

# 國立臺北大學自然資源與環境管理研究所

## 106 學年度第一學期『環境工程科學概論』

課程講義(17)：空氣品質管理、環境永續性與環境公共衛生  
Air Quality Management, Environmental Sustainability and Environmental Health

- INTRODUCTION AND SOME HISTORIC REMARKS AIR POLLUTION
  - Ambient Air Quality vs. Emission Source Control => Bubble Theory
  - Gaseous and Particulate Pollutants => Green House Gases
  - Episodes of Air Pollution and Historical Disasters => Alert and Restriction
- CRITERIA POLLUTANTS AND AIR QUALITY STANDARDS
  - Carbon monoxide CO: CO-Hb => CO<sub>2</sub>
  - Oxides of Nitrogen NO<sub>x</sub>; Oxides of Sulfur SO<sub>x</sub>
  - Photochemical Smog and Ozone => PAN (Peroxyacetyl Nitrate) and O<sub>3</sub>
  - Particulate Matter PM (TSP, M<sub>10</sub> and PM<sub>2.5</sub>) and Lead
  - Volatile Organic Compounds (VOCs) and Polycyclic Aromatic Hydrocarbon
  - Air Quality Index (AQI) and Warning Systems
- AIR QUALITY MANAGEMENT
  - Zoning and Control Strategies: Non-Attainment Area 空氣污染防制區
  - State Implementation Plan (SIP)
  - Command-and-Control vs. Economic Incentives => Total Emission Control
  - 空氣品質淨化區、空氣品質維護區
- MOBILE EMISSION SOURCES
  - Emission Standards vs. Fuel Standards; Gasoline Engines vs. Diesel Engines
  - Exhaust System Controls => Catalytic Converter (Precious Metals)
  - Alternative Fuels and Hybrid Vehicles => Tag Control?
  - Electrification and Mass Transit Systems => BRT? Light Rail? Cable Car?
- STATIONARY SOURCES
  - Control Strategies: Combustion, and Pre- or Post-Combustion Controls
  - Pollution Control Devices: Gaseous and Particulate Pollutants
    - ⇒ Scrubber, Bag-house, Electrostatic Precipitator (EP), FGD, SCR, SNCR...
  - Emission Trading: Conventional Pollutants and Greenhouse Gases
- INTRODUCTION TO GLOBAL ENVIRONMENTAL ISSUES
  - Earth Summit and World Summit on Sustainable Development: Rio / Rio+10
    - ⇒ WEHAB: Water, Energy, Health, Agriculture, and Biodiversity
  - United Nations Conference on Sustainable Development (UNCSD): Rio+20
    - ⇒ Main themes: Green Economy 綠色經濟 and Institutional Framework 制度架構

Critical issues: decent jobs, energy, sustainable cities, food security and sustainable agriculture, water, oceans and disaster readiness 就業 能源 城市 糧食 水 海洋 災害

- United Nations Millennium Declaration => [Millennium Development Goals \(MDGs\)](#)
- [United Nations Sustainable Development Goals \(SDGs\)](#) => 3P & 5P
- 3P: People, Planet, Prosperity (Profit); 5P: 3P + Peace and Partnership
- Deforestation, Desertification, Loss of Habitats, and Loss of Biodiversity
- Global Atmospheric Change => Global Warming and Climate Change
  - ⇒ 溫室氣體：指二氧化碳 (CO<sub>2</sub>)、甲烷 (CH<sub>4</sub>)、氧化亞氮 (N<sub>2</sub>O)、氫氟碳化物 (HFCs)、全氟碳化物 (PFCs)、六氟化硫 (SF<sub>6</sub>)、三氟化氮 (NF<sub>3</sub>)

## ● ENVIRONMENTAL SUSTAINABILITY

- Unsustainable Earth
  - ⇒ Carrying Capacity: Sustainable Yield
- Resource Depletion and Environmental Degradation
  - ⇒ Damage Cost, Maintenance Cost, Remediation Cost
  - ⇒ Green GDP
- Climate Change
  - ⇒ UNFCCC Focus: Adaptation, Mitigation, Climate Finance and Technology
  - ⇒ Emission Inventory
- Measures of sustainability
  - ⇒ Human Development Index
  - ⇒ Indicators vs. Index
- Corporate Sustainability
- United Nations Sustainable Development Goals

## ● ENVIRONMENTAL PUBLIC HEALTH

- Toxicology
  - ⇒ Two Phases in Risk Assessment
- Epidemiology
  - ⇒ Incidence, prevalence, and epidemics
  - ⇒ Mortality and morbidity
- Agents of infectious disease
  - ⇒ Prions Viruses Bacteria Protozoa Fungi
  - ⇒ Exotoxins vs. endotoxins
- Public Health and Engineering Measures for Control of Disease
  - ⇒ Controls directed against disease reservoirs
  - ⇒ Immunization Quarantine Surveillance Controls directed against pathogen transmission
- Emergent and Re-Emergent Infectious Diseases
  - ⇒ Climate and weather Changing ecosystems
  - ⇒ Technology and industry International travel and commerce