The boreal forest ecosystem contains 13% of the carbon stored in global biomass and 43% of the carbon stored in soil. Climate change is projected to happen most rapidly in the northern high latitudes. To understand how boreal forest ecosystems will respond to the future climate conditions is thus extremely important in both climate change and forest management studies. Since the climate and ecosystem interacts in a highly complex way, numerical models have been used as important tools in the investigations.

### The EALCO Model

**Current Water and Carbon Budgets**

**Projections by the EALCO Model**

**Reducing Canada’s vulnerability to climate change**

**Conclusions**

- **Water:**
  - Warmer climate increases ET and drought impact significantly. It could completely offset the effect of moderate precipitation increase.
  - Higher CO2 could significantly increase plant water use efficiency and reduce the drought impact caused by higher temperature.
  - Decrease of precipitation remarkably increases drought impact even under higher CO2 conditions.

- **Carbon:**
  - Warmer climate increases GPP moderately but decreases NEP due to significant increase in ecosystem respiration.
  - Higher CO2 could offset the negative impact of higher temperature and lower precipitation on NEP.
  - Inter-annual variations of precipitation has less impact on ecosystem C dynamics under higher CO2 conditions.
  - The impact of CO2 on forest C dynamics needs to be adequately addressed in assessing the C sequestration capability of the future forest ecosystems.

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