University of Idaho
College of Engineering

CENTER FOR ECOHYDRAULICS RESEARCH

Idaho Water Center
322 East Front Street,
Boise, Idaho, USA.

Opportunities for PhD Research Fellowships

The Center for Ecohydraulics Research has several fully funded PhD positions available, supported through the National Science Foundation and other federal research agencies. These positions require an undergraduate or masters degree in civil engineering, quantitative fluvial geomorphology or closely related science field. Further details on each project are available from the faculty contact.

The University of Idaho Water Center

Sediment Transport in Steep Headwater Streams.

The goal of this NSF-funded project is to understand the sediment transport dynamics of steep mountain streams. Research focuses on the link between sediment motion and flow turbulence. It would include field measurements in Chile and Switzerland and laboratory experiments in our large flume. The goal of this project is to gain a mechanistic understanding of sediment transport in steep streams and to use this understanding to improve sediment flux predictions. Most transport equations over predict sediment flux in these streams by several orders of magnitude.

Faculty contact: Dr. Elowyn Yager (eyager@uidaho.edu)

Restoration of the Kootenai River

The Kootenai River is significantly impacted by dams and levees. This project is already underway and the current goal is to improve current 2-D hydrodynamic and riparian vegetation models. The project involves understanding the feed backs between vegetation, flow, sediment transport and river morphology. The goal of this modeling effort is to identify locations on the river floodplain (currently disconnected from the channel because of low discharges and levees) that could be restored through levee removal.

Faculty contact: Dr. Elowyn Yager (eyager@uidaho.edu)

The Characteristics of Hyporheic Flows at the landscape Scale.

The connection between surface flows in streams and shallow groundwater is being increasingly recognized as a *Surface-subsurface interaction*

This research aims to develop analytical and numerical models for predicting water and solute exchange between rivers and the shallow ground waters and its influence on habitat quality. This exchange is the primarily mechanisms that bring oxygen in the streambed sediment preserving aerobic conditions. The research will identify those bio-morphodynamic parameters, which regulate the habitat quality within the sediment and affect organism drifting and movements.

Faculty contact: Dr. Daniele Tonina (dtonina@uidaho.edu)

Green Lidar development

The Experimental Advanced Airborne Research Lidar (EAARL) allows simultaneous surveying in both aquatic and terrestrial domains quickly and remotely. However, it was originally developed for marine and costal reef applications, providing new challenges in mountain streams. This research aims to the development of new algorithms and methodologies for applying EAARL in riverine systems. The outcome of this research will provide a breakthrough on the way, the quality and quantity of data collected to characterize river and floodplain morphology.

Faculty contact: Dr. Daniele Tonina (dtonina@uidaho.edu)

Spatiotemporal coupled snowmelt and soil temperature dynamics in complex landscapes.

The altered spatiotemporal distribution of winter snowpack is perhaps the single greatest ongoing and future climatic impact in many areas of the world. This project is focused on the determination of the physiographic and climatic controls on the spatial and temporal distribution of snow and the rain/snow transition zones. The research takes place at the Reynolds/Dry Creek NSF WATERS Testbed facility located in southwestern Idaho and utilizes automated meteorological stations, fiber-optic distributed temperature sensing, and high-resolution LiDAR imagery, and physically-based modeling to reveal vegetation, topography, and snowmelt interactions.

Faculty contacts: Dr. Timothy Link (tlink@uidaho.edu) or Dr. Danny Marks (arsdanny@gmail.com)

Sustainability of Pools in Gravel Bed Streams.

Some watersheds are subject to major perturbations such as wildfire or floods and pool features remain stable, yet pool features disappear in other watersheds are subject to minor disturbance. This project continues recent studies that developed criteria for predicting whether pools will be sustainable.

Faculty contact: Dr. Peter Goodwin (pgoodwin@uidaho.edu)

Temperature and aquatic habitat modeling of river systems.

This project is part of a major multi-agency initiative to study the effects of reservoir operations and water diversions on endangered species. The project will use an extensive monitoring program to model temperature regimes and aquatic habitat through the river-reservoir system.

Faculty contact: Dr. Peter Goodwin (pgoodwin@uidaho.edu)

Instrumentation and Laboratory Measurement

We also anticipate openings for laboratory studies related to turbulence measurements in natural channels and sediment-turbulence interactions. This will use PIV, ADCP, acoustic cameras and other newly installed equipment in the CER Stream Laboratory.

Faculty contact: Dr. Ralph Budwig (rbudwig@uidaho.edu)

Further details about the Center for Ecohydraulics Research can be found at www.uidaho.edu/ecohydraulics