

Semester IV

GEO-A-CC-4-10-TH- Soil and Biogeography

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Topic: Taiga Biome-

Location

The Taiga biome stretches in the Northern Hemisphere taking huge chunks of North America and Eurasia, especially Canada and Russia respectively. It also stretches in Northern Europe in countries such as Finland, Norway and Sweden and spans across Alaska and Scandinavia. It occupies about 27% of the Earth's surface. It is located south of the Tundra biome, which is characterized by a land frozen by ice and constant snow. Because of its location, the Taiga biome is fairly cold. It is to the north of the temperate deciduous forests and grasslands which are warmer. It is located above the Tropic Cancer between northern latitudes of 50° and 70°.



Climate

The Taiga biome is situated close to the Arctic Circle which is the next major latitude above the Tropic of Cancer. The areas around this latitude are freezing cold. Moreover, there are cold winds that blow the cold Arctic air into the biome making it extremely cold through most of the year. Hence, this climate is called the subarctic climate. The earth rotates around the sun annually. Geographically this means that there has to be an earth surface that is exposed to the sun for a period of time and seasonal change. However, due to this tilt of the sun, the biome faces away from the sun resulting in the long winters. Another effect is that there is less radiation from the sun to heat the land up. It is for these reasons that the summer is barely 3 months and winter is double that.

Precipitation in this biome takes place in both winter and summer. During winter it falls as snow while in summer it falls as rain. Dew is also a form of precipitation in this biome, though overshadowed by snow and rain. For over half a year, there is constant falling of snow with an annual height of 50-100cm. The summer season enjoys an average rainfall of 25-50cm annually bringing the average precipitation to about 75cm.

Temperature

Taiga biome is characterized by a lot of cold throughout most of the year. There are two major seasons, that is, winter and summer. Typically, due to cold, the summers are short spanning about 50 to 100 days per annum with over half the year experiencing winter. Winter has temperatures as low as -54°C and as high as -1°C. As a result, during winter, there is a lot of snow falling and the land is frozen with ice. This lowers the average temperature to below 0°C. However, though short, the summers are warm and

encourage the growth of some plants. This warmth ensures humidity, a basic requirement for plant growth. With temperatures of between -7°C and 20°C , most of the ice melts giving way for aeration of the soil which is essential for plant life. The warm temperatures reduce snow fall and encourage rainfall which helps plant life as well as animal life.

Autumn and spring are the shortest seasons in the biome to the point that they are almost insignificant. Spring enables animals that had gone on hibernation to come out to the wild in preparation for the summer season. It is at this time that large water bodies begin to melt giving way for watering points for animals. The seasonal change of the Taiga biome translates to temperatures that are either hot and humid or very cold during the year.

Plants

The biome is home to various species of plants. These plants are adapted to an extremely cold climate. The biome is mainly consisted of the coniferous trees such as pines, cedar, hemlock, larches, fir, evergreen and spruces. These conifers are the most dominant type of trees in the Taiga biome. There are other plant species such as aspen and birch which owing to their broad leafology are able to maximize on absorption of light despite the climate of this biome. There are also some lichens and mosses.

Adaptation is essential for plants to survive in this type of biome. They have to develop special key features that ensure they adapt to the varying climate of the Taiga biome. Leaves are the core source of food manufacture for plants and a lot of energy is needed. The absence of sunlight in the biome is an inhibiting factor which means that plants have to have adaptable leaves.

Other than the aspen and birch, the evergreen has green leaves throughout the year thus the plant name 'evergreen'. This means they have ample food due to the presence of chlorophyll in their leaves. Furthermore, this plant do not shed its leaves and keeps the same leaves for a very long time, enabling them to use minimal solar energy. This makes the plant to grow in breadth and length rather than growing numerous leaves.

Plants also exhibit other structures in their morphology such as needle like leaves which minimize the surface area of the leaf in contact with the atmosphere to reduce water loss through transpiration. They are also waxy to reduce chances of freezing or drying of the leaves. They keep their needle-like leaves throughout the year so that they can start photosynthesis as soon as the weather gets warm. These trees grow close to each other giving them protection from excessive wind. Coniferous trees are conical in shape with their branches pointing downwards. It's a feature that lets the snow slide off the slanted branches rather than pile up, which can freeze the plant. Other than that, continuous falling of snow on plants may add to their weight which leads to breaking off of stems and branches.

The biome is also favorable for crop farming. There are various growing seasons which vary with the climatic changes in the biome.



Animals

There is a limit to the number of animals that can survive in this biome due to the cold temperatures and climatic variations. Still, there are many animal species spanning from mammals such as bears, deers, moose, elk, caribou, ermine, moles, squirrels, chipmunks and bobcats, birds such as sparrows, finches, woodpeckers, crows and eagles, and a variety of insect species.

The herbivorous animals are found in parts of the biome where there are more trees to feed on. The presence of snow in the Taiga biome translates to ponds and water bodies during spring and summer. These are usually the breeding grounds for insects and serve as a source of food for rodents and birds, and for this reason, they can be said to be keystone species.

Birds from other biomes come to the Taiga biome to nest and feed on these insects and then migrate towards the end of the summer to their respective biomes. Though seed eaters such as sparrows and finches stay in the biome all year round.

Animals in the biome have to have adaptive features in order to survive in this cold climate. During the summer season, there are more animals on sight than during winter. This is because most of these animals either migrate to warmer biomes where they can cope easily especially for birds, or hibernate till the next summer season.

Bears are famous for this. They store volumes of food in their habitat enough to last them for 6 months when they will next see daylight. Migration is at times made difficult even for birds if the rate of snow fall is heavy. Alternatively, there are animals that do not migrate nor hibernate. They are specifically adapted to the cold. Features such as a thick layer of fat for mammals and numerous feathers ensure the warmth of the body is conserved despite the surrounding. Tigers have large paws to walk through deep snow.

Feeding habits do not change. Because some animals still need to eat during the winter season, they use camouflage, a common feature for animals such as ermine and snowshoe hare. They are able to change their fur coats from the normal brown to white during winter, enabling them to move in snow without being noticed.

Soil organisms

The species richness and total biomass of soil organisms are significantly lower in the taiga than they are at lower latitudes. Dominant soil organisms are protozoans, nematodes, rotifers, and tardigrades. These organisms live primarily in soil water film and soil pore water. The soil fauna of the taiga is distinctive because it generally lacks large invertebrates such as millipedes, isopods (springtails), and earthworms, especially in the middle and northern taiga. Larger soil invertebrate animals perform the function of biting off (shredding) pieces of leaf litter in forest soils and passing them through their guts. As a result of this activity, a thick layer of several years' accumulation of only partially decomposed plant material is characteristic of soils in the taiga biome.

Fungi are the dominant organisms in the task of decomposition of litter in the taiga, but flushes of bacterial growth occur in response to triggering factors. The soil animals generally do not attack the forest litter directly but instead exert their influence by grazing on the fungi and bacteria. The rate of decomposition in taiga soils does not keep pace with the rate of production, causing the progressive accumulation of organic matter. At middle depths of the forest floor, small invertebrates, especially dipteran larvae, partially consume or skeletonize leaf litter before emerging as adults.