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### Conceptualization of Hydrologic Systems [outline]

Kenneth E. Kolm

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**CONCEPTUALIZATION OF HYDROLOGIC SYSTEMS**

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**UNCOVERING THE HIDDEN RESOURCE:  
GROUNDWATER LAW, HYDROLOGY AND POLICY LAW  
IN THE 1990s**

**Rocky Mountain Ground-Water Conference  
Colorado Ground-Water Association  
University of Colorado  
School of Law  
Boulder, Colorado**

**June 15-17, 1992**

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May 19, 1992

ASTM Designation D 18.21.10 Ground-Water Modeling

## Conceptualization of Hydrologic Systems

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**I. General Introduction**

**II. Procedure for Conceptualizing Hydrologic Systems**

**A. Data Gathering**

1. Literature search
2. Locating or collecting basic data

**B. Data Preparation and Analysis**

1. Organizing primary data bases
2. Data conversion, preparation, and validation

**C. Surface and Subsurface Characterization**

1. Characterize the natural features and processes at or near the surface of the Earth

- a. Geomorphic process and deposits analysis
- b. Pedogenic process and deposits analysis
- c. Vegetation analysis
- d. Topography analysis (slope steepness, slope aspect, continuity)
- e. Climate analysis
- f. Anthropogenic effects analysis

2. Develop basic geologic model of subsurface conditions

- a. Stratigraphic and lithologic considerations
- b. Structural discontinuities (faults, fracture zones, lava tubes, karst)

#### **D. Development of Hydrogeologic Conceptual Model**

- 1. Characterization of primary porosity and permeability of materials**
  - a. Soils, unconsolidated (geomorphic materials) materials
  - b. Rock units
- 2. Characterization of secondary porosity and permeability of materials**
  - a. Structural geologic controls (tectonic, volcanic, etc.)
  - b. Geochemical geologic controls (solution features, etc.)
- 3. Characterization of hydrologic system units**
  - a. Geologic and topographic considerations
    - i. Continuity
    - ii. Spatial distribution and thickness
  - b. Isotropic/Anisotropic considerations
  - c. Homogeneous/Heterogeneous considerations
  - d. Hydrogeologic map, cross sections, and column

#### **E. Development of Hydrologic Conceptual Model**

- 1. Location of recharge areas**
- 2. Location of discharge areas**
- 3. Determination of flow paths and potentiometric surfaces**
- 4. Determination of type of hydrologic system (confined or unconfined; unsaturated zone vrs. saturated zone; scale considerations; anthropogenic considerations/effects)**
- 5. Determination of type of boundary conditions**

#### **F. Numerical Simulation of Hydrologic System**

- 1. Integration of data bases for numerical estimates of parameters**
- 2. Model selection and design**
  - a. Determination of appropriate grid (s): size, spacing, 2 - D vrs. 3 - D.
  - b. Determination of appropriate boundary representations
  - c. Assignment of hydrologic parameter values
- 3. Model calibration and validation**

### **III. Conclusions**