



Transport and Development in China Project

# Transport and the Urban Environment

## Context

Increasing urbanization and mobility has brought forward new dimensions of environmental issues, notably transportation. Urban transportation is now a source of several environmental problems. This course investigates the numerous dimensions involved, from environmental externalities induced by air, water, noise and hazardous materials pollution to socio-economic externalities imposed by land use, safety, and congestion. All these problems are fundamental to the issue of urban and transport sustainability. Policy formulation is the next major challenge and will have to include strategies that consider environmental and socio-economic externalities alike.

## Objective

This course aims to provide a comprehensive evaluation of the role, function, extent and impacts of urban transportation over environmental systems. It is divided in two major parts, one conceptual and one methodological.

- **Conceptual objective.** The first part deals with concepts pertaining to the environmental issues of urban transportation. Concepts such as transportation and energy, externalities, land use and sustainability are introduced.
- **Methodological objective.** The second part provides methods to assess environmental impacts of urban transportation. The Geographic Information System will be the main analytical tool used to measure emissions, impacts and externalities and help the urban planning process.

## Content

This course comes on a CD-ROM that includes PowerPoint presentations for all the topics, ArcView GIS datasets for practice and several reports available online.

## Outline

### Part I – Concepts

#### Topic 1 – The Emerging Issue of Transport and the Environment

Introduction to environmental issues related to urban transportation from infrastructure, modal and spatial perspectives.

- A- **Why transport and the urban environment?** 1. Context; An Urbanizing Society; 2. Modes of Territorial Occupation; 3. Economic Systems; 4. Social Preferences.
- B- **Transport / Environment Links.** 1. Environmental Systems; 2. Transport Systems and the Environment; 3. Environmental Impacts of Urban Transportation.
- C- **Environmental Issues of Urban Transportation.** 1. Congestion; 2. Public Transit; 3. Infrastructure Provision.

## **Topic 2 – Urban Transportation and Energy**

Energy requirements and consumption by urban transportation. Modal and land use pattern comparison.

- A- **Transportation and Energy Consumption.** 1. Energy in a Mobile World; 2. Petroleum Dependency; 3. Combustion of Hydrocarbons.
- B- **Energy, Transportation and Urban Form.** 1. The Notion of Distance; 2. Urban Transportation Modes and Energy; 3. Urban Forms and Energy Consumption.
- C- **Alternative Sources of Energy for Urban Transportation.** 1. Green Cars; 2. Green Transit.

## **Topic 3 – Environmental Externalities of Urban Transportation**

Nature and extent of environmental costs of urban transportation.

- A- **Environmental Externalities.** 1. Concept; 2. Distribution of Costs; 3. Emission Models.
- B- **Local and Regional Externalities.** 1. Air Pollutants; 2. Water Pollutants; 3. Noise.
- C- **Global Externalities.** 1. Global Warming; 2. Ozone Depletion; 3. Acid Rain.

## **Topic 4 – Urban Transportation, Land Use and The Environment**

Relationships between urban form, pattern and density and the environmental impacts of transportation.

- A- **Urban Land Use and Transportation.** 1. The Transportation / Land Use System; 2. Transportation and Urban Form; 3. Transportation and Urban Structure.
- B- **Environmental Impacts of the Transportation / Land Use System.** 1. Context; 2. Land Requirements and Consumption; 3. Spatial Form, Pattern and Interaction.
- C- **Case Studies.** 1. The North American Context; 2. The East Asian Context.

## **Topic 5 – Transportation and Urban Sustainability**

Achieving urban sustainability through better usage and management of transport systems.

- A- **The Concept of Urban Sustainability.** 1. Sustainability; 2. Global Sustainability; 3. Urban Sustainability; 4. Infrastructure, Land Use and Sustainability.
- B- **Sustainable Urban Transportation.** 1. Unsustainable Transportation; 2. General Indicators; 3. Unsustainable Impacts of Cars; 4. Sustainable Transportation / Land Use Systems.

## **Part II – Methods**

### **Topic 6 – GIS as Tools of Environmental Impact Assessment of Urban Transportation**

Basic introduction to Geographic Information Systems (GIS) and their use for environmental impact assessment of urban transportation.

- A- GIS as Spatial Analysis Tools.
- B- Urban Environmental Information Encoding and Management.
- C- GIS and Environmental Impact Assessment.

### **Topic 7 – Assessing Environmental Externalities of Urban Traffic**

GIS methods to assess environmental impacts linked to urban mobility.

- A- Emissions.
- B- Noise.
- C- Congestion.

### **Topic 8 – Assessing Environmental Externalities of Urban Land Use**

GIS methods to assess environmental impacts of urban land use.

- A- Urban Transport Infrastructure.
- B- Urban Transport Terminals.

### **Topic 9 – Transportation and Environmental Urban Planning**

Towards a comprehensive urban planning approach?

#### **Bibliography**

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