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Importance of Natural Resources Management in Economics

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Abstract

We know about many natural resources. They are varied by nature. The differences of natural resources depend on geography of a territory. In this article, I will present the nature of natural resources. Here different types of natural resources will be presented. Besides, many kinds of terms related this course will be presented. This article is a complete overview of the relation between economics and natural resources.

Keywords: Importance; Classification; Rules; Resources; Issue.

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1. Introduction

Let us start with the definition of economics. It is the study of the production, processing, distribution, consumption of goods/services in an exchange system. Economics is a social science concerned with the production, distribution, and consumption of goods and services. It studies how individuals, businesses, governments, and nations make choices on allocating resources to satisfy their wants and needs, and tries to determine how these groups should organize and coordinate efforts to achieve maximum output. Natural resources are entirely related with economics.

2. Natural Resources

Specific attributes of the environment that are valued or have proven useful to human.

Aspects of nature that can be used by humans to satisfy human wants. Natural resources refer to the things that exist freely in nature for human use and don't necessarily need the action of mankind for their generation or production. The key aspect of natural resources is that they dictate the survival of humans and other life forms on earth. These resources include land, rocks, forests (vegetation), water (ocean, lakes, streams, seas, and rivers), fossil fuel, animals, minerals, sunlight and air.

The basic argument underpinning environmental economics is that there are environmental costs of economic growth that go unaccounted in the current market model. These negative externalities, like pollution and other kinds of environmental degradation, could then result in market failure. Environmental economists thus analyze the costs and benefits of specific economic policies, which also involves running theoretical tests or studies on possible economic consequences of environmental degradation.

Some examples of natural resources are: air which provides wind energy, Coal which act as an input for electricity, forests which provide paper, wood and various medicines, Water which is used for drinking and production of hydroelectric energy, sunlight that is used for drying clothes, photosynthesis and solar energy.

3. Natural Resource Economics

Natural resource economics deals with the supply, demand and allocation of the earth natural resource. Main objective of natural resource economics is to better understand the role of natural resources in the economy in order to develop more sustainable methods of managing those resources to ensure their availability to future generations. Resource economists study interactions between economic and natural systems, with the goal of developing a sustainable and efficient economy. It is a multi - disciplinary field of academic research.

a) application of economics to manage naturally occurring resources for human needs/wants with efficiency as the primary goal

b) efficiency may be defined in market or nonmarket terms, focused on the short or long run, relative to current or future generations, local or global in scope

c) decision choices include maintaining the status quo, altering the status quo, or doing nothing with focus on relevant institutions

d) evaluation always includes the costs & benefits of a decision & to whom those costs & benefits accrue

e) Natural resource economics deals with the supply, demand, and allocation of the Earth's natural resources. One main objective of natural resource economics is to better understand the role of natural resources in the economy in order to develop more sustainable methods of managing those resources to ensure their availability to future generations. Resource economists study interactions between economic and natural systems, with the goal of developing a sustainable and efficient economy.

f) Natural resource economics helps decision-makers better understand market and other values associated with resource and environment use and management decisions. It also assists in capacity building and informed decision making regarding the allocation of scarce resources in order to achieve optimal environmental and social benefits.

4. Environmental Economics vs. Natural Resources Economics

Environmental Economics: It relates economic basis for pollution problems & policy alternatives. Environmental economics is an area of economics that studies the financial impact of environmental policies. Environmental economists perform studies to determine the theoretical or empirical effects of environmental policies on the economy. This field of economics helps users design appropriate environmental policies and analyze the effects and merits of existing or proposed policies.

Natural Resources Economics: It includes problems of managing common-pool and natural resources, determining optimal rates of extraction, & understanding resource markets.

Common-pool natural resources: It is difficult to exclude access, but once extracted is no longer available to others.

5. Importance of Natural Resource Economics

We can explain like these:

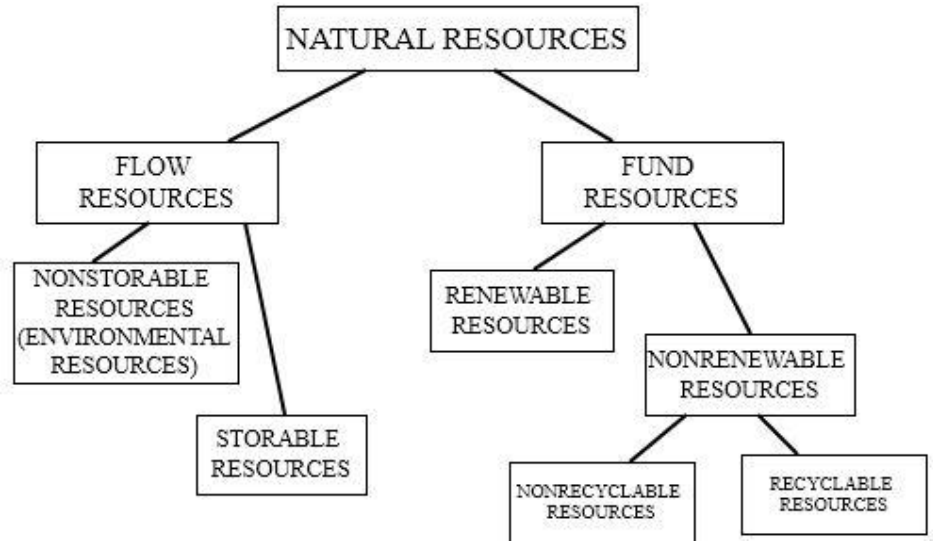
a) Natural Sciences lack commonly accepted decision process
b) Economics may “assume” the problem away
c) Irreversibility

d) Market failure
e) Joint importance of economic and ecological systems
f) Improved management of natural resources, whether for private, public or natural gain
g) Physical-Natural-Economic System Links
    i. Improves efficient functioning of system
    ii. Improves understanding about the world we live in

6. Natural Resource Management

Natural resource management Natural resource management refers to the management of natural resource such as land, water, soil, plants and animals with a particular focus on how management affects the quality of life for both present and future generations. Natural resource management deals brings together land use planning, water management, biodiversity conservation and the future sustainability of industries like agriculture, mining, fishing, etc.

7. Classification of Natural Resources



7.1. Flow Resources (nondepletable)

A flow resource is a resource which is neither renewable nor non-renewable. It is -

a. Nonscorable (sometimes called “environmental resources”)

» Often indivisible

» Inexhaustible (in human span of time)

» Time & management relevant only to consumption, not supply

Storable (by nature, as in living matter; by humans with technology)

» May be divisible

» Time & management relevant to both to consumption & supply

» The services are what are significant for humans

7.2. Fund Resources (stock or delectable resources)

a. Exhaustible & Renewable

» Regenerative within human use time frame

» Assumes use within minimum & maximum thresholds

b. Exhaustible & Nonrenewable

» Relatively fixed stocks/fund within human use time frame

(1) No recyclable--Examples: fossil-fuel energy resources (oil, natural gas, coal, peat, many "renewable" resources when thresholds violated)

(2) Recyclable--Examples: some minerals (iron, aluminum, and gold, silver)

8. Natural Resource Issues

a) Quantity & Quality of: Land, Water, Air, Energy

b) Public vs. Private Management Question

c) Trend of Magnitude of Problem:

- Persistent, Chronic, Cyclical, Declining, Growing?

d) Irreversibility

e) Geographic scope

f) Whose problem & who decides (ethics)?

g) Property rights

h) Time (short vs. long run; current vs. future generations)

Besides, there are other issues as like:

a) Deforestation

b) Urban Sprawl

c) Overfishing
d) Acid Rain
e) Ozone Layer Depletion
f) Ocean Acidification
g) Air Pollution
h) Biodiversity
i) The Nitrogen Cycle
j) Natural Resource Use
k) Transportation Polar Ice Caps
l) Climate Change

At this point there is no denying the fact that our environment is changing. Hundreds of studies have been conducted to demonstrate that this is happening and it is having an effect on life around us.

However, many may be unaware of the specific issues that have led to these changes. Terms like “climate change” and “genetic modification” are commonplace, but without additional information it is difficult to see why they actually matter.

To complicate the matter, many of these issues are linked to one another. The key is that they are all important challenges that need to be confronted.

Environmental and Ecological Economics

The insights into sustainability provided by mainstream economics are taken much further by environmental and ecological economists. The main areas of contribution include the following:

· A classification of sustainability views according to assumptions about the Conservation of natural resources

· Extending the analysis of externalities to provide a basis for designing antipollution Policies and deciding on the resources it is desirable to devote to avoiding pollution

· A range of methodologies for evaluating the services provided by environmental assets and social capital to extend the inclusiveness of Cost Benefit Analysis.

· Models for projecting the pricing and depletion of finite resources.

· Assessments of the implications of various access regimes governing the harvesting of renewable resources

There is considerable overlap in the subject matter of ecological and environmental economics. The key difference is one of orientation. Environmental economics tends to embrace the Neo-classical paradigm as an

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Analysis of the economic system and seeks to incorporate environmental assets and services.

Ecological economics gives priority to the health of complex interrelated ecological systems and consider how economic behavior can be modified to that end.

Resources can also be classified on the basis of their origin i.e. biotic and abiotic.

8.1 Biotic Resource

Biotic resources are derived from animals and plants (i.e-the living World). Biotic is a living component of a community; for example organisms, such as plants and animals.

8.2 Abiotic Resources

Abiotic resources are derived from the non-living world e.g. land, water, and air. Mineral and power resources are also abiotic resources some are derived from nature. In biology and ecology, abiotic components are non-living chemical and physical factors in the environment which affect ecosystems.

8.3 Optimism vs. Concern for Environment & Natural Resources Concerns

It can be characterized by

a) Global warming & climate impacts
b) Over-population & biodiversity
c) Soil/water quality/Mineral/energy cost/availability
d) Pollution/resource shortage impacts on social & political institutions

8.4 Optimism

It refers:

a) Legislative progress
b) Toxic release rates down
c) US competitiveness

9.Rules within Resource Economics

There are two intertemporal allocation rules have attracted particular attention:

The Hoteling rule and the Hardwick rule

9.1 The Hoteling Rule

- No-arbitrage possibility condition that every efficient resource utilisation path has to meet. The net price of an exhaustible resource must grow at a rate that equal the interest rate

Assumption

b. Suppose a private owner owns the complete stock of a natural resource.

c. The complete stock of the resource is fully known and there is no more.

d. Once some of the stock is withdrawn, the resource withdrawn is used completely with no waste and nothing left over for reuse.

e. The stock can never regenerate itself.

f. The cost of withdrawing a unit of the resource is always the same

g. There are no alternatives to the resource.

Hoteling's rule defines the net price path as a function of time while maximizing economic rent in the time of fully extracting a non-renewable natural resource. The maximum rent is also known as Hoteling rent or scarcity rent and is the maximum rent that could be obtained while emptying the stock resource. In an efficient exploitation of a non-renewable and non-augmentable resource, the percentage change in net-price per unit of time should equal the discount rate in order to maximize the present value of the resource capital over the extraction period.

This concept was the result of analysis of non-renewable resource management by Harold Hoteling, published in the Journal of Political Economy in 1931. Devarajan and Fisher note that a similar result was published by L. C. Gray in 1914, considering the case of a single mine owner.

The simple rule can be expressed by the equilibrium situation representing the optimal solution.

$$\frac{P'(t)}{P(t)} = \delta,$$

When P (t) is the unit profit at time t and δ is the discount rate.

9.2 The Hartwick Rule

Invest proceeds from resource extraction such that total capital is constant. In resource economics, Hardwick's rule defines the amount of investment in produced capital (buildings, roads, knowledge stocks, etc.) that is needed to exactly offset declining stocks of non-renewable resources. This investment is undertaken so that the standard of living does not fall as society moves into the indefinite future. Solow (1974) shows that, given

a degree of substitutability between produced capital and natural resources, one way to design a sustainable consumption program for an economy is to accumulate produced capital sufficiently rapidly so that the pinch from the shrinking exhaustible resource stock is precisely countered by the services from the enlarged produced capital stock. Hardwick's rule – often abbreviated as "invest resource rents" – requires that a nation invest all rent earned from exhaustible resources currently extracted, where "rent" is defined along paths that maximize returns to owners of the resource stock. The rule extends to the case of many types of capital goods, including a vector of stocks of natural capital.

9.3 Water Resource

Water resources are usually renewable resources which naturally recharge. Overexploitation occurs if a water resource is extracted at a rate that exceeds the recharge rate, that is, at a rate that exceeds the practical sustained yield.

9.4 Forest Resources

Forest is overexploited when they are logged at a rate faster than reforestation takes place. Reforestation competes with other land uses such as food production, livestock grazing, and living space for further economic growth.

10. Causes of Resource Depletion

a) Over-consumption/excessive or unnecessary use of resources

b) Non-equitable distribution of resources

c) Overpopulation

d) Slash and burn agricultural practices, currently occurring in many developing countries

e) Technological and industrial development

f) Erosion

g) Irrigation

h) Mining for oil and minerals

i) Aquifer depletion

j) Forestry

k) Pollution or contamination of resources

Natural resources are also categorized based on the stage of development

Potential Resources are known to exist and may be used in the future. For example, petroleum may exist in many parts of India and Kuwait that have sedimentary rocks, but until the time it is actually drilled out and put into use, it remains a potential resource.

Actual resources are those that have been surveyed, their quantity and quality determined, and are being used in present times. For example, petroleum and natural gas is actively being obtained from the Mumbai High Fields. That part of the actual resource that can be developed profitably with available technology is called a reserve resource, while that part that cannot be developed profitably because of lack of technology is called a stock resource.

Economic Approaches to Resource Management In economics approaches to resource management, the common denominator is typically some form of measurement that can be related to individual welfare. Economics provides a comprehensive framework for analyzing most aspects of natural resource and environmental issues. Optimal extraction and use of nonrenewable resources, in particular as analyzed by the Hoteling's rule. Economic indicators of sustainability derived from the weak sustainability view that the total amount of capital must be maintained. The basic Hoteling Rule is based on a number of simplifying assumptions. The total stock of resources is assumed to be known and of equal quality, and all the market players are assumed to have full knowledge. The concept of management of non-renewable resources is mainly concerned with how a resource stock should be used optimally and not concerned with sustainability.

Renewable resource is a natural resource which can replenish with the passage of time, either through biological reproduction or other naturally recurring processes. Renewable resources are a part of Earth's natural environment and the largest components of its ecosphere. A positive life cycle assessment is a key indicator of a resource's sustainability. Renewable resources may be the source of power for renewable energy. Sustainable harvesting of renewable resources (i.e., maintaining a positive renewal rate) can reduce air pollution, soil contamination, habitat destruction and land degradation.

10.1 Sustainability

The word sustainability is derived from the Latin sustainer (tenure, to hold; sues, up). The most widely quoted definition of sustainability and sustainable development, that of the Brundtland Commission of the United Nations on March 20, 1987: "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Environmental, social and economic demands - the "three pillars" of sustainability. The word sustainability is applied not only to human

sustainability on earth, but too many situations and contexts over many scales of space and time, from small local ones to the global balance of production and consumption. Sustainability is the capacity to endure.

10.2 Consumption

The total environmental impact of a community or of humankind as a whole depends both on population and impact per person, which in turn depends in complex ways on what resources are being used, whether or not those resources are renewable and the scale of the human activity relative to the carrying capacity of the ecosystems involved. To express human impact mathematically called as I PAT formula. This formulation attempts to explain human consumption in terms of three components: population numbers, levels of consumption and impact per unit of resource use, which is termed technology used.

11. Conclusion

Thus we can discuss about the aspects of natural resources and economics. How the natural resources effects the economy it is important to know. WE must know about many kinds of natural resources and their sources. This document holds many important issues of economy.

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