ENVIRONMENTAL ECONOMICS

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ENVIRONMENT AND DEVELOPMENT

ENVIRONMENT DEVELOPMENT TRADE-OFF: The Environmental Kuznet Curve (EKC)

- In the late 1980's and early 1990's some economists (Krueger and others) took up some studies to explore the relationships between level of economic development and environmental quality across countries.

- Plotting the concentration of certain key pollutants against per capita income of levels of countries some studies came up with a pattern of scatter shown in figure-1.

The Environmental Kuznet Curve

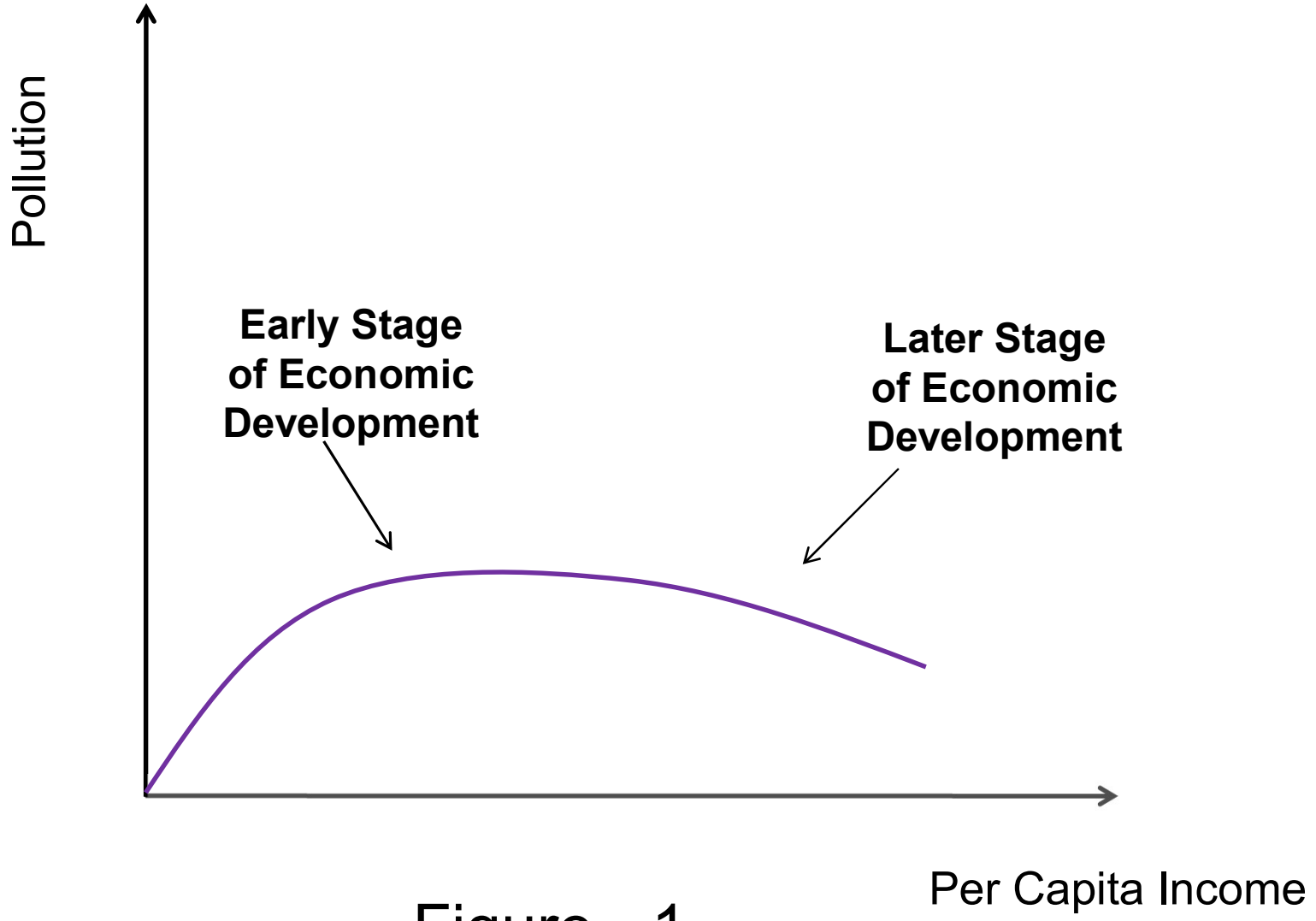

Figure - 1

The Environmental Kuznet Curve (EKC)

- This scatter indicated a relationship between per capita income (PCI) and pollution levels of the shape of an inverted U.

- Owing to the remarkable similarity of this pattern to Kuznet's findings about two decades earlier between PCI and inequality across countries, this relationship came to be known as the Environmental Kuznet's Curve (EKC).

The Environmental Kuznet Curve (EKC)

- The associated hypothesis with this curve has been put as thus:

"Environmental pressure tends to rise faster than income growth in early stages, then slows down and reaches a turning point after which it tends to decline with further growth. The last phase is referred to as delinking of environmental pressure from economic growth."

ENVIRONMENT DEVELOPMENT TRADE-OFF: The Environmental Kuznet Curve (EKC)

- The EKC hypothesis points towards a trade-off between environment and development i.e. it seems to suggest that underdeveloped countries will have to forgo environmental quality for the sake of attaining a higher level of development.

- It further suggests that environmental quality will be taken care of as developing countries attain further level of development.

ENVIRONMENT DEVELOPMENT TRADE-OFF: The Environmental Kuznet Curve (EKC)

The rationale behind the EKC hypothesis can be summed up in the following quotation:

"At low level of development both the quantity and intensity of environmental degradation is limited to the impacts of subsistence economic activity on the resource base and to limited quantities of biodegradable wastes. As economic development accelerates with the intensification of agriculture and other resource extraction and the take-off of industrialization, the rates of resource depletion begins to exceed the rates of resource regeneration, and waste generation increases in quantity and toxicity. At higher levels of development, structural and services, coupled with increased environmental awareness, enforcement of environmental regulations, better technology and higher environmental expenditures, result in leveling off and gradual decline of environmental degradation." (Panayotou 1993)

ENVIRONMENT DEVELOPMENT TRADE-OFF: The Environmental Kuznet Curve (EKC)

- Empirical evidence in support of the EKC is not yet conclusive to establish the observed trade-off or the hypothesis as a law.
- Studies based on longitudinal data of developing countries have not come out as yet.
- The possibility of such studies refuting the trade-off (the way the Kuznet's inverted U hypothesis was refuted by such studies that came up in 1970's) cannot be ruled out.

ENVIRONMENT DEVELOPMENT TRADE-OFF: The Environmental Kuznet Curve (EKC)

- Even if the trade-off was valid for the past experiences its policy implication for future of developing countries may not be very useful.
- An obvious policy suggestion which can be drawn from the trade-off is that developing countries should focus primarily on growth and economic development goals without bothering much about environmental protection in their early stages.
- Because growth itself will take care of environmental quality at a later stage.

ENVIRONMENT DEVELOPMENT TRADE-OFF: The Environmental Kuznet Curve (EKC)

- However, such a strategy can be mistaken (as was the growth oriented strategy of developing countries like India in the early planning era without much effort for reduction of poverty, believing that poverty was supposed to be mitigated by trickle down effect of high growth)

- Moreover, it is important to note that many components of environmental quality such as bio-diversity are non-reversible if degradation exceeds a threshold level.

ENVIRONMENT DEVELOPMENT TRADE-OFF: The Environmental Kuznet Curve (EKC)

- In this context it seems that, despite the ambiguity associated with the concept, sustainable development would be a better strategy.

- Moreover, a developing country today need not go through the same course of development on which the rationale for the EKC hypothesis has been formulated.

- For instance, countries like India have made the transition from a primary sector dominated economy to a service sector dominated economy without going through the phase dominated by the industrial sector.

ENVIRONMENT DEVELOPMENT TRADE-OFF: The Environmental Kuznet Curve (EKC)

- Such a pattern obviates the need for industrialization related environmental degradation in the course of economic development.

- Even if a country needs and chooses to industrialize it can leap-frog the course of technological advancement and adopt technologies, which are substantially less polluting than the technologies used by countries which industrialized in the past

- The environment-development trade-off might have existed historically. But it is not inevitable for a contemporary developing countries to sacrifice environment quality for the sack of expediting the pace of development.

SUSTAINABLE DEVELOPMENT

SUSTAINABLE DEVELOPMENT: BACKGROUND

- The ‘Limits to Growth’ Report
- Energy crisis of 1970s precipitated by oil price jumps
- Market failure in allocation of environmental resources
- World Commission on Environment and Development instituted in 1983
- The report ‘Our Common Future’ articulated the concept

SUSTAINABLE DEVELOPMENT: DEFINITION

- Development that meets the needs of the present without compromising the ability of the future generations to meet their own needs

- Appealing but ambiguous. Some called it delightfully vague

  - Present needs?
  - Needs of the future generations?
  - Requirements to meet the future needs?

- Difficult to operationalise.

SUSTAINABLE DEVELOPMENT: ECONOMIST'S PERCEPTION

- Resonates with Economists' conceptualization of INCOME, i.e., maximum consumption one can have in a period while remaining as well off in the end as in the beginning of the period (Solow)
- In that light sustainability has been interpreted as an obligation to conduct ourselves so that we leave to the future the option or capacity to be as well off as we are
- Hence sustainability requires that the stock of capital-manufactured, human and natural, is left undiminished
- This, in turn, needs restricting consumption to save resources for asset creation and conservation and protection of the environment

SUSTAINABLE DEVELOPMENT : Definitions

- A requirement to our generation to manage the resource base such that the average quality of life we ensure ourselves can potentially be shared by all future generations" -Asheim (1994)

- SD serving multiple goals- economic development, a better environment and a particular concern for poor

- Two common features of many definitions of SD:
  - Equity across generations
  - Equity within generations

- Equity vs. efficiency issue
- Sustainability and sustainable development

SUSTAINABLE DEVELOPMENT : Approaches

- Two approaches-
  - Outcome approach
  - Maintaining the means to generate well-being or consumption
- Outcome approach:
  - How the economic process directly affects human well being
  - Well being is synonymous with utility or welfare of an individual
  - Sustainability is the utility of a representative agent in any period t, U(t) to be non-declining for the rest of the time from time t* onwards
  - Defining SD in terms of observable determinants of utility

SUSTAINABLE DEVELOPMENT : Approaches

- Maintaining the resources available to society to generate well-being or consumption
- Resources consist of physical stocks and the technology
- Four forms of capital:
  - Man-made or produced capital, Km
  - Human capital, Kh
  - Natural capital, Kn
  - Social Capital, Ks

SUSTAINABILITY: Weak and Strong

Weak Sustainability views manufactured and natural capital to be substitutable

Therefore what matters is the total stock of these assets

Monetary valuation of stocks possible

Strong Sustainability treats natural and man made capital to be complementary

So renewable resources to be used only at rates at which they regenerate. Use of non-renewable should be minimized.

Resource stock have to be measured in physical units

EFFORTS AND INDICATORS FOR MONITORING SUSTAINABILITY

- Environmentally Adjusted National Income or Green NNP (=NNP-Depletion of Natural Capital-Environmental Damage)
- Genuine Savings
- Integrated Environmental Economic Accounting

GREEN NATIONAL ACCOUNTS

- Degradation of environmental capital is like depreciation of man-made capital
- Subtract from gross income to get net income
- Not doing it is steering with a faulty compass

GREEN NATIONAL ACCOUNTS

- System of National Accounting (SNA) as a measure of SD
- Income as given by Hicks- that portion of the value of output which could be consumed in any year without reducing one's wealth.
- Need for adjustment in conventional accounts

ADJUSTMENTS IN NATIONAL ACCOUNTS

- For NR resources, deduct from NNP an amount equal to the value of annual production (less discoveries) multiplied by the difference b/w P and MC
- For RR, annual production is deducted from annual growth and then valued using P and MC term
- For pollution, amount equivalent to change in stock of each pollutant multiplied by its marginal abatement cost
- Green NNP = NNP- $(p_1-mc_1)NR-(p_2-mc_2)$ R-v(S)
  - v= marginal cost of abatement for pollution stock S

GENUINE SAVINGS

- Pearce and Atkinson, 1993
- Compares reinvestment in an economy with depreciation of both natural and man made capital

  $GS = S - \theta m - \theta n$
- Positive genuine saving means that the weak sustainability norm is fulfilled. (natural and man made capital are perfect substitutes)

ISSUES FOR SUSTAINABLE DEVELOPMENT

- Economic growth is needed and desirable.
- Can needed growth be attained?
- What stress on environment would it put?
- How to make it green growth?
- How to ensure sustainable development?

POVERTY and Environmental Degradation

- Poor people, almost always, bear the burnt of environmental degradation
- Poverty and environmental degradation are often caught in a mutually reinforcing downward spiral
- If the spiral is to be arrested, addressing poverty alongwith environment oriented policy will be useful

POVERTY and Environmental Degradation

- For appropriate policy formulation, examining the causality between poverty and environmental degradation is important
- Poor usually don’t possess means and power to damage the environment to the point that will unleash the spiral
- Greed and rent-seeking by the rich and powerful section are responsible for such degradation of environment

ECONOMIC ASPECTS OF GLOBAL ENVIRONMENTAL ISSUES

TRADE and ENVIRONMENT

- Two broad categories of issues-
  - Those arising from the consequences of differences in environmental regulations across countries
  - Others concerned with management of global public bad

TRADE and ENVIRONMENT

- International trade helps a country to specialize in production of specific commodities (comparative cost advantage)
- Relative endowment of different types of natural resources plays an important role in determining the pattern and volume of trade
- Pattern and volume of trade affects the environment nationally and globally

TRADE and ENVIRONMENT

- Sources of international trade determining comparative cost advantage of countries are-
  - Differences in labour productivity
  - Relative availability of factors of production including natural resources

- Differential environmental standards or regulations across countries may also affect pattern and spatial distribution of trade, and thereby environment

TRADE and ENVIRONMENT

- International trade → Greater production and consumption → environmental problems (social cost)
- Market failure (external costs are not captured in price)
- Lower price → higher demand and production (more than socially optimal level)
- Appropriate regulation is required to curtail output

TRADE and ENVIRONMENT

- Environmental regulation and specialization in production
- Case of developed and developing countries
- Pollution haven hypothesis

Global Public Goods and Bads

- Public bads affect all people in a locality adversely and no one can be excluded
- Local and global public goods and bads
- Individual countries may not have enough incentives to conserve the goods and limit use of bads
- Tendency to ‘free ride.’
- Not enough actions and ‘tragedy of commons’
- Kyoto, Montreal protocol, etc.