國立臺北大學自然資源與環境管理研究所
九十九學年度第二學期
『環境系統分析』課程講義（十五）

進度：環境系統分析應用－水資源
Applications of Environmental Systems Analysis to
Water Resource Management

- **MORE ON MCDM**
  - □ ELECTRE (ELimination Et Choix Traduisant la Réalité or Elimination and Choice Translating Reality)
  - □ TOPSIS (Technique for Order Preference by Similarity to Ideal Solution)
  - □ The Analytic Hierarchy Process (AHP) => 許明華論文
    - ⇨ Mathematical Fundamentals: Properties a Positive Reciprocal Matrix
    - ⇨ Priority (Weighting) Vectors and Eigenvector
    - ⇨ Inconsistency Index and Eigenvalues
      - ─ The Maximum Eigenvalue and Random Index
      - ─ Consistency Index or Consistency Ratio
    - ⇨ Software Packages: Solving Linear Algebra Systems vs. General Modeling System
    - ⇨ Variations of AHP: Fuzzy AHP and Grey AHP (Preference Programming)
    - ⇨ Analytical Network Process

- **ENVIRONMENTAL SYSTEMS ANALYSIS AND WATER RESOURCE MANAGEMENT**
  - □ Ravindran (2008), *Operations Research Applications*, Chapter 10.
  - □ Issues that the Water Resource Managers Should Face
    - ⇨ Sustainability
      - ─ Water Quantity (Water Poverty Index, WPI)
      - ─ Water Quality (Total Maximum Daily Load, TMDL)
    - ⇨ Minor System: Distribution System and Plumbing
      - ─ Leak: before the gauge vs. after the gauge
      - ─ Minor Drainage System:
  - □ Water Resource Management
    - ⇨ Project planning including sequencing of multiple projects
      - ─ A reconnaissance study followed by feasibility assessment on a system-wide basis
      - ─ A design life is used: period of cost recovery, meeting the intended function, technological obsolescence, and the life of the weakest component
    - ⇨ Design: focuses on dimensioning of the components subject to regulatory, physical, societal, and technical constraints.
    - ⇨ Operation: addresses system behavior of an already built system and its coexistence under changing needs.
    - ⇨ Replacement: assumes that the facility's continued service is essential and it fails periodically.