The Mica Creek Experimental Watershed: An Outdoor Laboratory for the Investigation of Hydrologic Processes in a Continental/Maritime Mountainous Environment

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I. INTRODUCTION
An understanding of hydrological processes at the watershed scale and prediction of how a given system will respond to land use activities necessitates the collection of detailed meteorological, hydrological, and biophysical data.

The Mica Creek Experimental watershed in northern Idaho is an outdoor laboratory for the understanding of basic hydrological and ecological processes and for how forest harvest practices impact these processes.

II. OBJECTIVES
- Assess the impacts of current forest management practices of water flow, quality, fluvial geomorphology and aquatic health.
- Develop an existing experimental watershed to provide the detailed topographic, biophysical, and hydrogeomorphological data necessary for model development and testing.
- Data collection and site development for different forest management studies.
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- Data collection since: 2003/2004:
- Air temperature, humidity, wind speed and direction, snow depth, soil moisture, soil temperature:
- Thermal radiation
- Canopy throughfall:
- Thinned and control canopies
- Snow depth and SWE: ~14 snow courses stratified by elevation, aspect and treatment
- Air temperature transect
- Soil moisture: 3 days at 10 locations, 3 continuous profiles
- Gap flux - transects from riparian zone to hillslope
- Stable isotopes

III. HISTORY
- 1920’s and 1930’s: Watershed almost completely harvested.
- 1950: Experimental study initiated.
- 2006: Transition to working forest.

IV. SITE CHARACTERISTICS
- Size: 37 km² (38 mi²)
- Study watersheds: 27 km² (10 mi²)
- Elevation range: 793 – 1723 m (2,600 – 5,662 ft)
- Precipitation: 1400 mm y⁻¹ (55 in/yr)
- 70% of precipitation occurs as snow
- Continental/Maritime climate regime
- Vegetation: 70-80 yr. old mixed conifers
- Geology: Granite, quartztite, granofels

V. EXPERIMENTAL TREATMENTS
- Standard control: Clearcut and partial cut watersheds
- 50% canopy removal in 2 clearcut units - Watershed 3.
- 50% canopy removal in 2 partial cut units - Watershed 2
- Lower clearcut units burned and replanted 1 year after logging.

VI. DATA COLLECTION
- Data collection since 1990:
  - Streamflow - 7 Parshall flumes
  - Precipitation (rain + snow), air temperature, humidity, wind speed: 5 locations
  - Solar radiation
  - SWE, snow depth, precipitation: Mica SNOTEL site
  - Suspended sediment, stream temperature, nutrients, Wnsen pebble counts, stream crossections, macronutrients, fish
- Data collection since 2003/2004:
  - Air temperature, humidity, wind speed and direction, snow depth, soil moisture, soil temperature:
  - Thermal radiation
  - Canopy throughfall:
  - Thinned and control canopies
  - Snow depth and SWE: ~14 snow courses stratified by elevation, aspect and treatment
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VII. CURRENT RESEARCH PROJECTS
- Impact of forest management on aquatic ecosystem health.
- Potential hydrologic and water quality impacts of proposed road networks.
- Application of LIDAR data for precision forest management
- Stable isotope mass balance
- Impacts of forest management on aquatic ecosystem health.

VIII. CONCLUSIONS
The Mica Creek Experimental Watershed fills a critical need in experimental watersheds studies in the U.S.:
- Continental/maritime climate regime
- Sparsely forested to seasonal snow zone
- Second growth forest
- Working forestland
- Co-location of multiple projects with objectives requiring common datasets has produced an extremely valuable outdoor laboratory for the observation of hydrological and ecological processes:
- Evaluation of disturbances, and model development and testing.
- The Mica Creek Experimental Watershed is a model for how research efficiencies may be gained during the development of hydrologic observatories through integration, interdisciplinary studies focused on a range of applied and basic research questions.

References
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