

EC383 Environmental Economics

Introduction

Shunsuke Tsuda

Autumn 2025



University of Essex

Contact Details

Module Supervisor: Shunsuke Tsuda

Email: shunsuke.tsuda@essex.ac.uk

Office: 5B.338

Academic Support Hours: Tuesday 11.30-12.30

References & Acknowledgement

- The main textbook:
Perman, R. et al., *Natural Resource and Environmental Economics*, Fourth Edition, Pearson, 2011.
- Additional readings: Research papers in the module outline

I am grateful to Rossella Argenziano, Andrew Foster, Keita Abe, Takashi Kurosaki, Ken Miura, Kazuki Motohashi, Yoshito Takasaki, and Matt Turner for the materials on which various parts of my course materials are partly based.

Environment & Economic Development are Interconnected

The environment can impact economic development, e.g.,

- Pollution \Rightarrow labor productivity \downarrow
- Climate change \Rightarrow agricultural output \downarrow

Environment & Economic Development are Interconnected

The environment can impact economic development, e.g.,

- Pollution \Rightarrow labor productivity \downarrow
- Climate change \Rightarrow agricultural output \downarrow

Economic development can impact the environment

Environment & Economic Development are Interconnected

The environment can impact economic development, e.g.,

- Pollution \Rightarrow labor productivity \downarrow
- Climate change \Rightarrow agricultural output \downarrow

Economic development can impact the environment

- by increasing negative **externalities**
e.g. industrialization \Rightarrow pollution \uparrow

Environment & Economic Development are Interconnected

The environment can impact economic development, e.g.,

- Pollution \Rightarrow labor productivity \downarrow
- Climate change \Rightarrow agricultural output \downarrow

Economic development can impact the environment

- by increasing negative **externalities**
e.g. industrialization \Rightarrow pollution \uparrow
- by fostering the adoption of technologies that can mitigate these negative **externalities**
e.g. new crop varieties that are resistant to extreme climate

Jayachandran (2022)

Reviews microempirical evidence on the environmental effects of

- ① Consumption changes that arise when incomes rise
- ② Better access to credit and capital
- ③ More secure property rights
- ④ Technological progress and infrastructure
- ⑤ Improved regulatory capacity
- ⑥ Trade openness and market competition
- ⑦ Slower population growth

Externality and Market Failures

Externality:

- Production or consumption of a good directly impacts another agent's production or utility function (**not through prices**)
- The key concept in the environmental and resource economics, that drives **market failures**

Externality and Market Failures

Externality:

- Production or consumption of a good directly impacts another agent's production or utility function (**not through prices**)
- The key concept in the environmental and resource economics, that drives **market failures**

Market failure: a market does not achieve efficient allocation of resources

Economic Development and the Environment Entail Trade-offs

E.g.1 Between air quality vs. productivity

Regulating industrial pollution ↑ ⇒ air quality ↑ but costs for firms ↑

Mexico City pollution: Residents urged to stay indoors

① 15 May 2019



Some residents donned face masks as pollution levels rose

Officials in Mexico City have declared an environmental emergency after air pollution in the Mexican capital reached levels potentially dangerous to human health.

Source: [BBC News, 15 May 2019](#)

Economic Development and the Environment Entail Trade-offs

E.g.2 Between rainforest conservation vs. local populations' welfare:

Regulating forest clearing \Rightarrow Agriculture income \downarrow \Rightarrow Welfare \downarrow



Photo by Oliver T. Coomes in the Peruvian Amazon

Economic Development and the Environment Entail Trade-offs

E.g.2 Between rainforest conservation vs. local populations' welfare:

Regulating forest clearing \Rightarrow Agriculture income \downarrow \Rightarrow Welfare \downarrow



Photo by Oliver T. Coomes in the Peruvian Amazon

Q. Are there policies that improve both local populations' welfare and ecological conservation?

The Environment in Developing Economies

- Contributing more and more to environmental pollution
- More vulnerable to its effects
- Households, firms, and governments possess limited capacity and funding to invest in mitigating negative externalities



Poor north Indian farmers think they are scapegoats for a wider problem
by [Hannah Ellis-Petersen](#) in Haryana

Advertisement
[HARRY'S](#)

Source: [The Guardian](#), Fri 8 Nov 2019

Vicious Cycle between Poverty and Environmental Degradation

- The poor in rural areas often depend for their daily livelihood on local commons
- The local commons also provide some insurance for the poor (e.g. as a fallback source of food and fodder in bad crop years)

Vicious Cycle between Poverty and Environmental Degradation

- The poor in rural areas often depend for their daily livelihood on local commons
- The local commons also provide some insurance for the poor (e.g. as a fallback source of food and fodder in bad crop years)
- The poor is also vulnerable to the erosion of local commons:
 - Decimation of forests and grazing lands
 - Silting and increasing toxicity of rivers and ponds
 - Depletion of aquifers
 - Soil erosion and desertification

The erosion of local commons ⇒

Vicious Cycle between Poverty and Environmental Degradation

- The poor in rural areas often depend for their daily livelihood on local commons
- The local commons also provide some insurance for the poor (e.g. as a fallback source of food and fodder in bad crop years)
- The poor is also vulnerable to the erosion of local commons:
 - Decimation of forests and grazing lands
 - Silting and increasing toxicity of rivers and ponds
 - Depletion of aquifers
 - Soil erosion and desertification

The erosion of local commons ⇒

The life of rural poor becomes more insecure and impoverished ⇒

Vicious Cycle between Poverty and Environmental Degradation

- The poor in rural areas often depend for their daily livelihood on local commons
- The local commons also provide some insurance for the poor (e.g. as a fallback source of food and fodder in bad crop years)
- The poor is also vulnerable to the erosion of local commons:
 - Decimation of forests and grazing lands
 - Silting and increasing toxicity of rivers and ponds
 - Depletion of aquifers
 - Soil erosion and desertification

The erosion of local commons ⇒

The life of rural poor becomes more insecure and impoverished ⇒

Poverty drives people to myopic exploitation of commons ⇒

Vicious Cycle between Poverty and Environmental Degradation

- The poor in rural areas often depend for their daily livelihood on local commons
- The local commons also provide some insurance for the poor (e.g. as a fallback source of food and fodder in bad crop years)
- The poor is also vulnerable to the erosion of local commons:
 - Decimation of forests and grazing lands
 - Silting and increasing toxicity of rivers and ponds
 - Depletion of aquifers
 - Soil erosion and desertification

The erosion of local commons ⇒

The life of rural poor becomes more insecure and impoverished ⇒

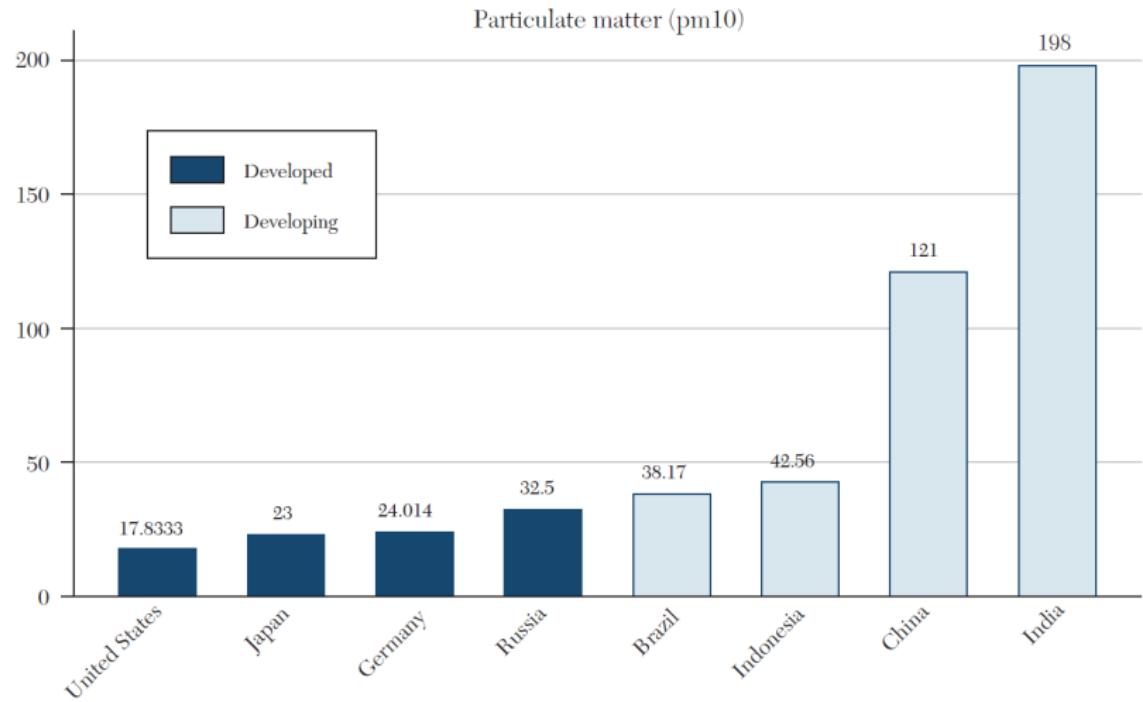
Poverty drives people to myopic exploitation of commons ⇒

More erosion of local commons ⇒ ...

Greenstone & Jack (2015) “Envirodevonomics”

Low and middle income countries (LMIC) have higher air pollution on average

Panel A. Air pollution

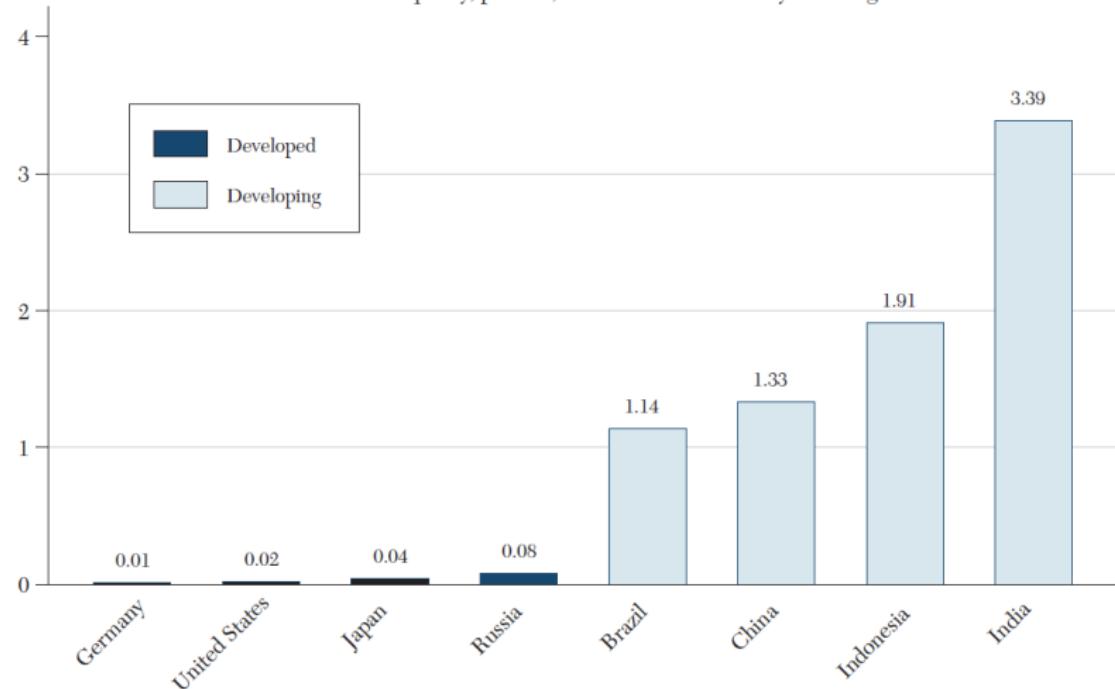


Greenstone & Jack (2015) “Envirodevonomics”

LMICs have worse environmental quality (from air) on average

Panel A. Disease Burden from Air Pollution

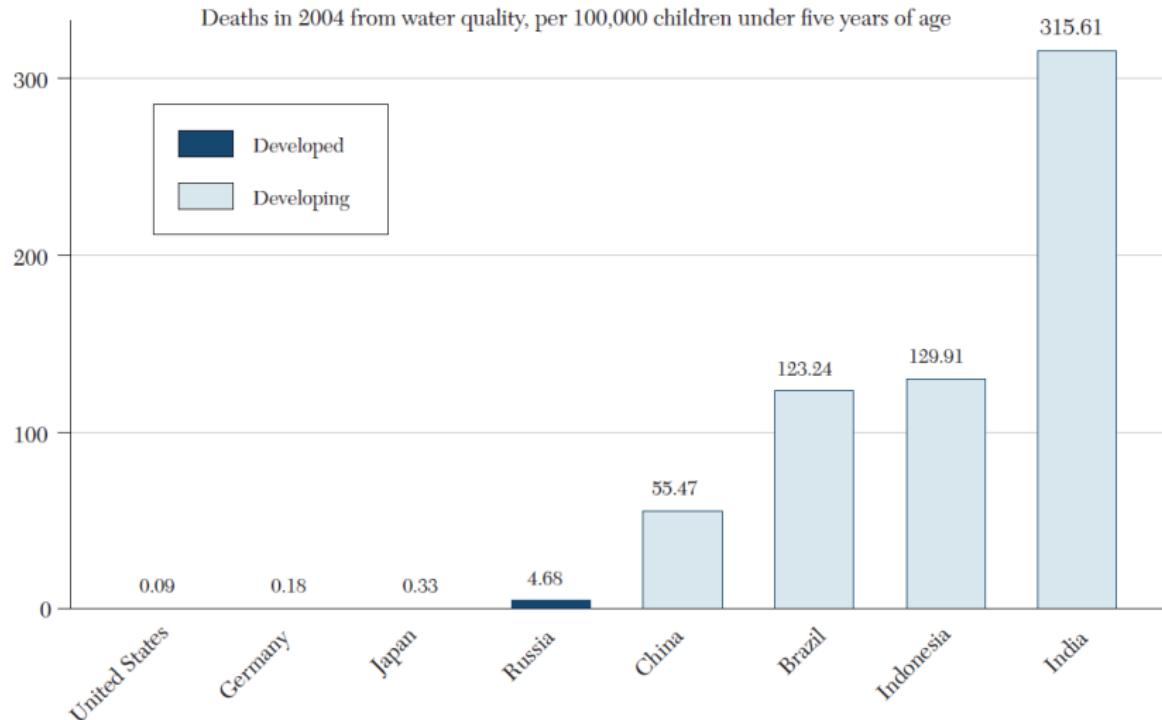
Deaths in 2004 from air quality, per 100,000 children under five years of age



Greenstone & Jack (2015) “Envirodevonomics”

LMICs have worse environmental quality (from water) on average

Panel B. Disease Burden from Water Pollution



Greenstone & Jack (2015) “Envirodevonomics”

Puzzle:

- Environmental quality in developing countries is worse, but
- Marginal willingness to pay (MWTP) for environmental quality improvements is low there

Greenstone & Jack (2015) “Envirodevonomics”

Puzzle:

- Environmental quality in developing countries is worse, but
- Marginal willingness to pay (MWTP) for environmental quality improvements is low there

Potential explanations:

- High marginal utility of consumption due to low income levels
- High marginal costs of environmental quality improvements
- Political economy and rent-seeking distort the social planner's problem
- Market failures (e.g. lack of information, weak property rights, missing credit markets) and behavioral biases (e.g. sunk cost) distort MWTP

Topics Covered in this Module

- Economic development and the environment (Introduction)
- Market failures

Topics Covered in this Module

- Economic development and the environment (Introduction)
- Market failures
- Pollution targets and instruments
- Pollution across space in general equilibrium
- Pollution policy with imperfect information
- Causes and consequences of air and water pollution

Topics Covered in this Module

- Economic development and the environment (Introduction)
- Market failures
- Pollution targets and instruments
- Pollution across space in general equilibrium
- Pollution policy with imperfect information
- Causes and consequences of air and water pollution
- The tragedy of the commons
- Natural resources: non-renewable and renewable resources

Topics Covered in this Module

- Economic development and the environment (Introduction)
- Market failures
- Pollution targets and instruments
- Pollution across space in general equilibrium
- Pollution policy with imperfect information
- Causes and consequences of air and water pollution
- The tragedy of the commons
- Natural resources: non-renewable and renewable resources
- Natural resource topic I: water resources
- Natural resource topic II: forest resources

Topics Covered in this Module

- Economic development and the environment (Introduction)
- Market failures
- Pollution targets and instruments
- Pollution across space in general equilibrium
- Pollution policy with imperfect information
- Causes and consequences of air and water pollution
- The tragedy of the commons
- Natural resources: non-renewable and renewable resources
- Natural resource topic I: water resources
- Natural resource topic II: forest resources
- Climate change, economic geography, and the environment

Topics Covered in this Module

- Economic development and the environment (Introduction)
- Market failures
- Pollution targets and instruments
- Pollution across space in general equilibrium
- Pollution policy with imperfect information
- Causes and consequences of air and water pollution
- The tragedy of the commons
- Natural resources: non-renewable and renewable resources
- Natural resource topic I: water resources
- Natural resource topic II: forest resources
- Climate change, economic geography, and the environment

This (optional) module will cover both basic theoretical framework and academic research articles focusing on developing countries. It may have more reading and workload than other undergraduate modules.

Key Concepts

- Quantity vs. Quality
- Flow vs. Stock
- Static vs. Dynamic
- Renewable vs. Non-renewable
- Private vs. Common
- Partial vs. General Equilibrium
- Urban vs. Rural
- Local vs. Regional vs. Global