

# 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 (十六)

進度：環境系統分析應用－水資源、能源管理

Applications of Environmental Systems Analysis to  
Water Resource Management and Energy Management

## ● ENVIRONMENTAL SYSTEMS ANALYSIS AND WATER RESOURCE MANAGEMENT

- [Ravindran \(2008\), \*Operations Research Applications\*, Chapter 10.](#)
- Issues that the Water Resource Managers Should Face
  - ⇒ Sustainability: WPI and TMDL
  - ⇒ Minor System: Distribution System and Plumbing => Leak and Minor Drainage
- Water Resource Management
  - ⇒ Project Planning; Design; Operation; Replacement
  - ⇒ Upstream Issues:
    - － Reservoir Development and Water Intakes => Dam and Weir
    - － Reservoir System Operation: Serial and Trans-Watershed Reservoirs
    - － Surface Water Utilization vs. Seawater Desalination
  - ⇒ Downstream Issues:
    - － Water Quality Management: Waste Allocation, On-Site Treatment...
  - ⇒ In-Betweens: Water Recycling and Reuse; Rainwater Utilization...
  - ⇒ Groundwater Management

## ● ENVIRONMENTAL SYSTEMS ANALYSIS AND ENERGY MANAGEMENT

- [Ravindran \(2008\), \*Operations Research Applications\*, Chapter 5.](#)
- Integrative decision scenarios involving technical and managerial issues:
  - ⇒ Micropower generation systems
  - ⇒ Negawatt systems
  - ⇒ Energy supply transitions
  - ⇒ Coordination of energy alternatives
  - ⇒ Global energy competition
  - ⇒ Green-power generation systems
  - ⇒ Integrative harnessing of sun, wind, and water energy sources
  - ⇒ Energy generation, transformation, transmission, distribution, storage, and consumption across global boundaries.
- Energy Resource Combination: Linear Programming Model
- Energy Investment Options: Integer Programming Model
- Distributed Energy Systems: Simulation and Optimization
- Point-of-Use Energy Generation: Distributed Energy
  - ⇒ Cogeneration of Heat and Power; Combined Heat and Power (CHP)
  - ⇒ “Tri-generation”: Electricity and Thermal Resources (Heating and Cooling)