國立臺北大學自然資源與環境管理研究所
113 學年度第一學期『環境工程科學概論』

課程講義(03)：環境議題與永續性
Environmental Issues/Concerns and Sustainability

- KEY FACTORS OF ENVIRONMENTAL SCIENCE AND ENGINEERING
  - □ Definition of "Environment"
    環境基本法第 2 條：環境係指影響人類生存與發展之各種天然資源及經過人為影響之自然因素總稱，包括陽光、空氣、水、土壤、陸地、礦產、森林、野生生物、景觀及遊憩、社會經濟、文化、人文史蹟、自然遺蹟及自然生態系統等。
    環境影響評估法：生活環境、自然環境、社會環境及經濟、文化、生態
  - □ Media or Carriers: Air, Water, Soil, Solid Waste...
  - □ Chemical, Biological, and Physical Pollution => Aesthetic Degradation
  - □ Aspects：空水廢毒噪＋「節能減碳」：藍天綠地、青山淨水、健康永續
    ⇒低碳宜居、淨零綠生活、「現代桃花源」「循環型經濟」「碳權、碳匯、碳費」
  - □ Spatial Scales – Local, Regional, Continental, and Global
  - □ Time Scales – Second, Minute, Day, Year, Decade, Generation, Century, *etc.*
  - □ Orientation – Economy-Oriented, Human-Oriented, Ecology-Oriented

- ENVIRONMENTAL ISSUES / ENVIRONMENTAL CONCERNS
  - □ 全球尺度：氣候變遷、臭氧層破壞、棲息地與生物多樣性之減少等=> Covid-19?
    Global Scale: Climate Change, Ozone Layer Depletion, Loss of Habitats/Biodiversity
  - □ 區域性尺度：酸雨、細懸浮微粒、能見度問題、水體污染、土壤酸化／鹽化等
    Regional Scale: Acid Deposition, Visibility, Water Pollution, Soil Acidification/Salinization
  - □ 地區性尺度：光化學煙霧、土壤及地下水污染、廢棄物、噪音振動問題等
    Local Scale: Photochemical Smog, Soil and Groundwater Contamination, Solid Waste, Noise
  - □ 利害相關者(Stakeholders): Social Responsibility => Corporate Sustainability and ESG
  - □ 焚化底渣、煉鋼爐渣、水泥產業、塑膠垃圾、美耐皿、風力發電、石虎、藻礁
  - □ Environmental Concerns
    (Chp.2 -- Reddy et al., 2019, *Sustainable Engineering Drivers, Metrics, Tools, and Applications*)
    ⇒Global Warming and Climate Change; Ozone Layer Depletion
    ⇒Desertification and Deforestation; Loss of Habitat and Biodiversity
    ⇒Air Pollution, Smog, and Acid Rain (Acidic Deposition)
    ⇒Water Usage and Pollution, Eutrophication, Salinity => See Water Desalinization
    ⇒Wastes and Disposal; Land Contamination; Land Use Patterns
    ⇒Visibility; Odors; Aesthetic Degradation; Thermal Pollution; Noise => Light Pollution
  - □ 15 Biggest Environmental Problems of 2024
    ⇒Global Warming; Poor Governance; Food Waste; Biodiversity Loss; Plastic Pollution; Deforestation; Air Pollution; Melting Ice Caps and Sea Level Rise; Ocean Acidification; Agriculture; Food and Water Insecurity; Fast Fashion and Textile Waste; Overfishing; Cobalt Mining; Soil Degradation

- SUSTAINABILITY
  - □ Definition of "Sustainability"
    - ⇒ In the simplest dictionary style definition, sustainability is a method of harvesting or using a resource so that the resource is not depleted or permanently damaged.
    - ⇒ Perspectives from which one might view sustainability: developing countries, developed countries, ecological, economic, social justice, worldwide, regional, national, local.
    - ⇒ World Commission on Environment and Development (WCED, 1987): Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
    - ⇒ A sustainable economy is one that produces wealth and provides jobs for many human generations without degrading the environment. There are two fundamental principles of this definition of sustainability:
      - ◆Reduction in the use of both renewable and nonrenewable natural resources.
      - ◆Provision of solutions that are both long-term and market-based.
  - □ The People (Population) Problem
    - ⇒An inherent problem with definitions of sustainability is "The People Problem," that is, the ability of future generations to meet their own needs.
    - ⇒Projections of population: exponential, logistic, … => The Limit to Growth
  - □ Water Resources
    - ⇒"Water: too much, too little, too dirty" => Flood, Draught, Water Pollution
    - ⇒Quantity and Quality of water
  - □ Energy Resources
    - ⇒Fossil Fuels, Nuclear Energy, Renewable Energy => Sustainable Energy Resources
    - ⇒Reserves/Production Ratio (R/P ratio)
  - □ Mineral Resources
    - ⇒Precious Metals, Rare Earth Metals
    - ⇒Non-Metal Minerals
  - □ Soil Resources
    - ⇒Energy Storage, Plant Production => Carbon Sink
  - □ Transition vs. Transformation
    - ⇒Transition of electricity shares
    - ⇒Transformation of social structure to adapt to climate change

- 環境相關之中央政府機關/構
  - □ 環境部：環境部組織法 (112 年 8 月 22 日施行)
    - ⇒綜合規劃司、環境保護司、大氣環境司、水質保護司、監測資訊司
    - ⇒氣候變遷署、資源循環署、化學物質管理署、環境管理署、國家環境研究院
  - □ 行政院其他部會
    - ⇒內政部國家公園署、內政部國土管理署 (112 年 9 月 20 日施行)
    - ⇒農業部農村發展及水土保持署、農業部林業及自然保育署、農業部農田水利署、農業部生物多樣性研究所 (112 年 8 月 1 日施行)
    - ⇒經濟部水利署、經濟部產業發展署、經濟部能源署、經濟部產業園區管理局、經濟部地質調查及礦業管理中心 (112 年 9 月 26 日施行)
    - ⇒海洋委員會海洋保育署 (107 年 4 月 28 日施行)
    - ⇒交通部中央氣象署 (112 年 9 月 15 日施行)