



Efforts of scientific evaluation and analysis of forest multi- functions.

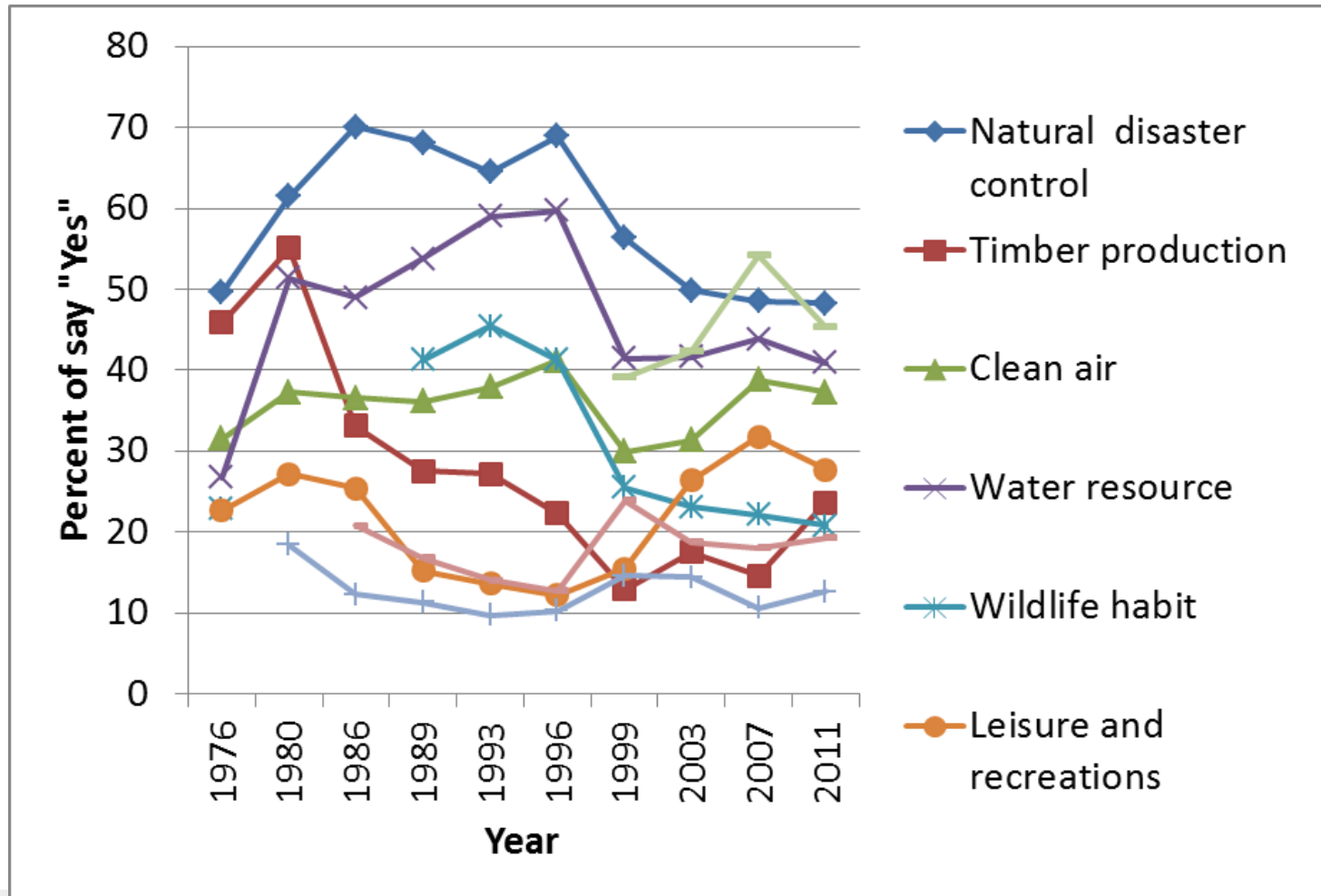
: soil and water conservation

森林の公益的機能の評価・分析に向けた取組

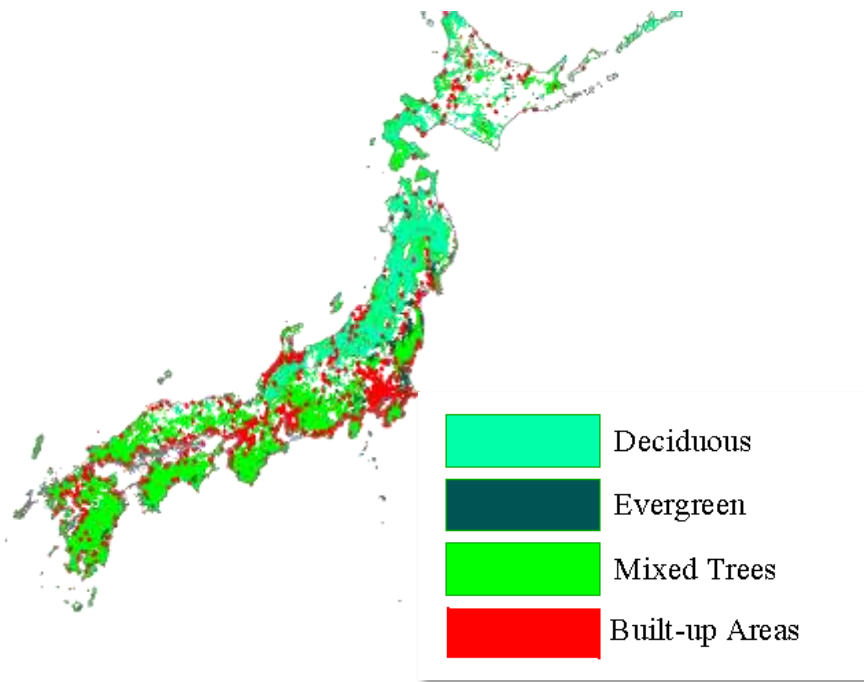
Masamichi Takahashi

Forestry and Forest Products
Research Institute

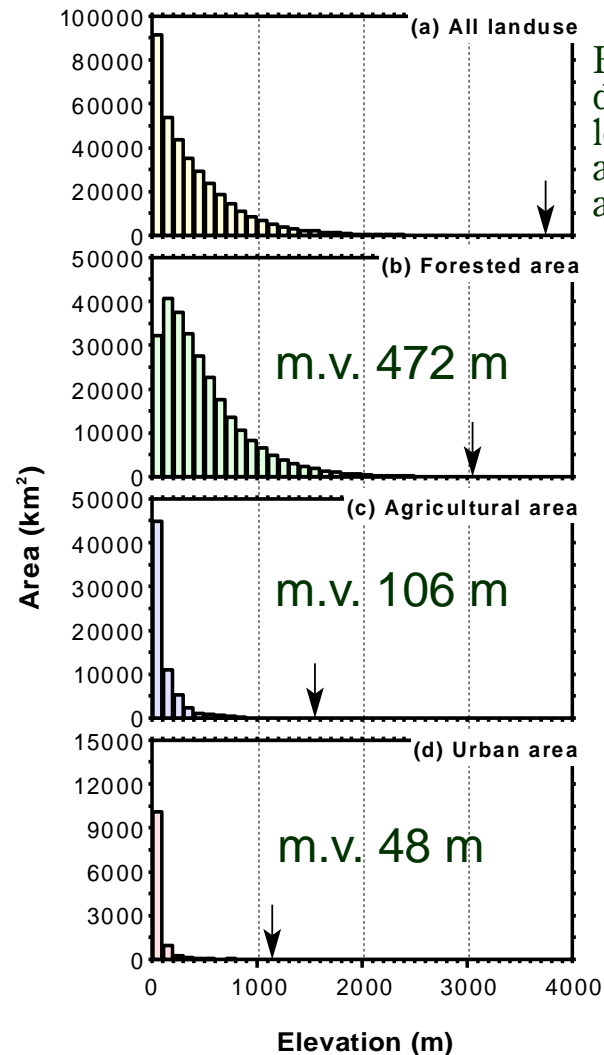
Public demands for forests, according to the public opinion poll



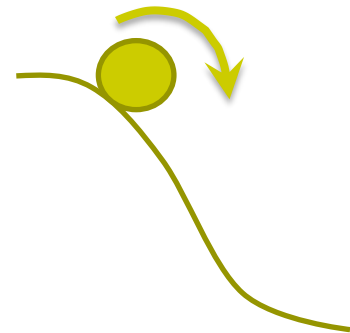
Distribution of forest, arable lands and urban land.



Annual rainfall
 Japan: 1750mm
 Main cities in the world: 900-1000mm



Forested area distributes at higher locations relative to agricultural and urban areas



Based on data from Digital Chart of the World

Japan as an unstable and natural disaster susceptible archipelago

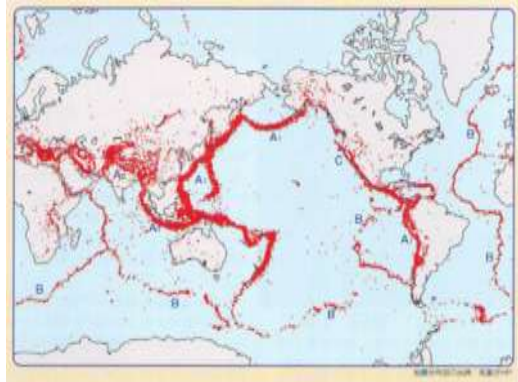


Plate tectonics in the world.
Red lines indicate the boundary of the plate.
(Meteorological Agency)



Mt. Unzen:
Volcanic mudflow,
(the Nagasaki forest management office)



Landslide by torrential rain in Mt. Aso, Kyushu.
(FFPRI)



Landslide by earthquake in Mt. Kukrikoma, Miyagi.
(FFPRI)

Helpless for deep-seated landslides

Litter accumulation on the floor



Broadleaved litter



Pine needle litter

Soil erosion by rain drop impact creates soil columns on litter-less forest floor even under the canopy of Hinoki forests.

Eroded soil



Surface soil erosion

Litter prevent from surface soil erosion; An artificial rainfall experiment by FFPRI.



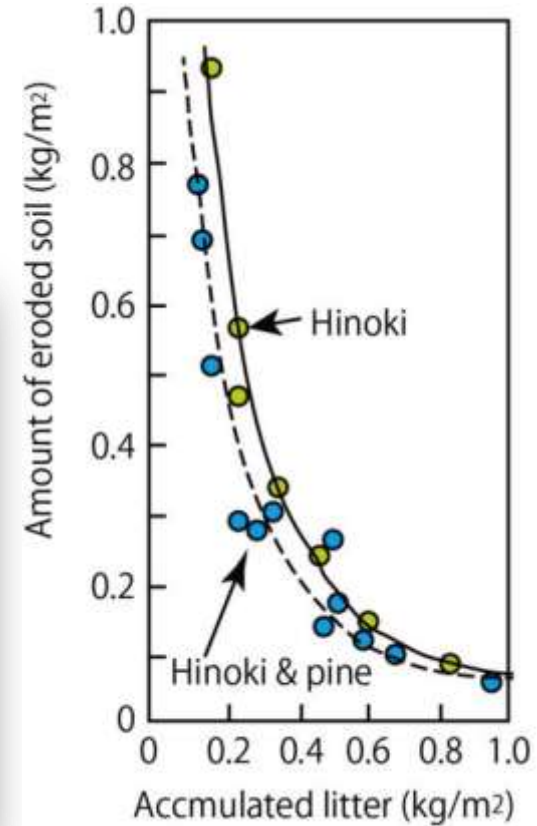
Rill



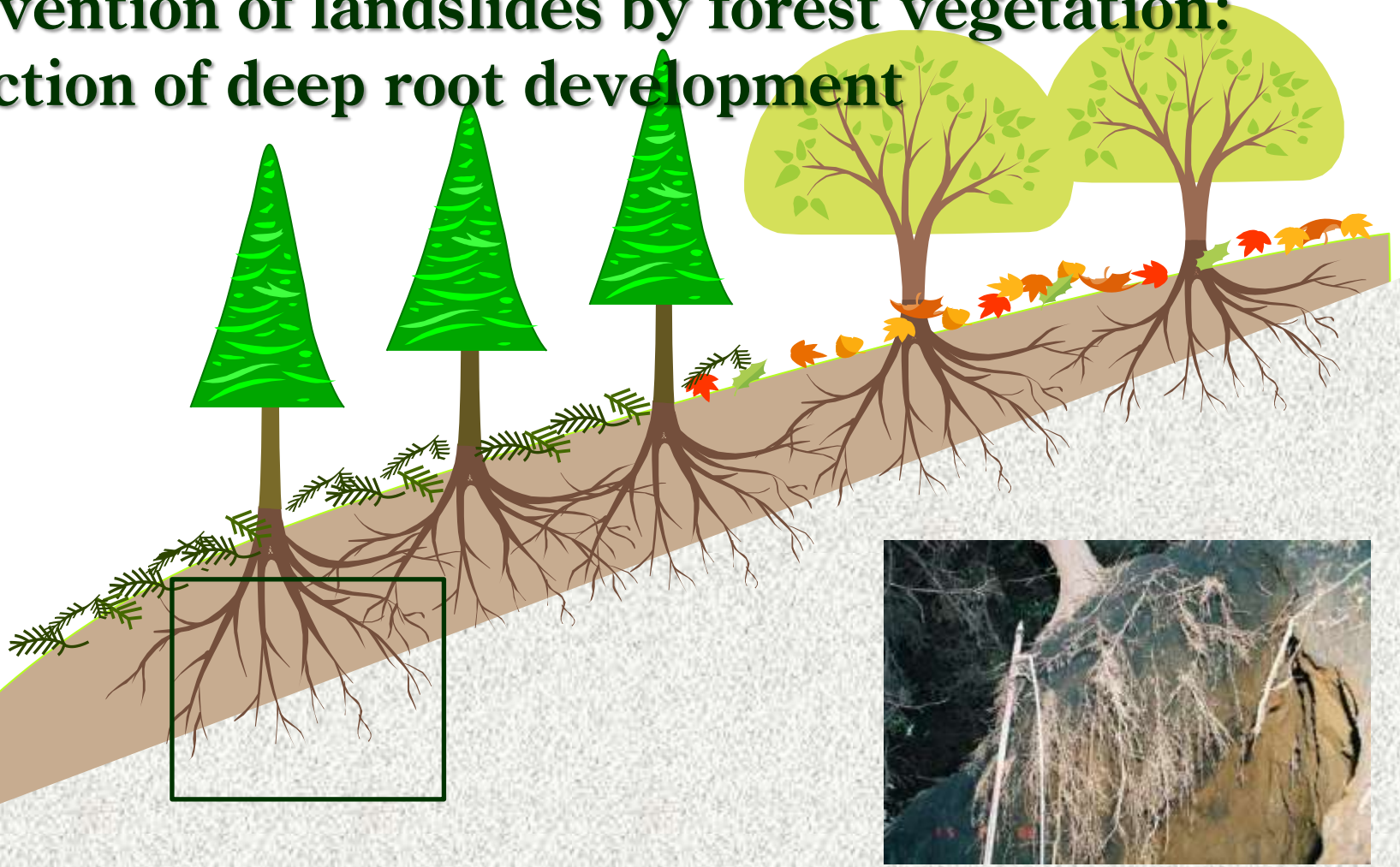
Gully



Okayama
Bare hill

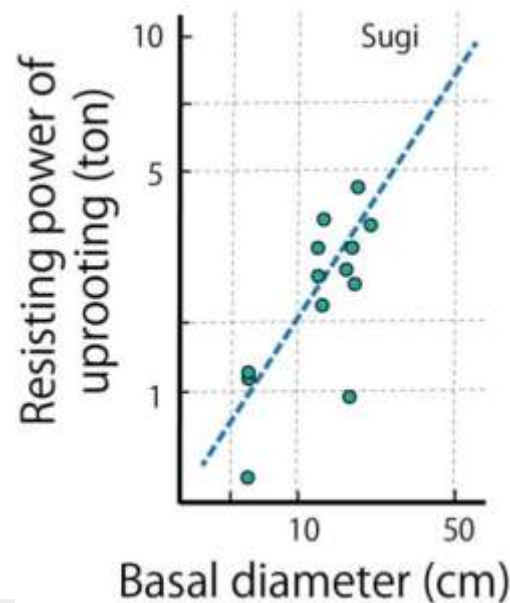
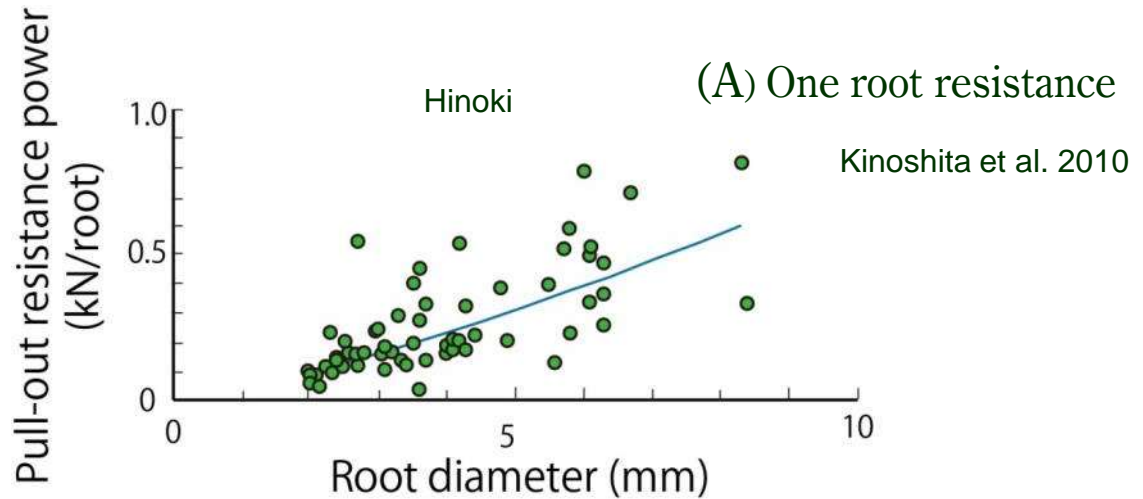
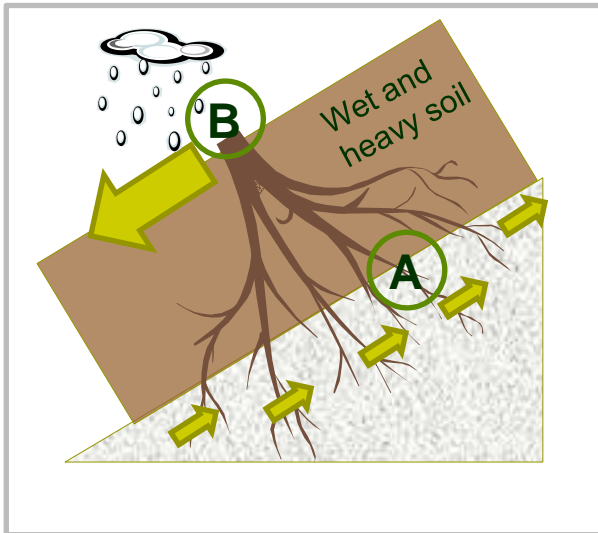


Prevention of landslides by forest vegetation: function of deep root development



Deep roots anchor the tree to the bedrocks.

Resisting power of roots and stumps



Forests for water resources and flood control

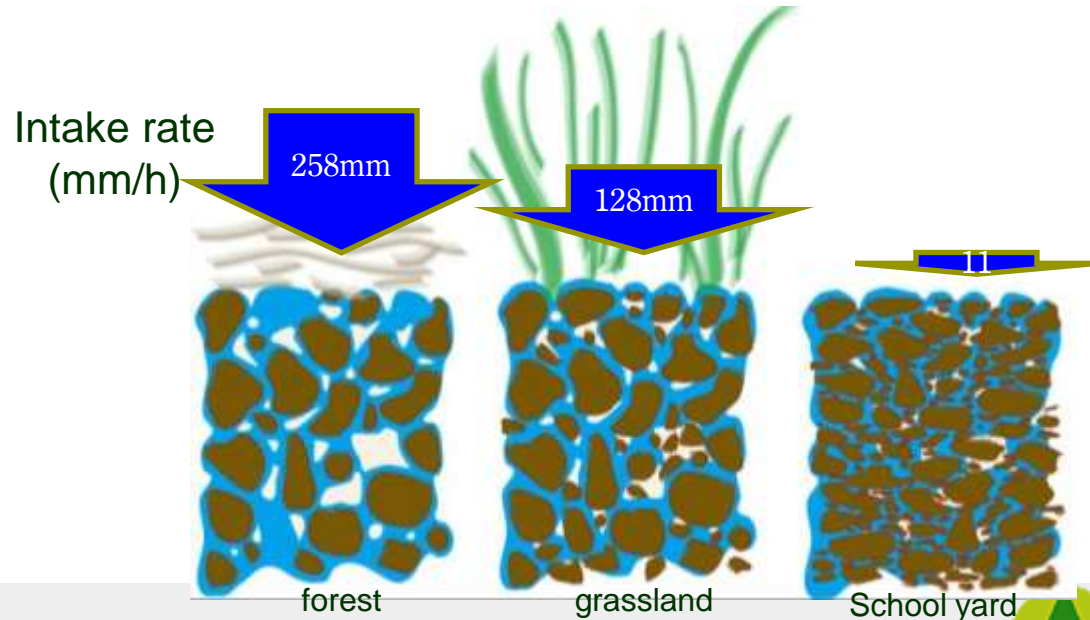
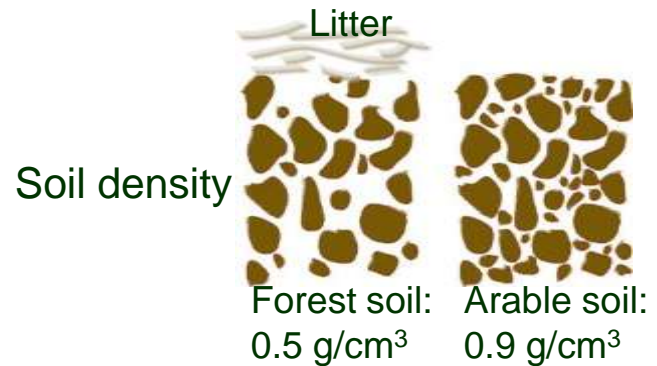


Iitate, Fukushima

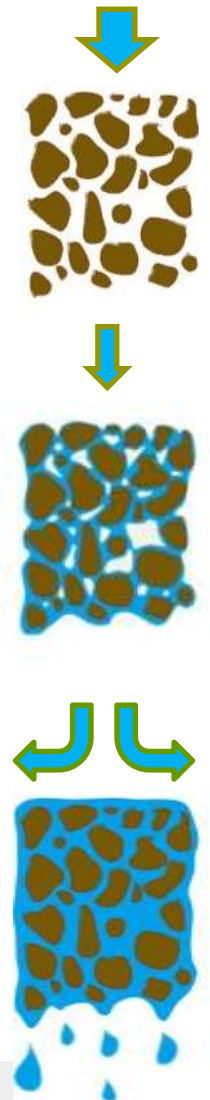
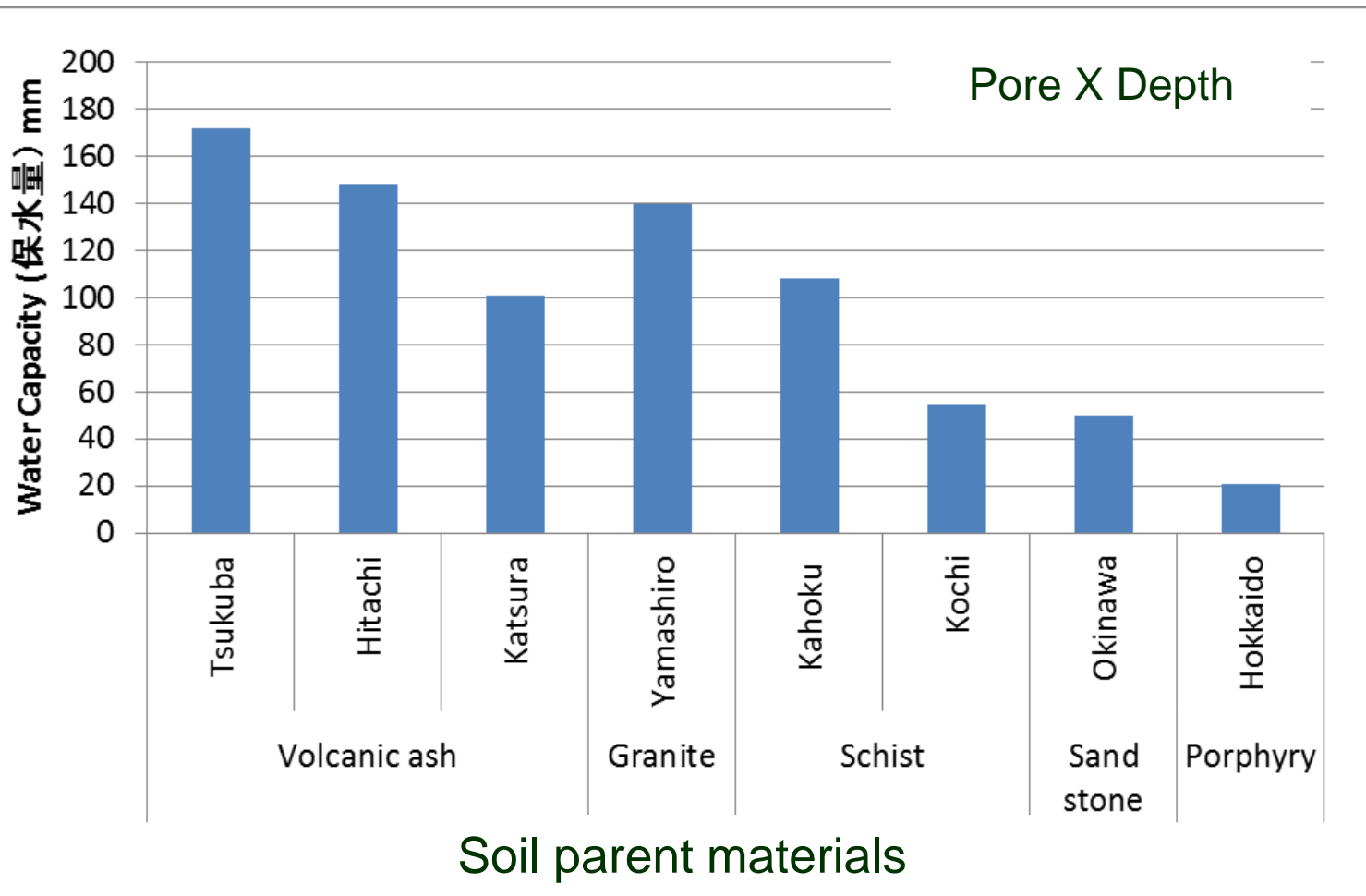


Nikko, Tochigi

Litter layer creates soft and sponge-like surface soil

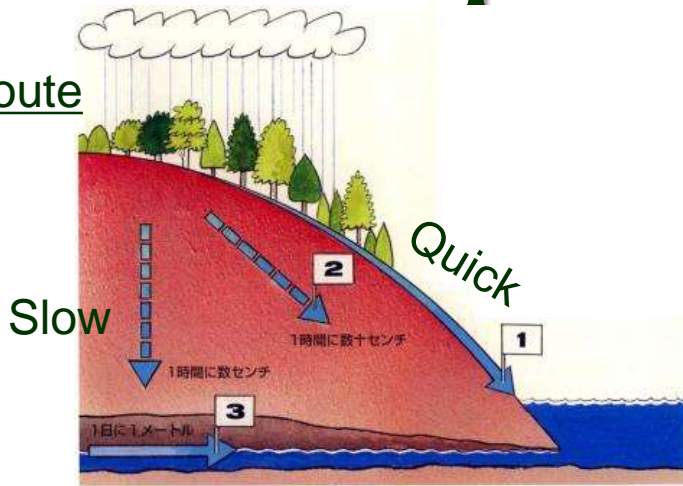


Soil water holding capacity

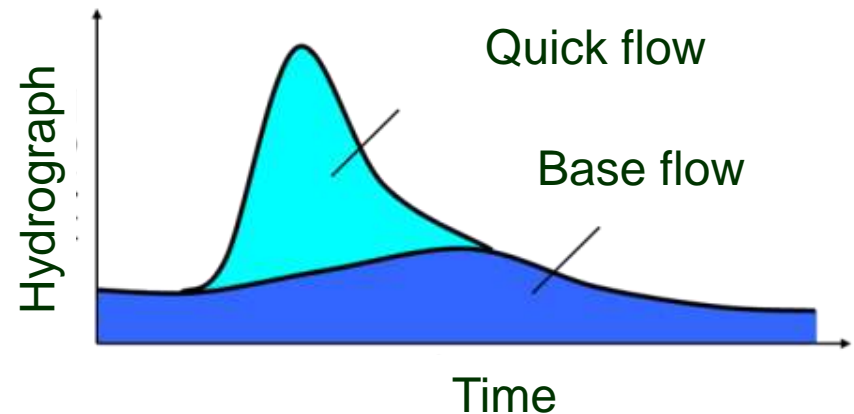
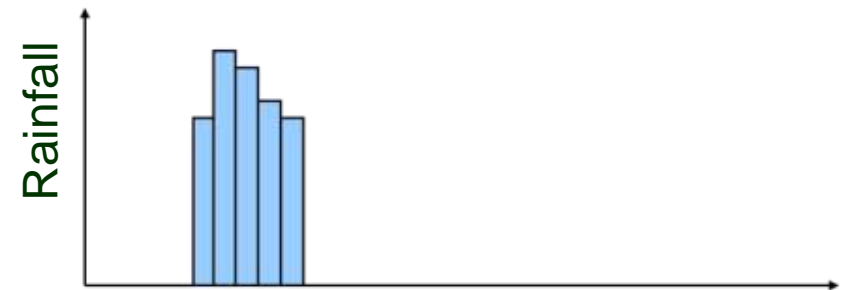
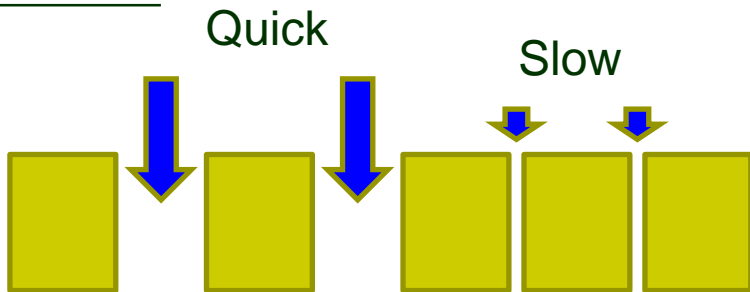


Different flow rates through different pathways

Flow route



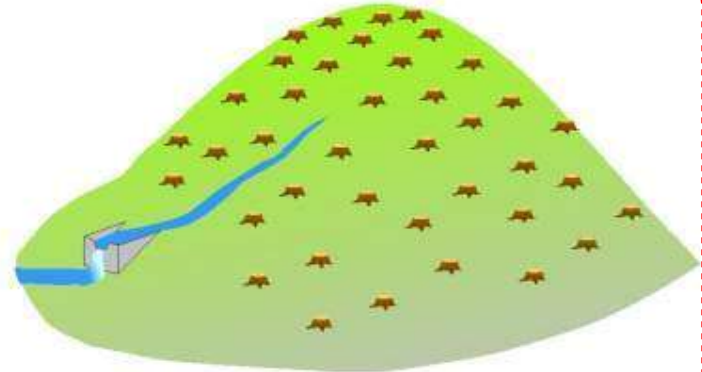
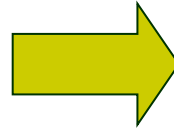
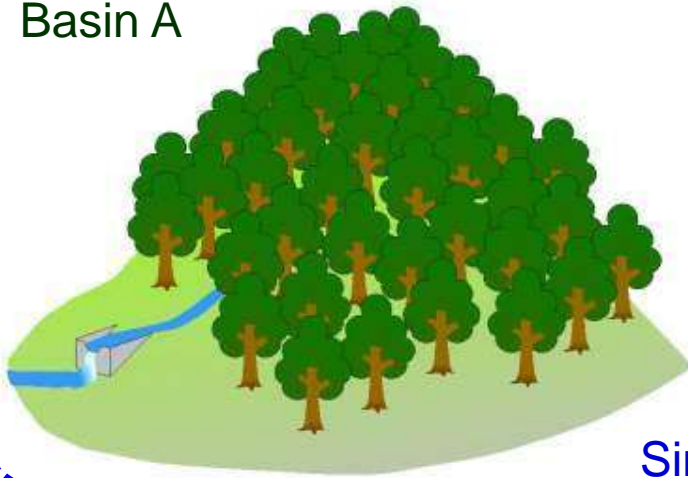
Pour size



Function for flood control
 + slow discharge
 + low flow peak

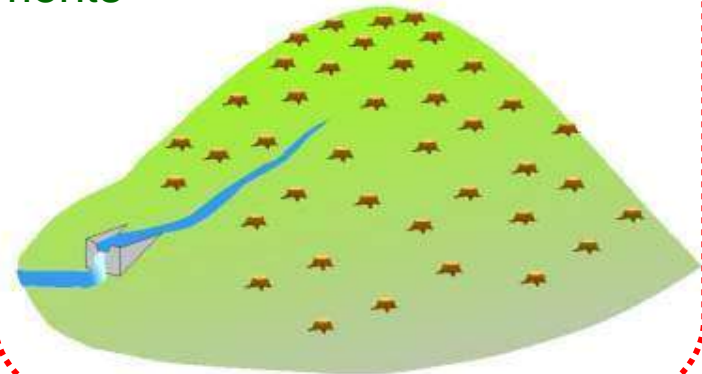
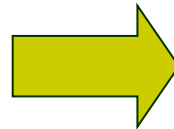
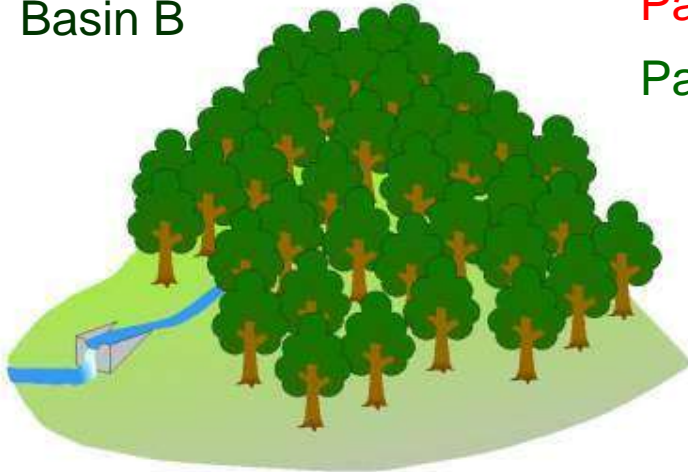
Experimental designs for comparison between forest and cutover site

Basin A



Single catchment

Basin B

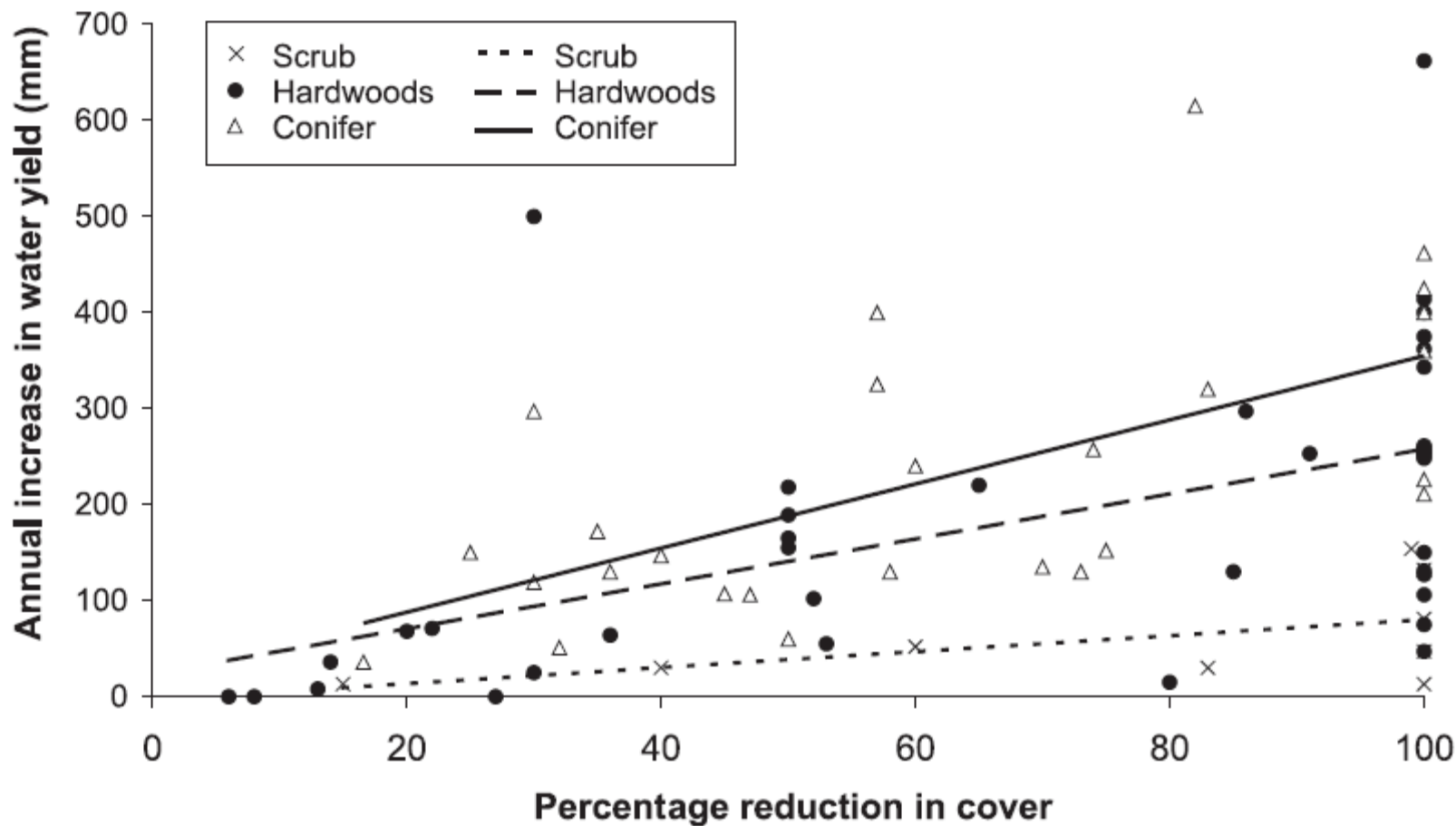


Parallel catchments

Paired catchments

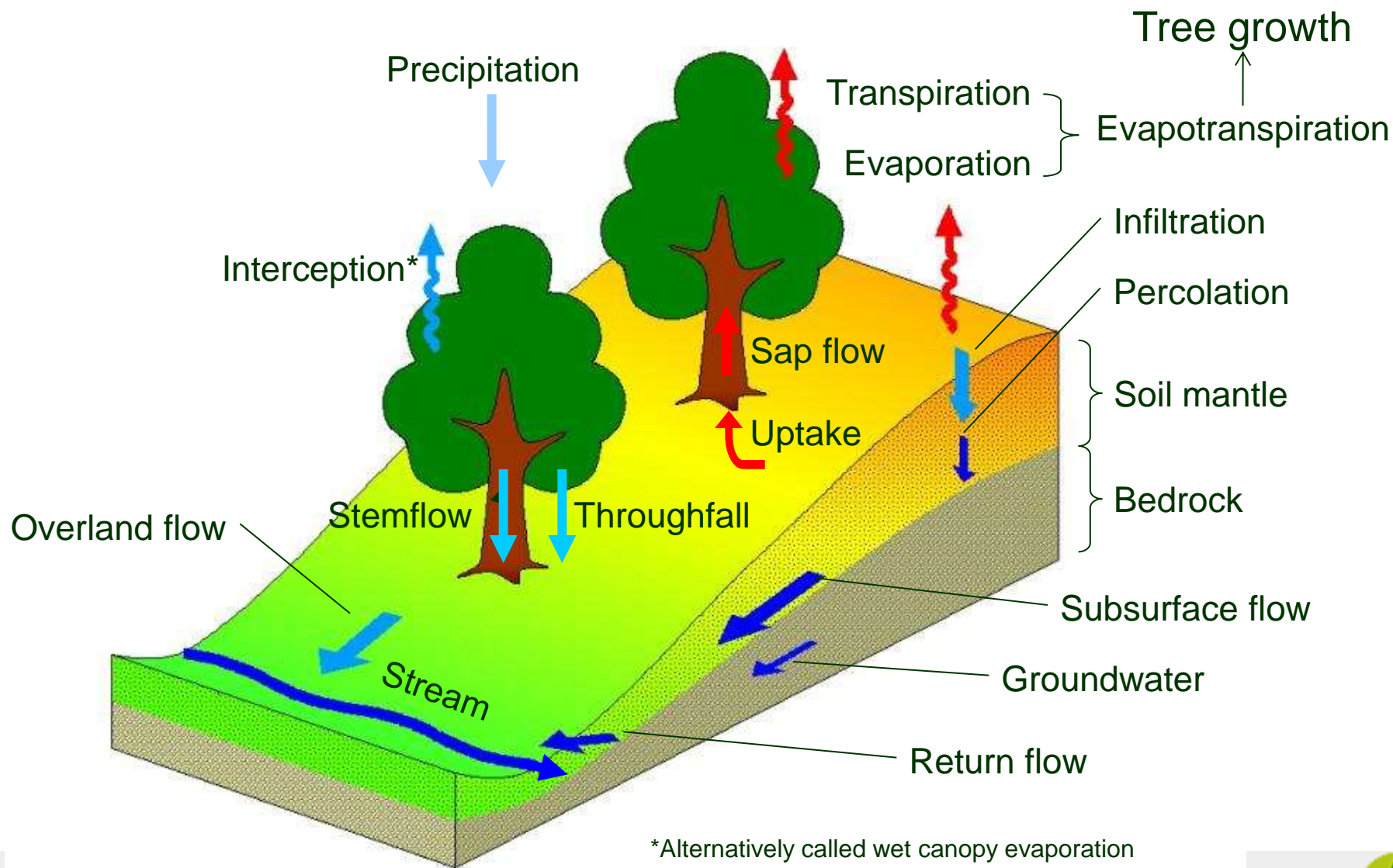
Basin C

Water yield increase after changes in vegetation cover



(Bosch and Hewlett, 1982)

Water flow on a forested hillslope



*Alternatively called wet canopy evaporation

Forests provide multiple functions for our life

