Environment and Development

Environment in development

- Environment/Resource economics: “Sustainable” growth, Externality and Pareto optimum by interventions (Policy)
- Environment in Development(1):

  Poverty ⇔ Environment
- Environment in Development (2):

  Human capital ⇔ Environment (Public health, Gender, Human security….)
- Environment in Development (3): Interdisciplinary approach ⇔ Finance (Aid, Trade and Emission trading), Governance and institutions (Property right, Rule of law, Corruption, Social capital (resident autonomy….)

Environmental degradation and the poverty

(Source: World Development Report 1992)

Problems	Effect on health	Effect on productivity
Water pollution/Scarcity	Death, illness, hygiene problems	Declining fisheries, Aquifer depletion
		for compaction
Air pollution	Acute or chronic circulatory, respiratory	Restriction on industrial activities,
	disease, Premature deaths	Acid rain on forest and water bodies
Solid and hazardous wastes	Diseases by rotting garbage and blocked	Groundwater pollution, Thread to agri-
	drains, Local but acute diseases	culture
Soil degradation	Reduced nutrition for farmers, Greater	Field productivity losses, Off-site siltation
	susceptibility to drought	of reservoirs, river transport channels
Deforestation	Flooding to death and diseases	Loss of logging potential and of erosion
		prevention, watershed stability and
		carbon sequestration loss
Loss of biodiversity	Loss of new drugs	Reduction of ecosystem adaptability
		Loss of genetic resources
Climate changes	Natural disasters, Vector-borne diseases,	Sea-rise damage, Agricultural productivity
	Skin cancer and other diseases…	loss, Disruption of food chain….

Environment-Poverty Linkages

(Source: https://www.slideshare.net/DharmasenaPb/11-poverty-environment-the-linkages)

- Who are responsible for degradation?: The richest and the poorest?: More complicated

Views on poverty-environment linkages

- Conventional view
  - Deterministic relationship: if one is poor, then one degrades the environment
  - Poverty is negatively related to sustainable development - short time horizons of the poor
  - ***Policy: need for economic growth to break the downward spiral: World Bank 1992***

Alternative perspectives (viewpoints)

- Reversing the causality
  - Dependence of the poor on natural resources for their livelihoods: CPR studies
  - Impact of internal and external pressures is to undermine the sustainability of the local resource base

  - ***Policy - improved environmental sustainability as a poverty alleviation strategy***

Change of ideas for the linkage

- Growth vs. Environment (1970s)

  Advanced economies: Slower growth

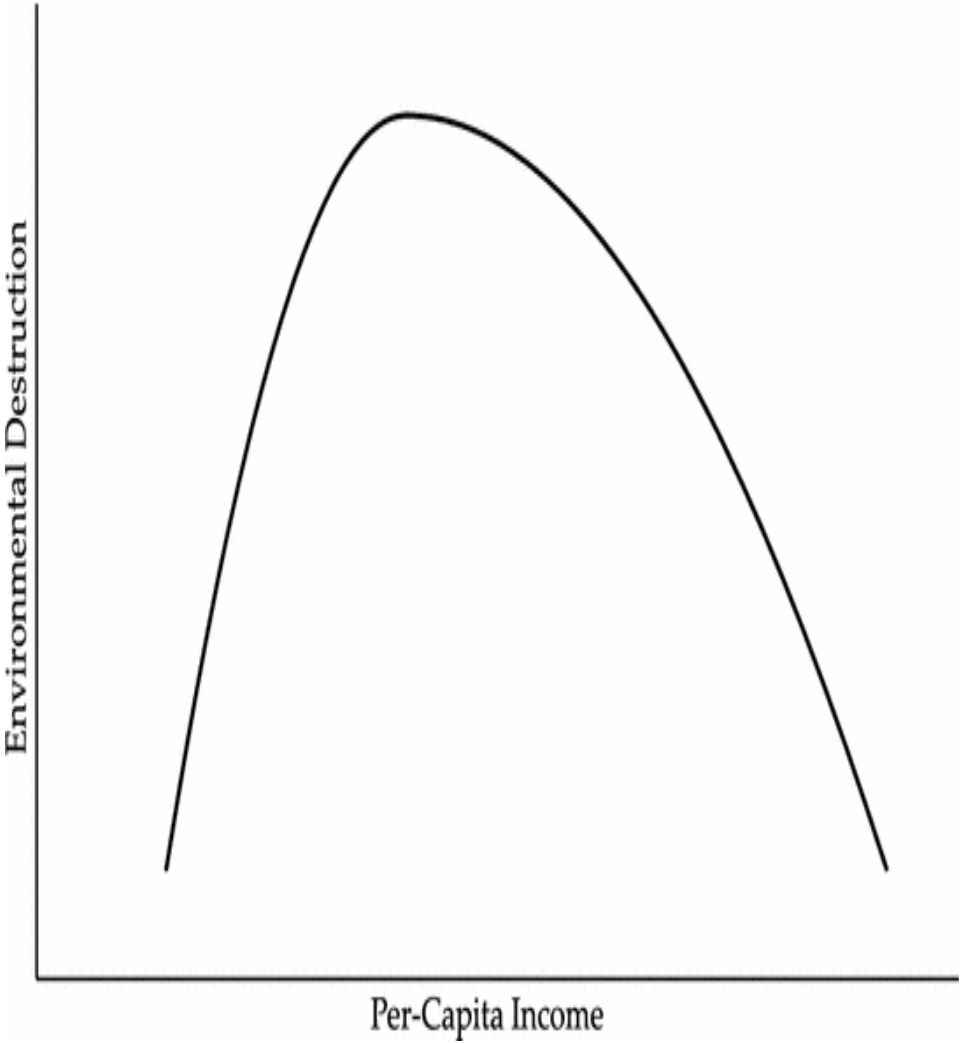
  Developing economies: Priority for development
- Concept of Sustainable development (1980s)

(Causality change: Environment degradation → poverty, Vicious cycles → Environment and growth)

- Local problems can be approached domestically (internalizing negative externalities: Regulations, taxation….)
- Global problems (Globalization): Competition, Resource demand, Population increase…→ Internalization constraints

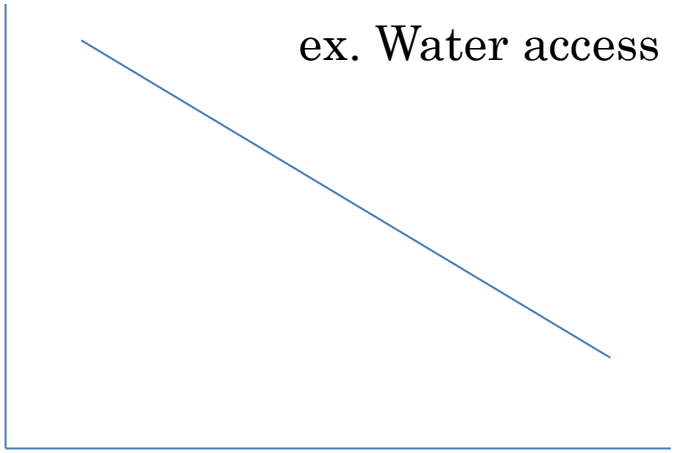
Environmental Kuznets curve

ex. Air/water pollution, deforestation



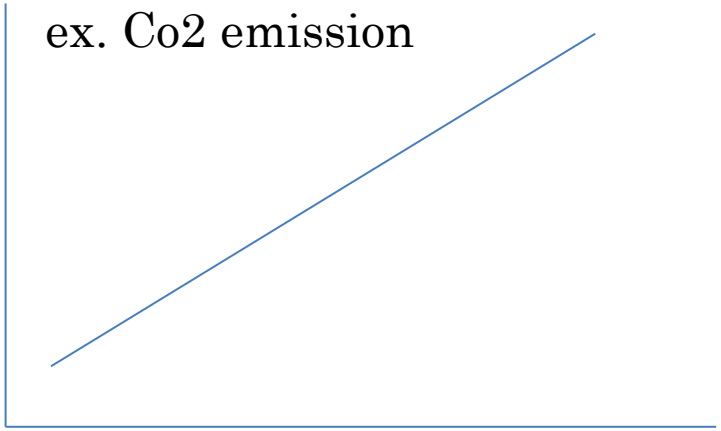
Constant improvement:

ex. Water access



Constant degradation

ex. Co2 emission



Negative production externality

- Price signals to individual producer to produce at $q^* < q^C$

(Externality exists, market is failing and excess production causes excess pollution, then how to realize social optimum ($q^* = q^C$)?

- Possible policy interventions

(1) Output or externality Tax for polluters (Pigouvian tax)

(2) Output reduction subsidies if the polluter has the right to pollute

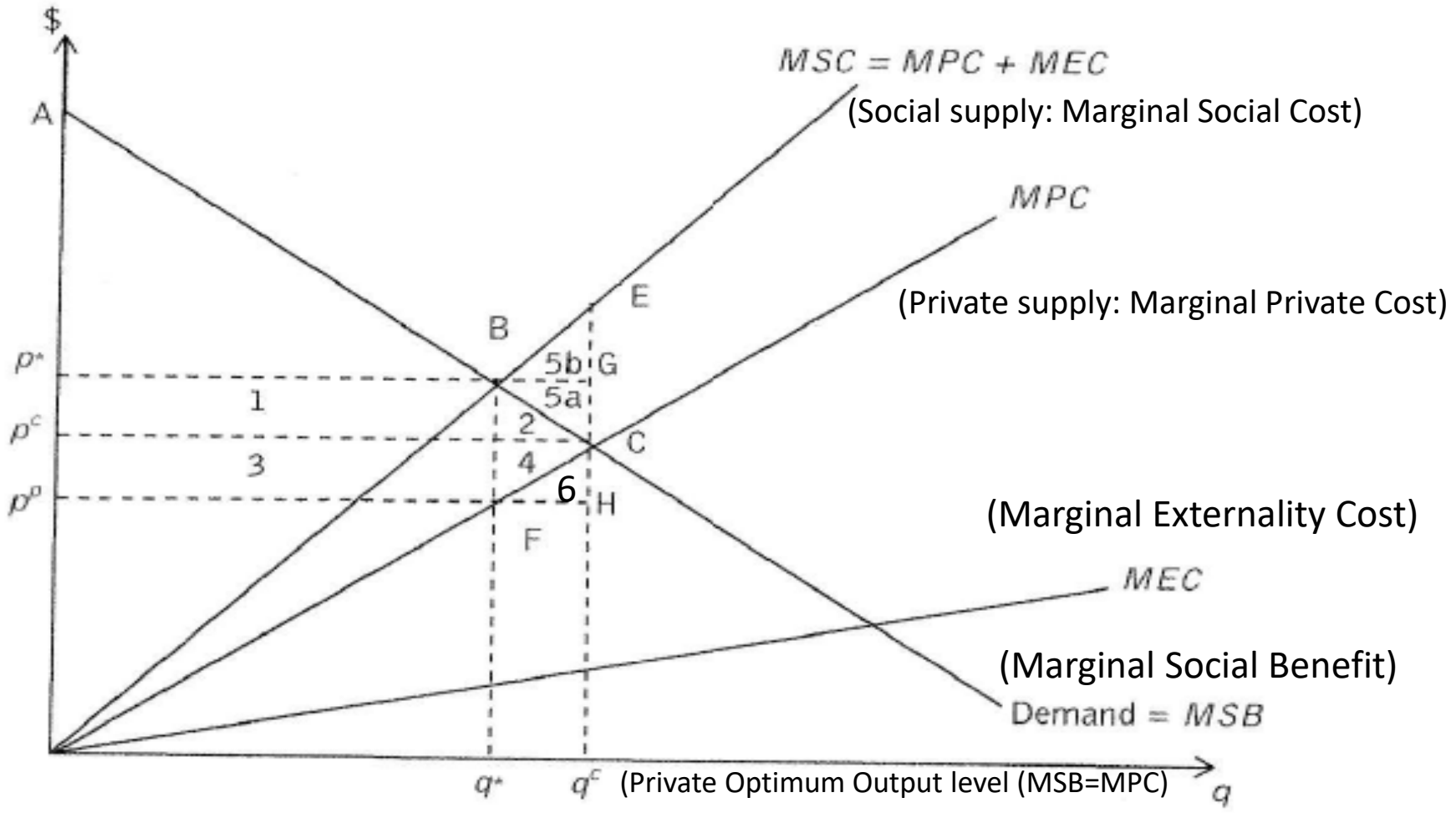
(3) Output or Pollution Quota (Command-Control approach)

(4) Pollution permits Trade (Cap-and-Trade approach)

(5) Institutional change in the producer organization (Unitization or Cooperation)

(6) Private negotiations among the parities (Coase theorem)

Negative production externality: How Producer Surplus, Consumer Surplus, Government Budget and Net Social Gain will change?



Major policy responses: Tax

(1) Output or externality Tax for polluters (if no property rights for polluters) :

Tax equals to BF $(p^* - p^p)$, Production at F, Consumption at B

Consumer Surplus (CS): -1-2<0

Producer Surplus (PS):-3-4<0

Government: +1+3>0

Pollution reduction: +2+4+5

Then Net Social Gain: 5

← No pollution elimination but polluting goods elimination

← C and P loses, G gains ← Government is wise enough?

Major policy responses: Subsidies

(2) Output reduction subsidies (if the property rights for the polluters):

Subsidize (p^*-p^p), (2+4+5a+6) then Production at F, Consumption at B

Consumer Surplus (CS): -1-2<0

Producer Surplus (PS)(+1-4)+(2+4+5a+6)>0

Government:- (2+4+5a+6) <0

Pollution reduction: +2+4+5

Then Net Social Gain: 5

← Highly attractive solution for producers

← May attract more polluters entry

← Very costly for Gov.

Major policy responses: Quota

(3) Restricting q to a quota (Command-and-Control approach):

Production at F, Consumption at B

Consumer Surplus (CS): -1-2<0

Producer Surplus (PS)(+1-4) generally >0

Government: 0 (no change)

Pollution reduction: +2+4+5

Then Net Social Gain: 5

← Attractive for producers (PS is larger than tax case: the rent from regulation through a higher price, especially in inelastic demand, like gasoline)

← Gov. vs. Producer interests (Gov. prefers tax, Producers prefers Quota)

← May be benefitted out of auctioning the quota until the producers will bid a price until the price cancels out the rent

Major policy responses: Permission trade

(4) Impossible task: Knowing MPC and MEC of many firms, then the alternative is to allocate pollution permits and let the firms to trade (Cap-and-Trade approach, Kyoto Protocol on Co2 emission) ← Regulator sets the total pollution in the level of Q* and allocates permits to all N firms (then Q*/N to each firm) to let the firm trade to find λ as the MSC

← Advantage in efficient use of a given total level of pollution

← The regulators must keep track of permission ownership, checking no more pollution beyond the permits (Administration costs, good capacity)

← Making less competitive environment (Rents) (Additional costs for new entrants)

← May be benefitted out of auctioning the quota

← No U.S., no China….

Major policy responses: Unitization or Cooperation

(5) Internalization of externality (polluting agents and polluted agent): Social optimum

← Limited to the local problems

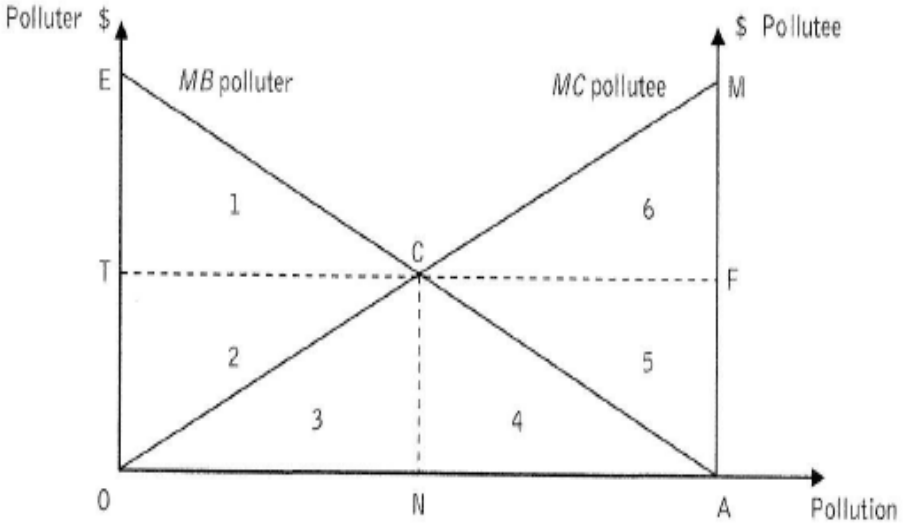
← Case of socialism in Europe (regime)

Major policy responses: Private negotiations (Coase theorem)

(6) Private negotiation may bring social optimum if property rights are clearly allocated, and not transaction costs exist

(Polluter has MB and

Pollutee has MC



Major policy responses: Private negotiations (Coase theorem)(2)

If the polluter has the polluting rights:
Initial condition:
Polluter welfare: 1+2+3+4
Pollutee welfare: -3-4-5-6
Social welfare: (1+2)-(5+6)
After negotiation
Pollution will be ON, Polluter welfare: (1+2+3)+(4+5) gains 5, Pollutee welfare: -3-(4+5)> -3-4-5-6 gains 6, Social welfare 1+2>0, NSG: 5+6>0

If the pollute has the right for clean air
Initial condition: All 0 in pollution, polluter welfare, pollutee welfare, social welfare
Pollution will be ON, Polluter welfare: (1+2+3)-(2+3) still gains 1, Pollutee welfare: -3+(2+3)>0 gains 2, Social welfare: 1+2 (NSG)

← Private negotiation may create win-win solution reducing pollution at the optimum
← Gov. is needed but less managing/ implementation costs
← Gov. should enhance reducing the transaction costs

What is needed in all solutions

- Property rights (over pollution):

Rights to access, extract, manage, exclude others, alienate….

- Relative importance of welfare effects
- Incidence of gains and losses for economic agents

Global Environmental Problems and Development

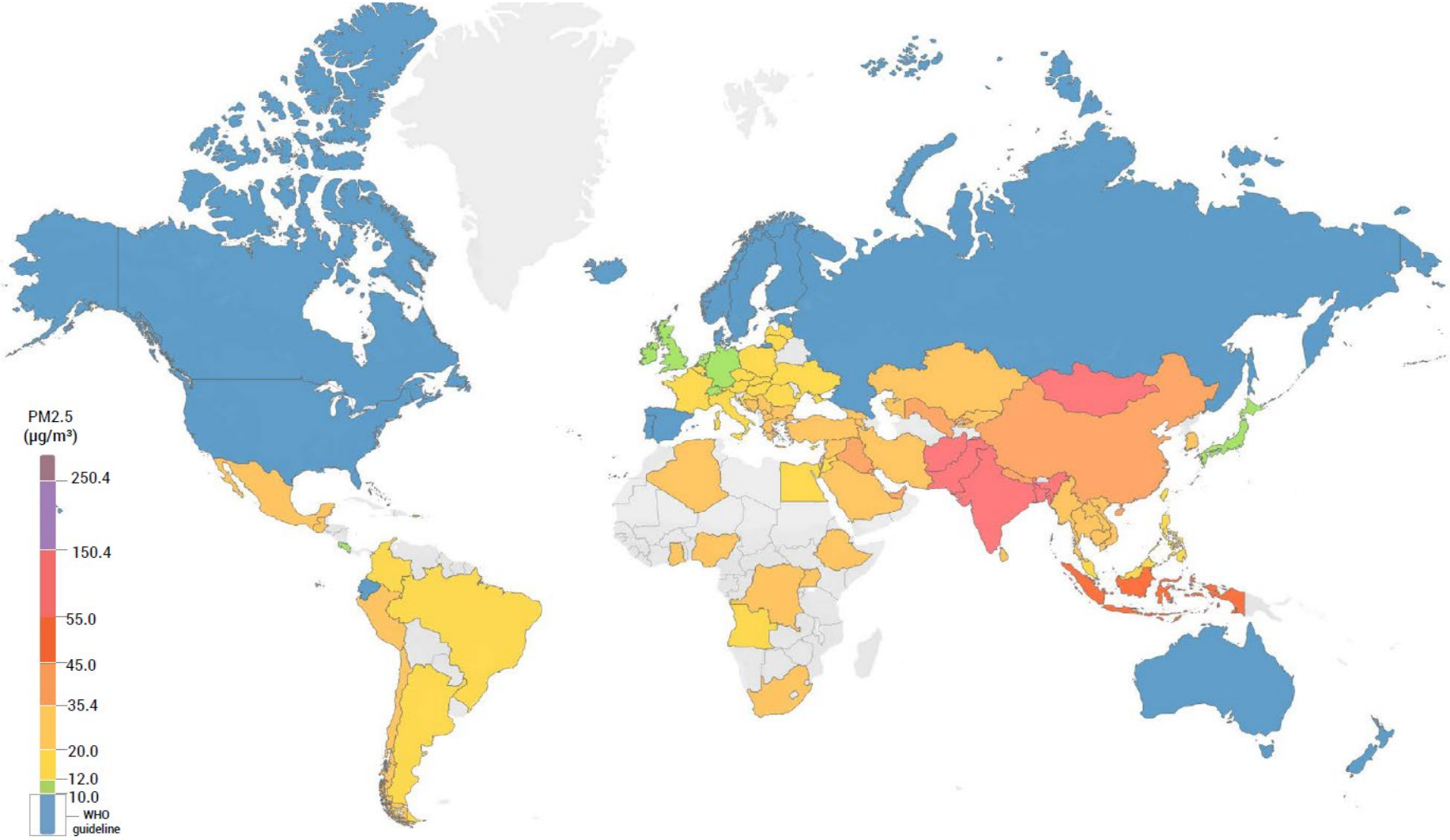
- North-South conflicts: The North should be more responsible for degradation historically

⇨ "Common but different responsibility principle"

- Kyoto Protocol in 1997：Greenhouse gas reduction emission for advanced countries (EU15 8%, US 7%, Japan 6%), Emission trading, Clean Development Mechanism(CDM): Provision of fund and technologies for developing countries to reflect the results for reduction obligations

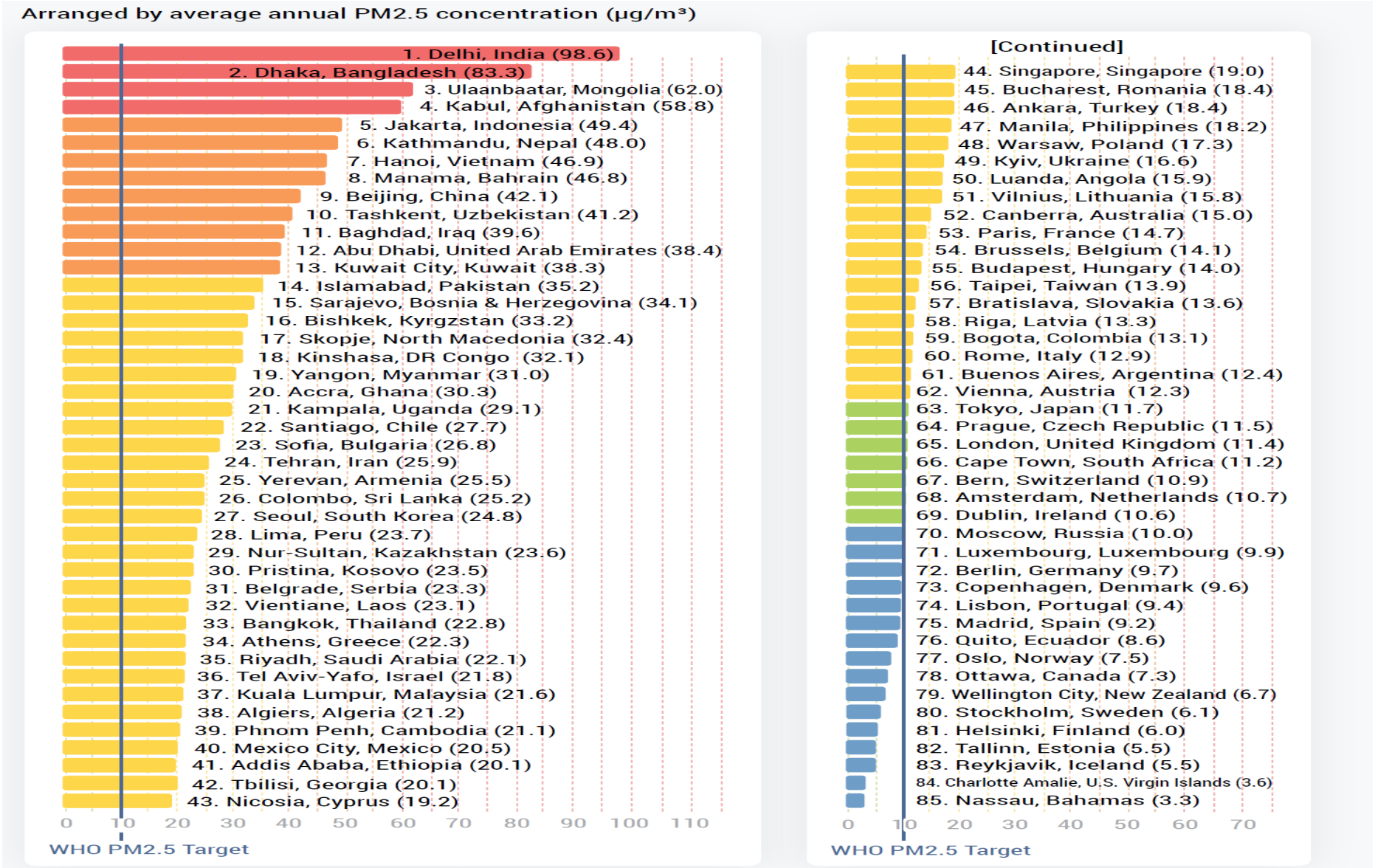
(← No participation by U.S.)

Global map of estimated PM2.5 exposure by country/region in 2019 (Source: https://www.iqair.com/blog/report-over-90-percent-of-global-population-breathes-dangerously-polluted-air)



World Regional City Ranking

(source: same as previous page)



Global Environmental Problems and Development (2)

- Emission reduction by CDM：Estimation by "Business as usual" base

⇨Certain emission volume if certain development stage, Rapidly growing economies/ Large population countries for more emission (Reduction projection very large for China and India)

- CDM projects：$ 20 billion-40 billion in 2005～2010, Major capital flows (More than $12.5 billion by DAC ODA)
- Coordination efforts are needed with local community in forestry protection

Global Environmental Problems and Development (3)

- Paris accord (2015) : Agreement on measures for Global Warming after 2020

* Emission reduction goal obligation for all, Commitment for domestic policies
* Long-term Goals (Average temperature less than +2.0 ℃, 5 year reviews, Verification
* Supports by developing countries for necessary countries
* More than 55 countries ratification (55% of global emission) (but negative US response)

Global Environmental Problems and Development (4): Different interests

- The South-South conflicts：More affected vs. Less affected
- Trade and environment：Global Supply Chain and Co2 emission (Export>Import for Developing countries, Import>Export for matured economies with reduction obligations
- Carbon Linkage with Trade: Meaningless if production slower but more import from other countries boost emission→Regulation?
- Impact of regulations from matured economies into developing countries: ex. Hazardous chemical goods controls by EU spreads to GSC in Asia)
- CBAM（Carbon Boarder Adjustment Mechanism）: Consistency with the WTO regime (non-discrimination)

Trade and Environment

- Trade should not disrupt environment (ex. China produced 30% of CO^2 in export)
- Carbon Linkage
- WTO consistency: Exception in GATT Article XX? (Resource preservation and others)
- Development cooperation for environment related trade measures
- Fair trade ideas

Suggested Readings

- M. V. Nadkarni (2000) “Poverty, Environment, Development: A Many-Patterned Nexus”, *Economic and Political Weekly,* Vol. 35, No. 14
- Barbier, Edward B., (2010) "Poverty, development, and environment," *Environment and Development Economics*, Cambridge University Press, vol. 15(6a)
- Mink, S.D., (1993) "Poverty, Population, and the Environment," World Bank - Discussion Papers 189, World Bank.
- World bank (1992) World Development Report 1992: Development and the Environment
- Copeland,B.R. & Scott Taylor,M., 2003. "Trade, growth and the environment," Working papers 10, Wisconsin Madison - Social Systems.
- Al, Gore (2009) *An Inconvenient Truth,* Viking Books for Young Readers