# CP vs FP Paper outline

## 3 main messages

1. The effect of forest on landslides might be underestimated
2. climate change isn’t the only factor that leads to landslides
3. The need to apply probabilistic approach in forest management and landslide studies (knowledge gap)

# Outline

1. Introduction
   1. Increased global landslide frequency
      1. Cariboo
      2. Economic loss and public safety concerns
   2. Past studies on triggers of landslides
      1. Climate change
         1. “Exceedance of a climatic threshold is thus a necessary, but not a sufficient, condition for debris flow occurrence.” (Jakob et al., 2005, p. 756)
      2. Land use change
   3. Knowledge gap
      1. Regional scale landslide phenomenon
      2. Landslides aren’t single factor events
2. Role of Forest in slope stability
   1. Direct effect (deterministically)
      1. Decreased root cohesion
      2. Increased pore pressure
   2. Indirect effect (probabilistic)
      1. The frequency of saturated soil
         1. Timing and duration of snowmelt
            1. Energy balance

3 Past studies on forest harvesting and landslide frequencies

* determinism
  + lack of temporal analysis
  + small scale
  + calculate frequency density of landslides happening in the watershed (number of landslides/ area) then compare pre- and post-harvest
    - doesn’t tease out how landslide frequencies change with time
    - example from Jakob 2000:

A table with numbers and text

AI-generated content may be incorrect.

* examples:
  + (Johnson et al., 2007)
  + (Guthrie, 2002)
  + (Jakob, 2000)
  + (Imaizumi et al., 2008)

4 Attribution science in landslides

* causal framework
* Climate change isn’t the only factor causing the increased in landslide frequency
  + “Exceedence of a climatic threshold is thus a necessary, but not a sufficient, condition for debris flow occurrence.” (Jakob et al., 2005, p. 756)
* the need to develop regional analysis
  + soil fatigue/ threshold behavior
  + citation
    - (Wood et al., 2015)
    - “While most research tends to centre on basin scale landsliding, focusing on modelling and understanding the mechanisms and precursors that lead to landslide initiation, understanding the relationship between landsliding and climate change is a regional-scale problem which needs to be assessed at this level through regional-scale studies.” (Wood et al., 2015)
* past examples: landslide frequencies under climate change
* landslide pdf methods (still learning)
  + [Landslide inventories and their statistical properties](zotero://note/u/UJ8MMI6R/) (Malamud et al., 2004)

# Questions

1. Do the three messages align with your vision?
2. Do we need to talk about Cariboo? How much do we talk about it?
3. Should we mention groundwater? Maybe in the scope of analysis part or under role of forest part?

# To research

* Attribution science
* Modern causal inference
* Soil fatigue/ threshold behavior

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