3.0 Inter-relatedness of Living and Non-living Elements Within A forested Environment

3.1 Various forms of plant species live in the boreal forest.

a. Vascular plants

- have a "plumbing system" in which fluids move throughout the plant
- this allows the movement of nutrients, repair chemicals, and anything needed for the plant's survival and growth.
- Most plants are vascular in nature, but plants like mosses and lichens have limited means of moving material through the plant.

Vascular plants can be split into two groups:

- **Spores** such as ferns

- Those plants which produce seeds (spermatophyte)

  i) **gymnosperms** –have naked seeds
  --include conifer trees
  --have no "true flowers" and include fir, spruce, and pine
  --have their seeds in a cone or some other casing which exposes them to the air and the environment
  --700 species on the earth

  ii) **angiosperms** --have enclosed seeds
  --have true flowers which produce seeds and are covered up in various ways
  --pin cherry or apples have seeds that are eaten and spread in various ways
  --most common plants around with over 250,000 plant species on the earth

b. Life Span

- **Annuals**---plants that germinate, grow, produce seeds and die all in one season
  ---plants don't get very large

- **Biennial**---produce seeds in the second year then dies
  ---examples are turnip, parsnip
  ---plants don't get very large in size

- **Angiosperms**

  Perennials---produce seeds and live indefinitely

---some can produce seeds each year
---these plants will only produce seeds under certain conditions of health, age, nutrition level or the growth site

Woody plants---are trees with wood as their stem such as the white spruce
---is a shrub less than 5 meters in height
---is usually multi-stemmed
---an example is a Jack Pine tree

Herbaceous---is any plant whose stem withers away to the ground after each season's growth
---these plants do not get very large

3.3 Abiotic Factors Within a Forest Ecosystem

Abiotic means non-living and these factors are very important in a forest ecosystem.

A. **Solar Radiation**

- Affects the ecosystem by the strength and how long there is solar radiation.
- It allows photosynthesis to complete its process and convert light energy into chemical energy.
- In our hemisphere, slopes facing south will get more solar radiation then any other direction.
- Slopes facing east will get morning sun while here in the Northern Hemisphere, the north facing slopes have the least amount of solar radiation.

B. **Temperature**

- Is important for the life forms to occur.
- Areas with hot and cold extremes have limited life forms for both plant and animal life.
- The average temperature for such is 0 degrees C, but seasonal averages vary greatly.
- In Saskatchewan we have a short growing season (100 frost free days).

- The extreme temperatures from -40 degrees C to +37degrees C, limit plant growth not because of the higher summer temperatures but because of the cold winter temperatures here.

- **Hardiness** is the plant's ability to withstand certain cold temperatures. Most plants can survive in warmer temperatures but not in extreme cold temperatures.

C. **Atmospheric Moisture**

- If we had most of the moisture in the winter, or for three days in the summer, it would not be very beneficial for plant growth.

- In Saskatchewan, we normally get enough moisture for plant growth in our forest ecosystem, it does not need irrigation.

- Moisture could be in the form of snow, sleet, mist, rain, or hail.

- If we get 3 days of solid rain for the whole summer, the first few hours of rain would be of the most use to plant growth. The rest of the moisture would be run off and would end up in streams and ponds.

D. **Climate**

- Is the combination of radiation, temperature and moisture

- In southern Saskatchewan there is a lot of sunshine and little precipitation.

- In northern Saskatchewan the temperature is cooler with more moisture.

E. Soils

Most of the soils of Saskatchewan's forest ecosystem are made by deposits from wind blowing, lake deposits, and mountain or glacial deposits.

- **Weathering** is the wearing away by the natural elements of moisture, wind, heat, and decomposition.

  ----Areas that have a lot of oxygen, moisture, high temperatures, and microorganisms will decompose plant parts rapidly into organic matter.

  ----Plants in places such as bogs, marshes and tundra have carbon that is not fully decomposed and therefore is of little use for plant growth.

----This organic matter stays on the top of the soil acting like mulch and keeping in moisture, oxygen, and a healthy soil temperature which is good for plant growth.

----Mulch is ideal for plant growth if it is 10 cm thick. Anything more than 10 cm can't give enough nutrients to the plant and the plant's roots can't anchor in this soil.

F. Fire has much influence on the forest ecosystem.

- Some plants depend upon fire for reproduction. Jack Pine trees need heat to open up their cones. For suckers and sprouting to happen on existing plants, or to just burn away competing vegetation allows other plant species to grow on the burnt site.

G.

It is difficult to understand the sum total of all these interactions among the environmental factors. A plant lives in the total complex of the environment and a change in any one factor may well cause a changed requirement of the plant for other factors. These factors are interdependent and interrelated and make the ecosystem very complex.