

# Field Measurements in Hydrology



# Background and Justification

- The science of hydrology depends on field measurements:
  - Precipitation;
  - Streamflow;
  - Soil moisture;
  - Evaporation;
  - Erosion;
  - Infiltration, etc.
  - Field data also required for model calibration and validation.

# Reviews of Hydrologic Education

- In civil engineering departments, only 2 of 73 hydrology courses included a lab or field component (Groves and Moody, 1992);
- In natural science programs, only 8 of 74 courses focussed on field measurements (2 of these were at Colorado State University) (Brooks, 1992);

## U.S. National Research Council report on hydrology (1991)

**“This brings up another serious educational problem—the lack of field and laboratory experience at the undergraduate level, a situation that has almost reached crisis proportions.”**  
(p. 287)

A Unesco panel also emphasized the need for education to further the science and practice of hydrology (Nash et al., 1990).

# Reviews of Hydrologic Education

- #5: Need integrated research and teaching, and encouraging greater cooperation between universities;
- #6: Promote English language skills for both students and faculty, as English is the dominant language for worldwide scientific communication.

Review of education in physics and computer sciences resulted in a similar set of conclusions.

# Consequences of omitting field studies in hydrologic education

1. Unwarranted faith in published data;
2. Lack of appreciation for spatial and temporal variability;
3. Lack of appreciation for the difficulty of collecting good quality field data;
4. Inability to design and execute field data collection projects;
5. Inability to interpret field observations;

# Consequences of omitting field studies in hydrologic education (2)

6. Inability to evaluate models and predictions against field reality;
7. Excessive trust in model predictions;
8. Reduced potential for lifelong learning through observation and analysis;

MacDonald, *Water Resources Bulletin*, 1993

# Reviews of Hydrologic Education

- U.S. National Research Council, 1991

“ The consequences of this are both profound and disturbing. Students have become separated from the realities of the physical world they seek to master, studying only conceptual models in which the rich complexity of nature is replaced necessarily by the convenience of ad hoc simplification. In the absence of experimental validation, these models tend to take on a sense of reality in the minds of the users, which may lead to scientific error and stagnation.”



Hand out course outline