees produce softwood and are the world's main source of softwood timber. The most common logging technique is **clear-cutting**. All the trees in an area are cut down and the logs transported to sawmills where they are cut into timber to be used for construction, or to paper mills where the trees are turned into pulp, ready to be made into paper. The mills themselves are often located in the taiga, near waterways or railways.

The value of softwood means that large areas of Russia's taiga have been cleared: deforestation is occurring at a rate of 12 million hectares per year (2014). As much as half of the logging in the far east of Siberia is illegal. This illegal logging is a huge threat to the taiga as no efforts are made to replant taiga trees. Without replacing the trees, the pine needle litter will diminish, eventually lowering soil fertility. Logging in Canada is much better controlled as the government ensures that all logging of the taiga forest is accompanied by **replanting**.

### Indirect threats: exploitation of minerals, fossil fuels and HEP potential

**Mining** leads to even more deforestation. Mining can be for minerals like diamond, gold or iron ore. It can also be to gain access to fossil fuel reserves.

**Russia** has 20% of the world's oil and gas, and the majority of those reserves are in the taiga, in what are known as **tar sands**. Tar sand is sediments containing thick, black oil, which can be processed into petrol. Extraction requires open-pit mining or strip mining, which means digging up the land surface in strips to get to the sands beneath.

According to the non-governmental organisation Greenpeace, which campaigns on environmental issues, Russia's oil industry spills 5 million barrels, or 795 million litres, of oil each year through accidents and leaks in the enormous pipelines that transport oil from the remote taiga oilfields to population centres. In Canada, where the government puts much stricter controls on oil companies, oil spills from pipelines still sometimes occur. In 2011, for example, 5 million litres of bitumen (oil from tar sands) mixed with water spilled from a broken pipeline in Alberta. Oil spills are very damaging in the taiga as drainage is often poor, so the oil doesn't get washed away. Decomposition occurs very slowly in the taiga, which means that the oil remains in the ecosystem for a long time. Oil seeps down into the soil and is taken up by trees, which often kills them.

Like in the TRF, hydro-electric power dams are also problematic for the taiga, because they flood large amounts of the forest. The roads surrounding the dam and the reservoir itself disrupt migration patterns of certain animals like caribou.

#### Acid precipitation and biodiversity loss

There are a few other threats to the taiga, that particularly reduce biodiversity – that is the **range** or **number** of different species inhabiting an area.

Some parts of the taiga are affected by acid rain, particularly in Scandinavia, eastern Russia, south-east Canada and eastern USA. All rain is slightly acidic, but a pH lower than 5.7 is more acid than natural. Acid rain forms when fossil fuels are burnt, releasing sulphur dioxide and nitrogen into the air. These react with water in clouds to form sulphuric and nitric acids. Precipitation carries these acids down to the surface. When falling on the taiga, it reduces biodiversity in a number of ways:

- Lakes and wetlands become so acidic that fish and aquatic plants can die
- Spruce needles are damaged and less able to photosynthesise
- Soils become too acidic, meaning they are less fertile and can damage tree roots
- Weaker roots can't take up nutrients, and so are more at risk of disease and insect attack.
- If the trees die, this reduces available food for animals further up the food chain, resulting in further biodiversity loss.

#### Forest fires and biodiversity loss

Natural wildfires are actually **normal** in the taiga. Forest fires occur because: the summers in the taiga are quite warm and dry; there is a thick carpet of pine needle litter which is perfect tinder to help start a fire; occasional summer storms generate lightning strikes; coniferous trees contain a sticky resin, which burns easily. Such fires actually *create* biodiversity. This is because certain animals where the forest is newly burned, which different species live in areas that have not burned for hundreds of years. However, wildfires in the taiga have increased since the 1990s. It is thought that this is due to global warming, bringing warmer and drier summers. They are becoming **larger and more frequent**, without giving the forest time to recover. This means that only fire-tolerant trees will begin to dominate, reducing biodiversity. Plants that aren't fire-tolerant, and the animals that feed on them, would decline.

#### Pests and diseases and biodiversity loss

The taiga has fungus and mould species that damage conifers' needles, trunks and roots, and insects also eat their pine cones, needles and young shoots. In addition, new pests and new diseases have spread to the taiga more recently. An example of a pest is the **silkworm**, which spread into eastern Siberia from Mongolia in the early 2000s. At this time, the taiga forest had been weakened by forest fires and drought, and the silkworm finished many trees off. In North America, 'plagues' of spruce-bark beetles have killed large numbers of taiga trees. Over 6 million acres of Alaska's forest show signs of spruce-bark beetle activity!

Finally, an example of a disease is the **white pine blister rust**. This is a fungal disease that attacks white pine trees.