Hydrologic Responses to Increased Forest Cover

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Conclusions:

- More scientific research addressing the complexity of watershed systems
- Natural Resource management at a watershed level
- Improved public watershed education

Global Challenges
- Population growth
  - increase resource demands
  - Climate change
  - Degraded ecosystems
  - Water scarcity

Reforestation/Afforestation
- Provides resources
  - Carbon sequestration
- Landscape restoration
  - Vital habitat

Sustainable Watershed Management
Baseflow Essential for:
- Water quality
  - Water quantity
  - Aquatic ecosystems

Increased Forest Cover Affects Watershed Hydrology
- Current Research indicates conflicting results
  - Increased baseflow due to increased infiltration
  - Decreased baseflow due to increased evapotranspiration

Understanding the Conflict
- Hydrologic response controlled by complexity related watershed processes
  - Limited long term studies on large watersheds

Geology
- Geomorphology & subsurface properties influence infiltration, storage, runoff & groundwater flow

Water Demands
- The amount of water withdrawn from the watershed complicates the affects of reforestation

Snowmelt
- Forests prolong snow melt, increase infiltration & reduce spring peakflow

Climate
- ET is controlled by Radiation, temperature, wind speeds & humidity

Prior Land Cover
- Relative magnitude of reforestation impact depends on what covered the land before

Forest Management
- Reforestation scale, intensity & other forestry practices will affect ET, runoff & infiltration amounts

Spatial Design
- Tree plantings on upper slopes have different impacts on streamflow than those near stream banks

How will reforestation affect your watershed?

General Water Balance Components:
- Precipitation (P), Evapotranspiration (ET), Streamflow (Q), Change in Storage (ΔS)

Source: Mao; Journal of Hydrology 374 (2009) 77

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* Geology
* Water Demands
* Geomorphology & subsurface properties influence infiltration, storage, runoff & groundwater flow

Source: 2007 Bruno Locatelli

Source: Barlow 2005

Citations:


Trabucco, Trabucco, Antonio, Robert J., & Wei, Keith A. "NSERC Online." https://people.ok.ubc.ca/adamwei/NSERC


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