

Professional Career Program

Environmental Economic Theory

No. 12

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Chapter 18. Comparative Environmental Policies

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Textbook: Barry .C. Field & Martha K. Fields (2009)

Environmental Economics - an introduction, McGraw-Hill,
International Edition

The purpose of today's lecture

We study the courses of environmental policies which different countries have taken, and compare the differences. We also study how those differences have occurred in the history of environmental policies. It is revealed that command-and-control type policies are gradually changing to incentive based ones in quite a few countries.

International Comparisons of Environmental Quality

There are some difficulties for making international comparison

- Suitable data are not available for international comparison of environmental policies.
- Within any country, environmental quality can vary substantially among regions.

International Comparisons of Environmental Quality

Difficulty of comparison (cont.)

- The most cogent comparisons are in terms of achieved levels of ambient quality, such as SO₂ concentration.
- In all the countries in the following Table, ambient SO₂ levels have dropped drastically during the period.

Table: How SO2 levels dropped.

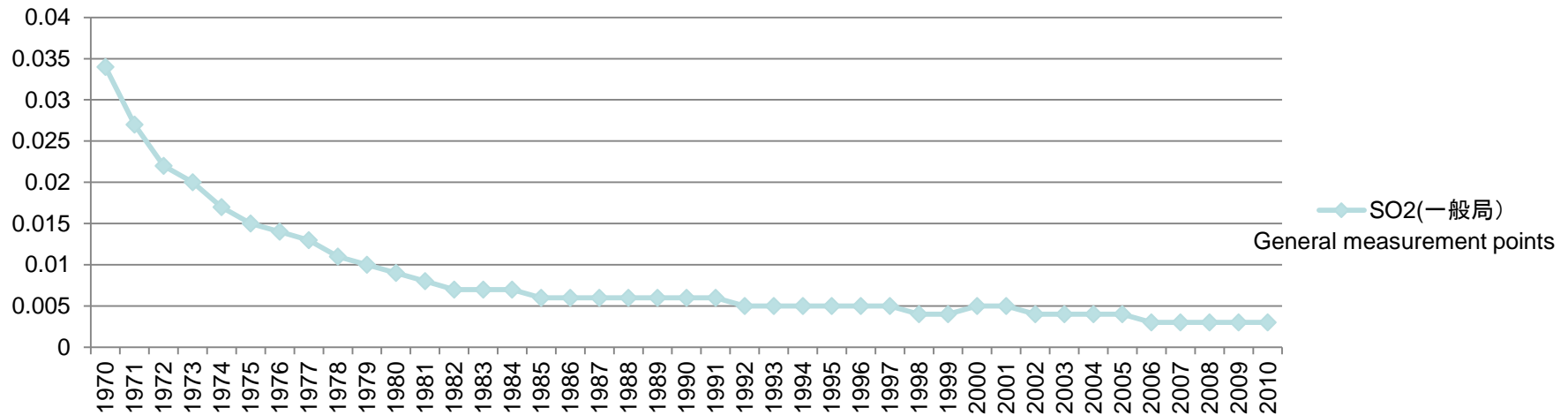
Ambient Levels of SO2 for Six Major Cities
(annual average concentration in $\mu\text{g}/\text{m}^3$)

	New York	Paris	Berlin	London	Tokyo	Montreal
1975	44	115	n/a	119	60	41
1980	35	89	90	69	48	n/a
1985	34	54	67	46	21	n/a
1990	29	28	51	38	24	15
1995	17	13	18	29	19	10
2000	n/a	12	5**	15	19	12*

*1998 ** 1999

Concentration of SO₂ in Japan

SO₂(general measurement point)



Concentration of NO2 in Japan

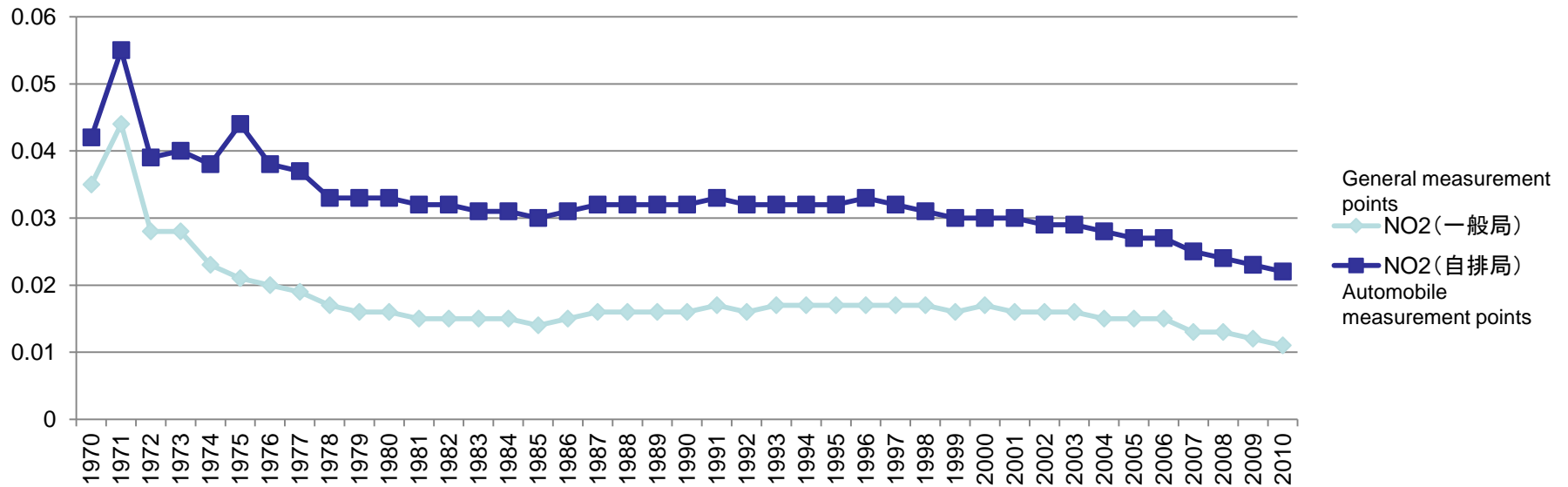


Table: Environmental Indicators for Selected Countries in Recent Years

	Australia	Canada	France	Hungary	Italy	Japan
Emissions						
SO2(kg/capita)	142.6	76.2	9.0	35.3	24.6	6.7
NO(kg/capita)	86.0	78.3	22.7	17.7	31.1	15.8
CO2(ton/capita)	17.0	16.2	6.2	5.5	10.9	2.0
Wastewater treatment (% of population served)						
	n/a	72	79	32	73	64
Municipal solid waste generated (kg/capita)	690	350	540	460	700	410
Nuclear waste	–	5.6	4.3	1.8	–	1.8
	Korea	Mexico	Sweden	UK	USA	
Emissions						
SO2(kg/capita)	20.4	12.2	6.5	16.6	48.4	
NO(kg/capita)	24.4	12.0	27.1	26.3	63.9	
CO2(ton/capita)	9.9	3.8	5.8	8.8	19.8	
Wastewater treatment (% of population served)						
	70	25	86	95	71	
Municipal solid waste generated (kg/capita)	380	320	470	580	730	
Nuclear waste	2.8	0.1	4.5	5.1	0.9	

Which index is suitable for showing environmental quality?

- There are many indices which express environmental quality.
- Concentration of SO_x, NO_x, SPM, PM 2.5 and so on shows the air quality.
- BOD (Biochemical Oxygen Demand, COD (Chemical Oxygen Demand), DO (Dissolved Oxygen) and so on show the water quality.
- Recently, the index called ecological footprint has come to be more and more popular.

Ecological footprint

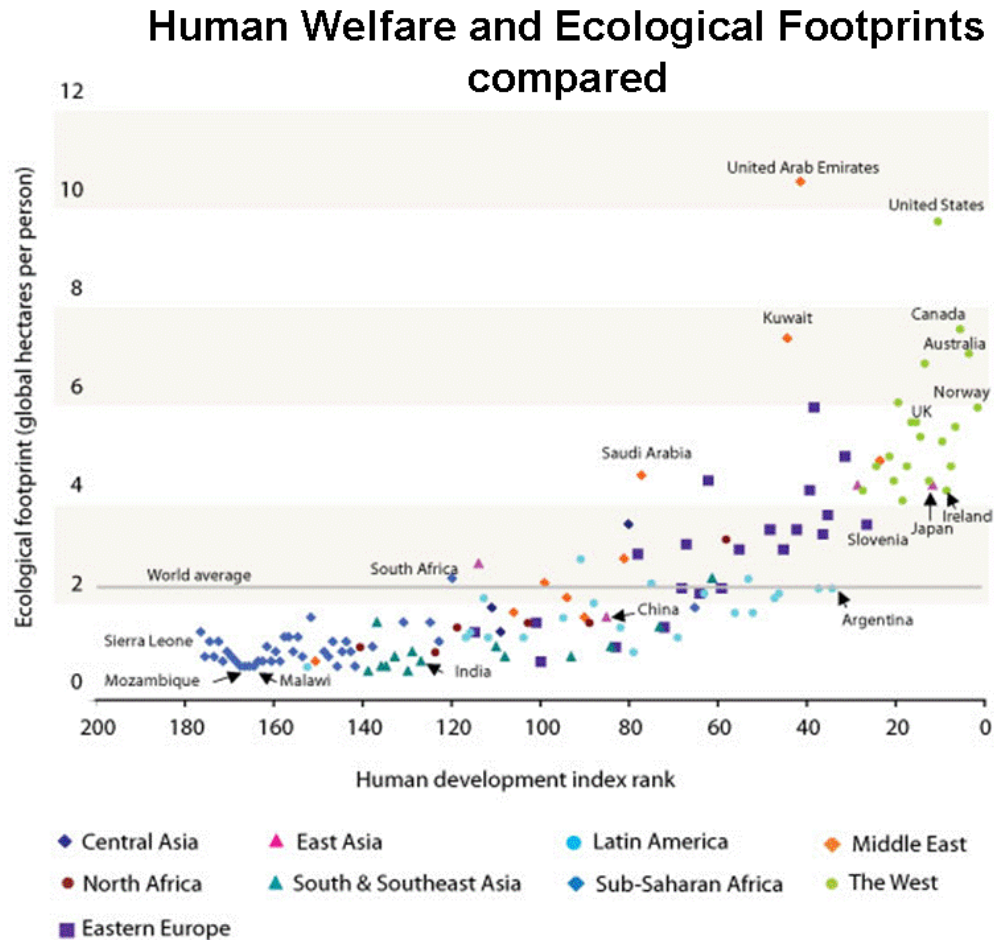
- Ecological footprint is an index which measures the environmental burden of a country.
- It is expressed the area of land and sea which a country is considered to utilize for obtaining various resources.
- Roughly speaking, ecological footprint of a country increases as its GDP increases.

Human development index (HDI)

- The HDI was created to emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone. The HDI can also be used to question national policy choices, asking how two countries with the same level of GNI per capita can end up with different human development outcomes. These contrasts can stimulate debate about government policy priorities.
- The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions.

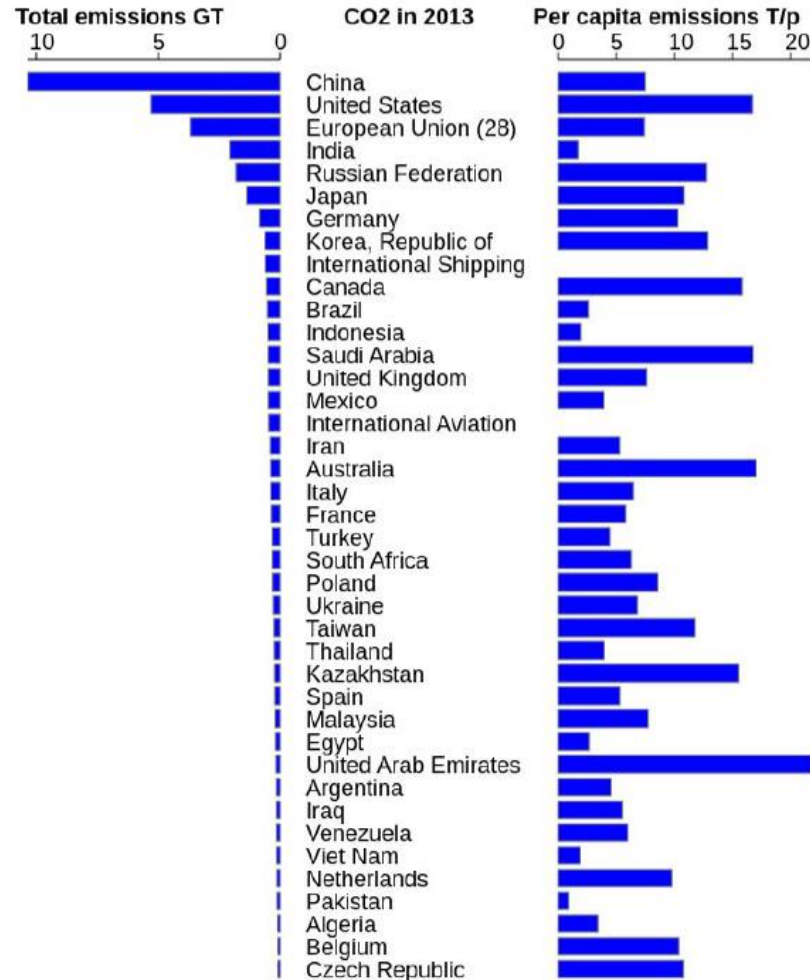
Source: Website of UNITED NATIONS DEVELOPMENT PROGRAMME
([HTTP://HDR.UNDP.ORG/EN/CONTENT/HUMAN-DEVELOPMENT-INDEX-HDI](http://hdr.undp.org/en/content/human-development-index-hdi))

Relationship between human welfare and ecological footprint



Source: Global Footprint Network (2006); United Nations Development Programme (2006).]

CO₂ emission: total and per capita bases



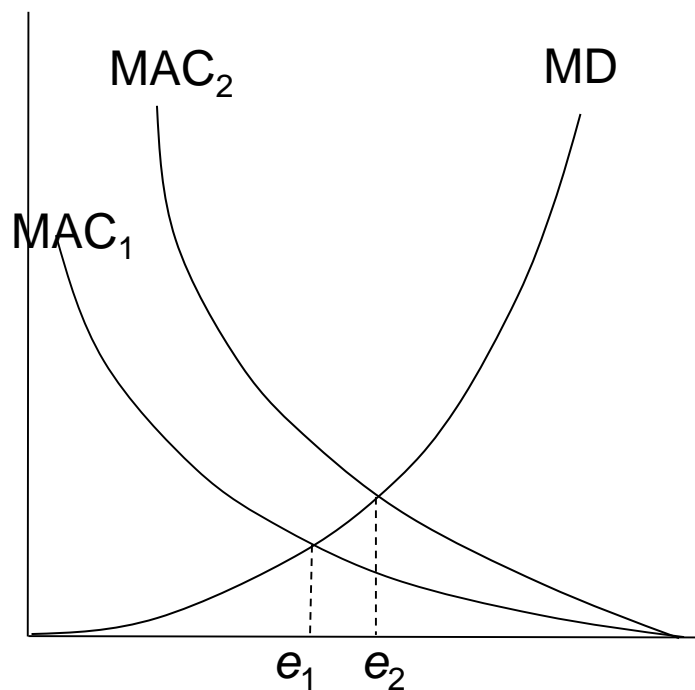
Source: Wikipedia

(https://en.wikipedia.org/wiki/List_of_countries_by_carbon_dioxide_emissions)

Interpreting Differences in Environmental Performance

- Do those differences reflect differences of the effort which each country has put into pollution control?
- It may be so, maybe not. Things are not so easy.
- There are two types of differences.
- (1) Differences in the efficient, or desired, levels of ambient quality.
- (2) Differences in the extent to which each country, through policy and its enforcement, has achieved these efficient levels.

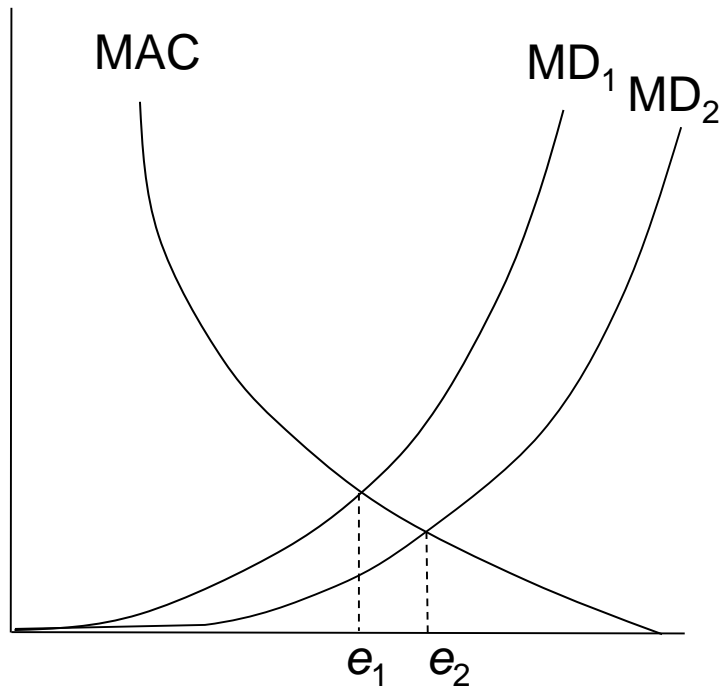
Explanation by means of a figure (a)



The performance result comes from the difference between the two countries in terms of their MACs. It may be the case that the difference in MACs could arise because one country adopted more cost-effective environmental policies than the other. Assimilative capacity may be different among countries, and this also affects the performances. Differences in income levels affect the environmental standards, since the opportunity costs of environmental policies are different, particularly between rich and poor countries.

Explanation by means of a figure

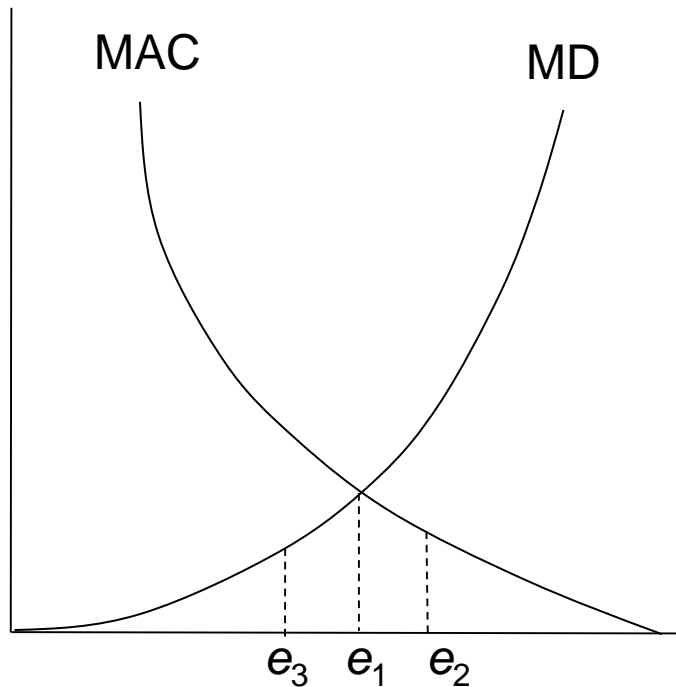
(b)



In the figure, the difference between e_1 and e_2 is explained by the differences in the damages flowing from ambient pollution loads in the two countries. People's willingness to pay for pollution control may be different from country to country. It may also be the case that differences of evaluation of environmental damages come from differences of political systems which reflect voices of people. Hence, democracy is important for enhancing environmental quality.

Explanation by means of a figure

(c)



In this figure, the differences between e_1 and e_2 are the result of different enforcement efforts. Differences of enforcement efforts matter as for shooting at the target level.

It is even possible that a stricter level of emission than legally required is realized in a certain condition, represented by e_3 , although it is not so usual nor efficient.

Environmental Policy in Other Countries than US

National Styles in Environmental Policy

- There are differences in styles in environmental policy.
- Environmental policies in different countries are a reflection of their unique political cultures and institutions.
- One country may have been a pioneer in environmental policies once, whereas the other may be a leader for different periods.

US vs. Sweden

United States	Sweden
1. Statutory ambient standards	1. Nonstatutory emission guidelines
2. Strict timetables for compliance	2. Compliance timetables set on bases of economic feasibility
3. Technology-forcing emission standards	3. Adjustments of standards to technological development

- Despite those differences in the policy styles, there is no significant differences in the results of environmental performances.
- As the world becomes integrated, environmental policy also becomes more integrated and hybrid.

Emission charge scheme vs. transferable emission permit scheme

- An emission charge scheme was preferred to a transferable emission permit scheme in European countries, while the latter scheme is preferred to the former scheme in US.
- Yet, the circumstances are changing recently.
- EU have adopted the transferable emission scheme, EU-ETS to reduce the amount of CO₂ emission.

Guiding Principles of Pollution Control

- Guiding principles are often adopted: it is to identify appropriate pollution control policies, such as “harmonization principle*” which was adopted in Japan, “polluter pays principle”, “precautionary principle” and so on.
- Polluter Pays Principle (PPP) was proposed by OECD first.
- It says that it is the polluters themselves who should bear the cost of measures to reduce pollution to levels specified by public authorities.
- This principle rules out situations where governments subsidize pollution-control expenditures of firms or industries in order to give them an economic advantage over competitors who must pay their own compliance costs.

* Harmonization of environmental quality and economic performances.

Guiding Principles (cont.)

- Another important principle which has been gradually introduced is Precautionary Principle.
- This intends to introduce greater caution into public decisions in cases where there could be substantial future costs (damages) that are currently unknown.
- It says that, if there is a perceptible threat of serious and/or irreversible damage in undertaking some action, these future costs should not be overlooked or discounted simply because they are scientifically uncertain.

Precautionary Principle

- Precautionary Principle has come to be more and more widely accepted among advanced countries, particularly for chemical substances.
- This principle is often applied to toxic and/or hazardous substances.
- It is often very hard to anticipate how serious effects will be caused by those substances.
- Thus, it may be wise to deal with chemical substances very carefully, sometimes with strict regulation.

Precautionary Principle (cont.)

- There are quite a few chemical substances which had been supposed harmless when they were invented but proved to give serious effects to human health such as DDT, PCP, PCB and so on.
- If Precautionary Principle had been introduced in the past, we might have been able to avoid some pollution related diseases. (Eg. PCB)
- Yet, if Precautionary Principle were abused, efficient production might possibly be hindered.

Instrument Choices

- Environmental regulation in most industrial countries has historically been based upon CAC standard setting.
- In most countries, some basic criterion has been adopted to establish the technological level(s) on which CAC decision is based.
- Eg: “Best practicable means” in GB, “state-of-art” technology in Germany, “the lowest level possible through available technologies” in Italy and so on.
- Technologies which gives the least possible environmental burden are sometimes recommended by authorities.

Instrument Choices (cont.)

- Yet, there has been a clear evolution in many countries toward the use of incentive-based policies.
- Emission charges have been introduced extensively in many countries of Europe, for reduction of SO₂ and NO₂.
- The emission charges employed in Europe are not, however, incentive charges, but were introduced to raise money for subsidizing pollution-control activities.
- Emission trading scheme (EU-ETS) has been introduced in Europe for the purpose of reducing CO₂.

Environmental Analysis

- The cost-effectiveness of particular policy actions has come to be evaluated in many countries.
- Thus, the benefits of environmental improvements as well as the costs of policy actions are evaluated and compared.
- Benefits/costs analysis is utilized to measure the cost-effectiveness of policy actions.

Environmental Policy in Transition Countries

- Command economic systems might be considered better than market economies in managing environmental quality issues.
- Administrative agencies would take correct decisions, internalizing all the external diseconomies so that the optimal allocation of resources could be attained, provided that they were omnipotent.
- Yet, this is not the case in the real world.
- On the contrary, environmental situations in command economies such as the former socialist economies were much worse than those in market economies. Sometimes disastrous!

Environmental Policy in Transition Countries

- Main reasons for this were that the heavy priority was given to industrial growth in the former socialist economies.
- The perverse incentives for managers in command economies were also destructive for environmental protection.
- Furthermore, the inability of the citizenry to get information on environmental impacts and petition effectively for their amelioration was adverse to environmental protection.
- This shows the importance of freedom!

The Aral Sea

- The Aral Sea has shrunk due to irrigation of the two rivers which flow into the sea.
- Those two rivers have been irrigated for increasing the amount of agricultural production.
- Since the input of water from the rivers into the sea decreased, the sea has gradually shrunk and almost disappeared.
- The former Soviet Union did not pay any attention to this severe environmental problem₅₀

An Example: The Aral Sea



1989

2014

Source: Wikipedia (<https://ja.wikipedia.org/wiki>)

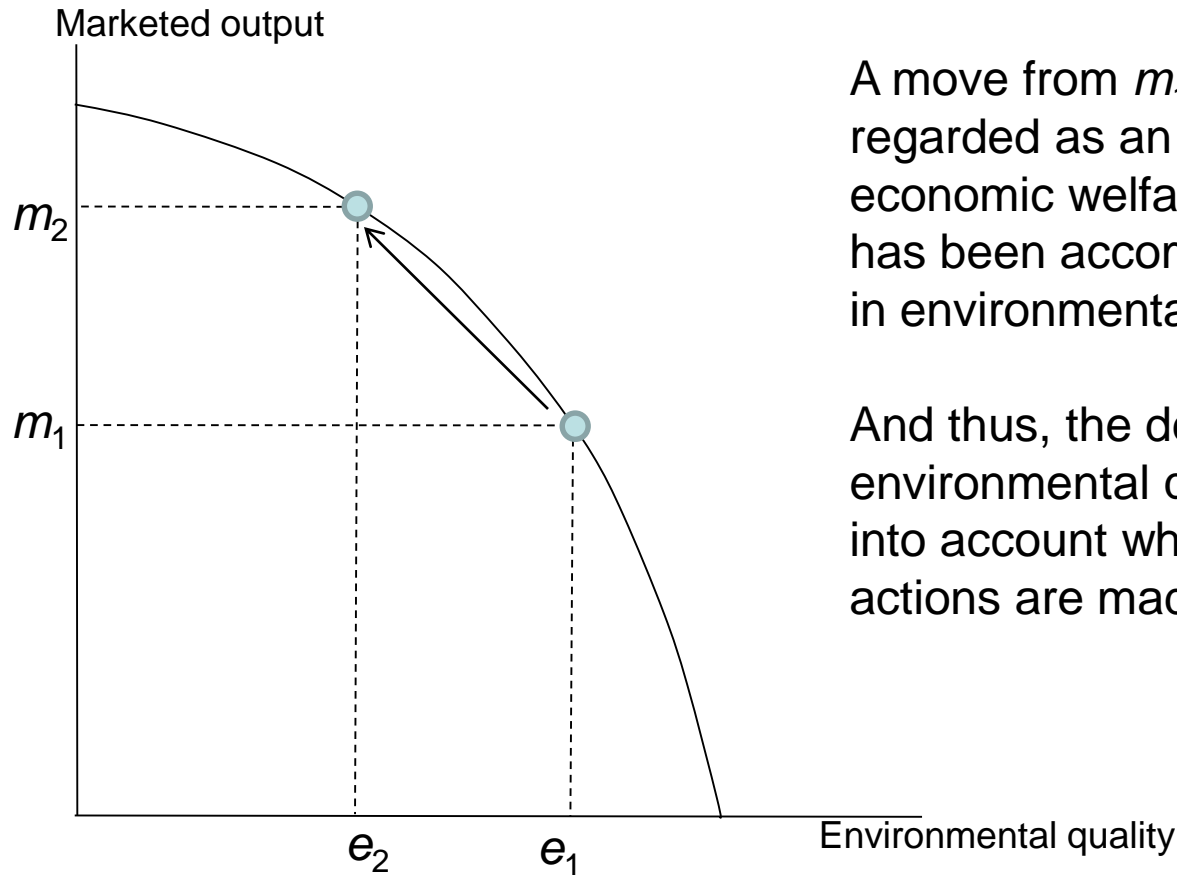
An Example: The Aral Sea (cont.)



Development in Environmental Accounting

- The national income accounting system has been developed in many industrialized countries.
- The conventional national accounting ignores environmental benefits as well as environmental costs.
- To get a complete picture of changes in social welfare, we need to take into account both the increase in marketed output and the reduction in environmental quality.
- Nowadays, so-called environmental accounting has been introduced in many countries.

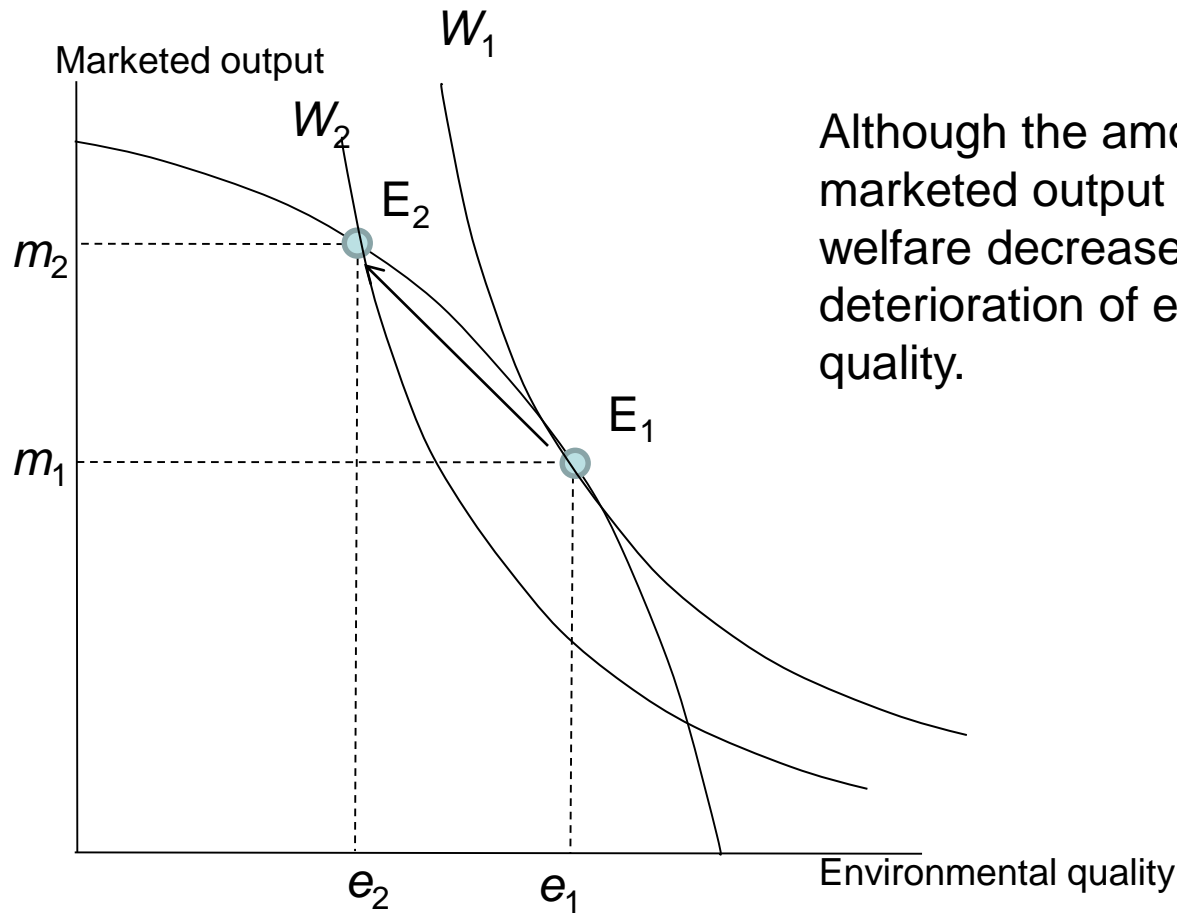
Explanation by means of figure



A move from m_1 to m_2 would be regarded as an improvement in economic welfare. But this improvement has been accompanied by a reduction in environmental quality from e_1 to e_2 .

And thus, the decrease in environmental quality must be taken into account when some economic actions are made.

Explanation by means of figure (cont.)



Although the amount of marketed output increases, the welfare decreases, due to deterioration of environmental quality.

Why isn't the point E chosen?

- E_1 is better than E_2 in terms of welfare.
- Yet, E_1 is not chosen in a market economy.
- This is because environmental scarcity is not reflected in a market price in an economy where there is no restriction on the use of environmental resources.
- This is why proper environmental policies are required.

Evaluation of Environmental Quality

- Evaluation of environmental quality is a hard task.
- First the physical quantities of environmental resources and changes in these quantities over time must be measured.
- Next, they have to be evaluated in value terms, otherwise the comparison between economic gains and environmental losses could not be made.
- The so-called Green Accounting System (environmental accounting system) has been developed.

In the field of waste management and recycling (1)

- EU member countries try to move from a linear economy to a circular economy.
- A linear economy is one where resources are used in one way style and disposed of at an end-of-life of a product, while a circular economy is one where resources are used in a cyclical manner and not disposed of easily.
- For creating a circular economy, EU countries try to law-based recycling.

In the field of waste management and recycling (2)

- United States goes in a different way in the field of waste management and recycling.
- They try to promote recycling, based upon market mechanism, instead of law-based recycling.
- Yet, the quality of recycling is sufficiently good, so that recycled materials are sold well in a market.

Conclusion

- Despite the different policy styles, environmental performances are not different among developed countries as far as some environmental indices are concerned.
- However, there are some indices which show big gaps even among developed countries.
- They reflect differences of environmental policies, socio-economic structures, history, culture and so on.
- Yet, it is absolutely true that we have to pursue the so-called sustainable development.