



# Consultant's (Partial) View of Needs in Water and Environmental Research

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# Overview

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- **Hydrology**
- **Hydraulics**
- **Sediment Transport & Geomorphology**
- **Water Quality**
- **Ecohydraulics**
- **Monitoring**
- **Models**
- **Larger View**

# Hydrology

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- **Risk & uncertainty**
  - Including climate variability in flow forecasting
  - Hydrology analysis methods (e.g., regional regression equations)
- **Drought planning**
  - Very long-term reliability of water supply

# Hydraulics

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- **Channel & overbank roughness**
- **Hydraulic radius vs. resistance radius**

# Sediment Transport & Geomorphology

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- Science-based criteria for channel migration zones and riparian buffer strips
- Quantifying channel migration
  - Process-based (roughness, sediment, hydrology & hydraulics)
- Large woody debris
  - Design & reliability
- Sustainable approaches for flood & erosion control

# Water Quality

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- Automated calibration as part of standard models
- Guidance (“expert system”) for water quality parameter selection
- How many algal groups are needed/necessary to model lakes & reservoirs?
- Influence of riffles on water quality processes & parameters

# Water Quality (continued)

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- Include super-saturation mechanisms
- (How much) should we mow medians?

# Ecohydraulics

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- **“Normative” Flows**
  - **Hydrologic or “physics” based**
- **Hydrologic & hydraulic conditions needed to assess long-term effects on aquatic systems**
- **Risk-based instream flow methods**
- **Peak flow vs. hydrocycle approaches to stormwater control**
- **Sustainable restoration/rehabilitation**

# Monitoring

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- **Following dam removal**
- **Wetland restoration**
- **Water quality monitoring design**

# Models

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- **Standardized tests for model comparison**
- **From research to market**
- **Model selection (“expert system”?)**

# Larger View

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- **Proprietary vs. non-proprietary models**
- **Coupled vs. separate models**
- **Open source models**
  - **Or limited access**
- **Standardized graphics**
- **“Risk-based” methodologies**
- **Global pressures on water resources**
- **Security**
- **Water rights**