Temperate Forest Regions

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Composition of our group:

- 50 % consultants
- 50 % academics

Questions:

How can the various approaches for hydrological prediction in the forest region be implemented given the availability of meteorological and catchment data and current understanding of hydrology

1)Small spatial scales, short time scales
2)Large scales, longer time scales

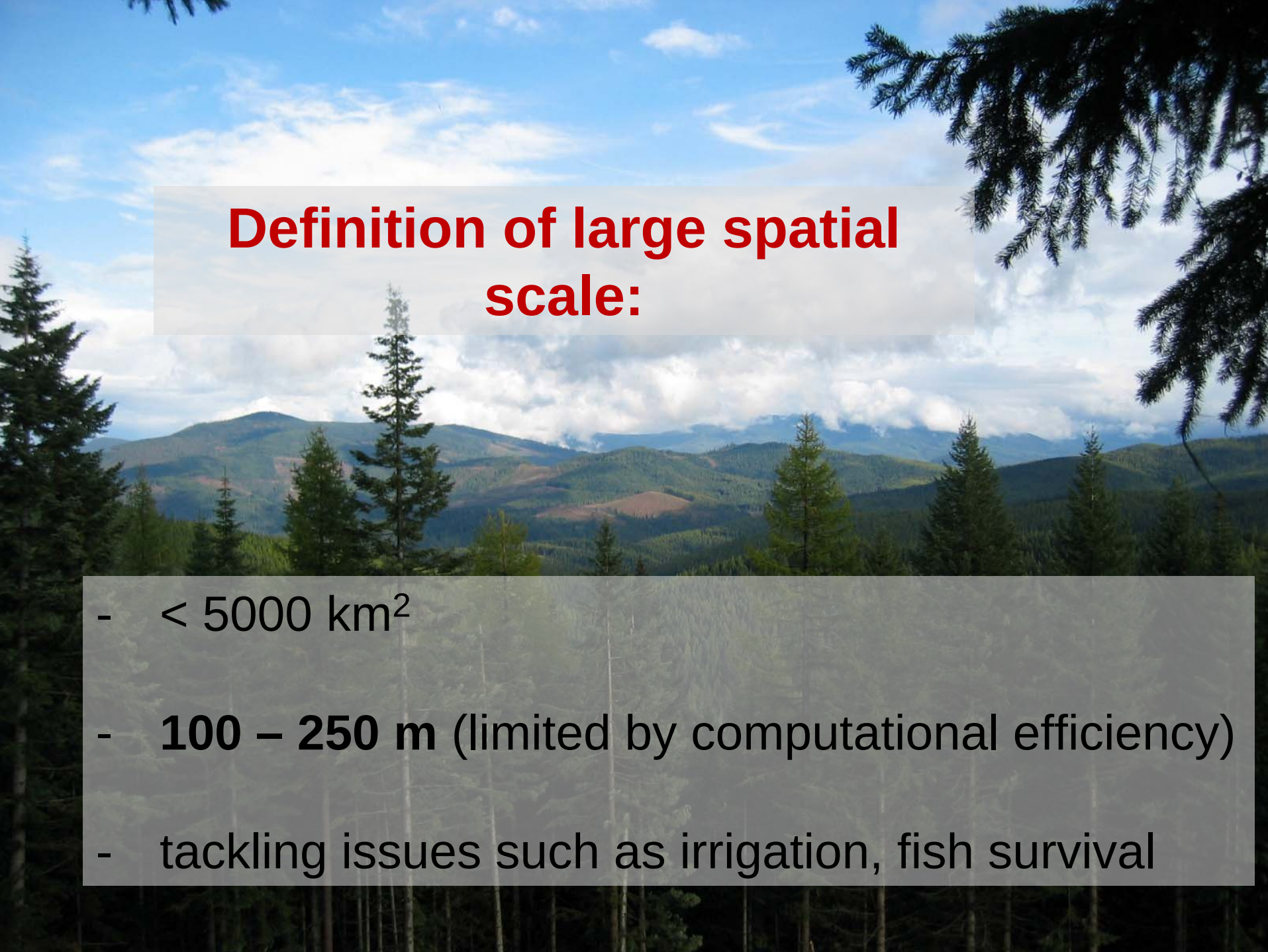
Approaches for hydrological prediction

- Depend on the **objectives** and whether **research** or
  applied
    e.g. water availability for peak / low flow
    post-project changes such as diversions /dams

- Depend on the **choice of model**
  (statistical or process-based)

Definition of small spatial scale:

- 10 – 200 km^2
- **30 – 500 m** grid (consultants) versus **< 1 m** grid e.g. from LIDAR (researchers)
- **Problems** with spatial resolution of **remote sensing** such as Landsat e.g. for snow modeling. Other tools are starting to be used



Definition of large spatial scale:

- < 5000 km^2
- **100 – 250 m** (limited by computational efficiency)
- tackling issues such as irrigation, fish survival

What is data rich ?

Spatial

-depends on **density** of **meteorological** and **hydrological** (surface) and **groundwater** (subsurface) stations

-**Diversity** of data and superimposition of **different scales** of data

Temporal

-depends on **temporal scale**, **length** and **resolution** of data record

Application

- ***What is the use of data rich ?*** Is the **full range** of

  available variables exploited in models ?

What kind of hydrological prediction is necessary ?

- Most often **stream flow** but in the context of forests sometimes **ET**

- Even if data and tools are available, **often very simple approach** is used, e.g. for oil sands, observed Q, simple numbers without complicated dynamics

- Simple, **user friendly spreadsheets preferred** to complex models

How is the vegetation component implemented in the different models ?

- Mostly very simple, not dynamical, only **vegetation class**
- For **ET** and **rooting depth**
- For subsurface approaches it remains a simple, **conceptual / bucket approach**

- Difficulties of **modeling snow** in forests (canopy issue) Problems of verification with **remote sensing**
- **Applied issues**: how much forest can be cleared without influencing the stream flow

How is the soil component implemented in the different models ?

- Key aspect: how **parameters** are **back-calculated**
- **Problem of definition** of soil depth, many unknowns.
- Often soils only used as **classified soils**. Conceptual / bucket approach. Only knowledge of top 1- 2 m.
- Problem of **soil moisture** and **soil texture** definition (infiltration capacity v. high, assume = precipitation)
- How is **macro-porosity** dealt with?
- How are **rooting depth** and **fractures** dealt with ?

How is climate change dealt with ?

- **Choice** of parameters
- **Climate variability / trend analysis**
- Limited to **temperature** and **precipitation**
- **Invasion of pests** (pine beetle)
- **Difficulties of downscaling** data from IPCC

Longer time scales

-Not much of an issue yet

Longer temporal scales

- Different **age classes** of trees
- **Vegetation growth / dynamics** should be simulated
- Impact of **pests** e.g. Pine beetle
- **Migration of species** with climate change
- Impacts of **forest fire / clear cut / storm damage** should be considered

Use of soft data

-**Dendrochronology** (e.g. for reconstruction of droughts)
-Indictors for low river levels

-**Scars on trees** left by ice / Debris flow tracks on trees
-**Mapping of inundated areas**, correlate with flood wave
-**Experience of stakeholders**, long term data (e.g. valley flooded every year independent of precipitation)
-Deep snow pack in forests
-**Historical trends as experienced by ranchers**, turning on of irrigation system
-but **caution should be taken on reliability of observations**

Other Issues

- **Role of wetlands / lakes** and interactions with **groundwater regimes** not discussed

- **Location of meteorological stations** in forest clearings or under canopy

Participants

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