Questions & Answers

Part 1: True or false

No.	Question	Ans.
1	When economics makes statements about the decisions and behavior of consumers and firms, it is neither specifically referring to particular consumer nor particular firm. Instead, it is referring to the decisions and the behavior of “dummies” (generic entities), which are thought to be useful serving as representatives of consumers and firms, respectively.	T
2	Economics is a soft science that aims at solving the problem of scarce resources.	T
3	Economic problem is represented in the existence of various and renewable needs and limited goods. Thus, the needs of human beings are perceived as principally unbounded.	T
4	Needs at lower levels are stronger than needs at higher levels, while both remain unfulfilled.	T
5	Needs at higher levels are unimportant, even non-existent, as long as needs at lower levels are unsatisfied.	T
6	Once the needs at lower levels are satisfied, other needs at higher levels come into focus.	T
7	Many goods have the ability to satisfy human needs directly, and such goods are called consumer goods.	T
8	The more consumer goods are consumed, the more satisfaction is obtained. This is true till a certain level, then additional units of a certain good may implies a decline in the degree of satisfaction.	T
9	A public good is a good that is non-excludable, and consumption of it is non-rival.	T
10	"Non-excludable" means that it is impractical to prevent people who haven't paid for it from using or enjoying the good.	T

11	"non-rival" means one person's use or enjoyment of the good does not use it up or preclude another's use or enjoyment of it.	T
12	Wildlife stock and fish stock are considered examples of open-access Resources.	T
13	Club goods are usually facing the problem of congestion or overuse.	T
14	Coal is considered one example of open-access Resources.	T
15	Parking spaces are considered examples of private goods.	T
16	Public parks and free-to air television are considered examples of collective goods.	T
17	Cable television and private parks are considered one example of club goods.	T
18	Inputs, i.e. natural resources used in the production process, often do not have the ability to satisfy needs directly.	T
19	Capital goods are types of goods that are utilized to help increase future production, such as coal, aluminum, and gold.	T
20	The distinction between consumer goods and investment goods does not always depend on the characteristics of a certain good but often on its mode of use.	T
21	Although it is impossible to remove scarcity completely, it is possible to minimize the negative consequences of scarcity.	T
22	The minimum principle requires that a goal be achieved to a given level using the minimum amount of resources.	T
23	The maximum principle recommends that the goal at hand be achieved at the maximum level possible given the means available.	T
24	The standard circular flow shows land merely as a supplier of raw materials for human economic activity.	T
25	The economic system created and operated by mankind must be viewed as subordinate to nature and a subsystem of nature.	T

	As, without certain services of nature, human economic activity could not take place at all.	
26	There are many natural commodities that directly satisfy humans' needs at the basic level. However, it is much harder to find any example of natural resources which directly contribute to the satisfaction of needs at the top levels Maslow's framework such as human belongingness and love needs, or esteem needs.	T
27	By substantially reducing greenhouse gas emissions, global climate stabilization could be achieved.	T
28	Many greenhouse gases are emitted from direct human-induced impacts on forestry and other land use, such as through deforestation, land clearing for agriculture, and degradation of soils.	T
29	It is possible to remove carbon dioxide (Co2) from the atmosphere through reforestation and improvement of soils.	T
30	Severe environmental problems may arise where natural goods can be characterized as collective goods (non-excludability, non-rivalry) such as the purity of the atmosphere; or as open access goods (non-excludability, rivalry) such as sea fish.	T
31	Climate stabilization is considered non-rival and non-excludable. As, no person in the world could be excluded from the corresponding benefits. In addition, there is non-rivalry, because climate stabilization would be enjoyed by people in all over the world.	T
32	Resources that have known reserves, i.e, of which we know the quantity and quality available, are the actual resources.	T
33	Potential resources are known to exist and may be used in the future, but it is not actually drilled out or put into use.	T
34	Stock resources are that part of actual resources that cannot be developed profitably because of lack of technology.	T
35	Reserve resources are that part of the actual resource that can be developed profitably with available technology.	T

36	An externality exists where a consumption or production activity has unintended effects on others for which no compensation is paid.	T
37	Sulphur emissions from a coal-burning power station might be an example of the external effect that is an untraded – and unpriced –arising because the victim has no property rights that can be exploited to obtain compensation for the external effect.	T
38	Renewable resources are biotic, plant and animal populations, and have the capacity to grow in size over time, through biological reproduction.	T
39	Non-renewable resources are abiotic, stocks of minerals, and do not have that capacity to grow over time.	T
40	Renewable resources are exhaustible if harvested for too long at a rate exceeding their regeneration capacities.	T
41	If the depletion of a resource stock is irreversible, and there is no close substitute for the services that it provides, then clearly the rate at which the resource is depleted has major negative impact on sustainability.	T
42	If what is available from natural resources in the market is increased, the price that producers are willing to pay falls.	T
43	The demand curve for natural resources is negatively sloped. As, it reflects the inverse relationship between the price of natural resources (coal) and the quantity demanded.	T
44	As more and more of a given resource (coal, petroleum, natural gas, nuclear, solar, geothermal, etc.) is used, according to the law of diminishing marginal product, the marginal contribution of the resource in terms of output declines.	T
45	Other things being equal, producers will be willing to buy more of a natural resource (such as coal) if, and only if, its price is lowered to compensate for the decline in the productivity of the resource at the margin.	T

46	Unlike the market demand for a product, it is productivity, not utility, that determines the demand (value) for a factor of production.	T
47	The demand for any natural resources is determined by the consumer demand for the goods and services that are produced using the resources under consideration.	T
48	The price of the final good is considered one of the most important factors in determining the demand for (or value of) natural resources.	T
49	The higher the price of electricity, the higher the demand (price) for coal will be.	T
50	A decrease in the price of other natural resources that is a substitute for coal cause a reduction in the demand for, and hence the price of, coal.	T
51	If a new technology enhanced the relative productivity of natural gas (i.e., relative to coal) in the production of electricity, other things being equal, this could cause a decline in the demand for, and price of, coal.	T
52	If a new chemical additive to coal were to contribute significantly to the efficient combustion of coal in the production process of electricity, other things being equal, this would cause increase in the demand for, and hence the price of, coal.	T
53	The price that resource owners ultimately receive depends on both the demand for and the supply of the resource under consideration.	T
54	The minimum price that owners of natural resources are willing to accept increases with an increase in quantity of natural resources supplied to the market.	T

Part 2: Define the Following Items

1. **Natural Resource Economics**

It deals with the supply, demand, management, 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. Natural resource economists study interactions between economic and natural systems, with the goal of developing a sustainable and efficient economy; and managing natural resources.

2. **Natural resource management**

It 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 brings together land use planning, water management, biodiversity conservation and the future sustainability of industries like agriculture, mining, fishing, etc.

3. **Environmental economics**

It is the subset of economics that is concerned with the efficient allocation of environmental resources. The environment provides both a direct value as well as raw material intended for economic activity, thus making the environment and the economy interdependent. For that reason, the way in which the economy is managed has an impact on the environment which, in turn, affects both welfare and the performance of the economy.

4. **Needs**

A need is a feeling of suffering or dissatisfaction, e.g., Hunger, fear, loneliness, rejection and boredom.

5. **Goods (commodities)**

A good is commodity, or a physical, tangible item that satisfies some human need, or something that people find useful or desirable and make an effort to acquire it.

6. **Services**

A service is an intangible item that satisfies some human need. It is considered as actions undertaken by other people which satisfy our own needs, such as: banking, education, insurance, and transportation.

7. **Overfishing problem**

Overfishing can be defined as catching too much fish for the system to support leads to an overall degradation to the system. Overfishing is a non-sustainable use of the oceans.

8. **Excludability of use**

It is a feature of a good that means the possibility of preventing potential users of a good from actually using it, after the good has already been provided.

9. **Non-excludability of use**

It is a feature of a good that means it is not possible to prevent any person from using the good once it has been provided.

10. **Rivalry in use**

It is a feature of a good that means if a person A uses the good, it makes that difficult or even impossible for a Person B to use the good simultaneously.

11. **Non-rivalry in use**

It is a feature of a good that means the use of a certain good by one person does not prevent the same good simultaneously being used by many other people.

12. **Private goods**

An item of consumption that if used by one party, may not be available for others. They are characterized by both excludability and rivalry, e.g., Pizza, food, and clothing.

13. **Collective goods (public goods)**

An item of consumption that may be consumed without reducing the amount available for others, and cannot be withheld from those who do not pay for it.

This type of goods requires natural monopoly. They are characterized by non-excludability and non-rivalry, e.g., public parks, the air, oceans, and military protection.

14.Club goods

An item of consumption that can be classified as a subtype of public good. In most cases, this type of goods requires natural monopoly. They are characterized by excludability and non-rivalry, e.g., swimming pool and cable television.

15.An open access goods (Common-pool resources)

An item of consumption that are owned by everybody. They are sometimes referred to as "common property" resources. Users recognize that the next person will take whatever they leave, so there is no conservation incentive. Each user immediately takes as much as he or she wants, and the resource can be quickly depleted. They are characterized by non-excludability and rivalry, e.g., free buffet and marine fisheries.

16.Scarcity

The tension between the bounded availability of goods and the boundlessness of human needs. This implies that the provision of goods is restricted and it is impossible to satisfy all the needs of all the people simultaneously. The problem of scarcity exists at every level of cultural development.

17.Resource Efficiency

It means using the Earth's limited resources in a sustainable manner while minimizing impacts on the environment. It allows us to create more with less and to deliver greater value with less input. Thus, it implies the absence of any wasting of goods or resources.

18.The circular flow

It is a simplified representation of the interaction between economic agents. It portrays the structure of real and monetary transactions between the various sectors of an economy.

19.Sustainable development

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

20.Greenhouse gases

Greenhouse gases are gases that trap heat in the atmosphere such as carbon dioxide, methane, and fluorinated gases. Each of these gases can remain in the atmosphere for different amounts of time. Larger emissions of greenhouse gases lead to higher concentrations in the atmosphere. Some of these gases are more effective than others at making the planet warmer.

21.Biotic resources

They are derived from animals and plants (i.e., the living and organic resources). Biotic are considered a living component of a community obtained from the biosphere; for example, organisms, such as plants and animals.

22.Abiotic resources

They are derived from the non-living materials e.g. land, water, air, mineral and power resources.

23.Biofuels

Biofuels are produced from living organisms or from metabolic by-products (organic or food waste products). Unlike other renewable energy sources, biomass can be converted directly into liquid fuels - biofuels - for our transportation needs (cars, trucks, buses, airplanes, and trains). The two most common types of biofuels are ethanol and biodiesel.

24.The market demand for natural resources

It shows the maximum prices producers are willing to pay for various levels of the resource available in the market at a point in time.

25.The market supply for natural resources

It shows all possible minimum prices owners of natural resources are willing to accept for various amounts of natural resources offered in the market at a specified point in time.

Part 3: Answer the following questions

1. **Differentiate between the market demand for a product and the market demand for natural resources.**

Regarding the market demand for a product, utility is the main factor that determines the demand (value) for a product. Regarding the market demand for natural resources it is productivity that determines the demand (value) for a factor of production. Another significant difference between the demand for a product and the demand for a factor of production is the fact that the demand for a factor of production is viewed as a derived demand. That is, the demand for any factor of production is determined by the consumer demand for the goods and services that are produced using the resources under consideration.

2. **what are the main objectives of environmental economics?**

Environmental economics aims at analyzing the following issues:• how economics proceeds to analyze resources related problems and how it attempts to solve them.

• what is the behavior of consumers and firms and other economic agents in dealing with environmental problems?

• Understanding the concept of the common good of society

• Examining main economic tools to solve environment related problems.

3. **How could policy maker manage the behavior of economic agents?**

An obvious difficulty in making reasonable statements about consumers is that there is no single consumer but rather (innumerable) numerous consumers who are different: in terms of: tastes, financial resources, cultural background, education, profession, gender and others.

An obvious difficulty in making reasonable statements about firms is that there is no single firm but rather (innumerable) numerous firms which are different: in terms of: location, size, type of technology, and type of industry.

So when economics makes statements about the decisions and behavior of consumers and firms, it is neither specifically referring to particular consumer nor particular firm. Instead, it is referring to the decisions and the behavior of

"dummies" (generic entities), which are thought to be useful serving as representatives of consumers and firms, respectively.

4. **What is the role of economic theory?**

The role of economic theory is to depict the behavior of economic agents, e.g., consumers, firms, and governments, environmental advocacy groups, in a simplified model. In such model, the interaction and the conflict among these economic agents are represented.

5. **What are the main classification of human needs?**

Abraham Maslow classified human needs as following:

- At the bottom of the hierarchy, basic needs or physiological are located: hunger, thirst, tiredness or pain.
- At the next level above the basic needs, safety needs are located: fear and anxiety.
- At the third level, belongingness and love needs are located.
- At the fourth level, Esteem needs are located.
- at the top level, self-actualization needs are located.

6. **Why is classification of goods based on criteria of excludability of use and rivalry in use considered important for environmental economists?**

This is because certain environmental problems arise concerning the provision of goods which do not exhibit the characteristics of excludability and/or rivalry. Such problems are crucial in the case of some natural goods, and cause, for example, phenomena like global warming and overfishing.

7. **what are the main goals of resource management?**

There are three main goals of resource management that are related to circular flow:

a. How could economic efficiency be achieved?
b. How could social equity be achieved?
c. How could ecological sustainability be achieved?

8. **why does natural gas serve as an example for private goods?**

Natural gas may serve as an example for private goods, which are characterized by excludability and rivalry. If the price is not paid, the pipeline can be locked. Furthermore, if a given amount of natural gas is used in the oven of family A, family B can't use this amount to produce heating, so we have rivalry.

9. **What are the required conditions a market system must satisfy in order to be considered as an efficient institution for allocating resources?**

The market has to satisfy the following conditions:

a. Freedom of choice based on self-interest and rational behavior
b. Perfect information
c. Competition
d. Mobility of resources
e. Ownership rights

10. **Why are prices considered as a measure of resource scarcity?**

For consumers, price measures marginal private benefit (MPB). For producers, prices measure marginal private cost (MPC). The equilibrium price equates marginal private (consumers') benefit with that of marginal private (producers') costs, that is P_e=MPB=MPC. In this context, a market price tends to reflect the true scarcity value of a resource under consideration. In pricing theory, the scarcity principle suggests that the price for a scarce good should rise until an equilibrium is reached between supply and demand, i.e. the higher the price is, the more scarcity of a good is.

11. **Why are prices considered as a signal of the trend of a good or service cost over time?**

Prices measure changes in aggregate costs over time. That is, prices show the change in the aggregate costs of all the factors that are used in producing a specific good (labor, capital, natural resources, etc.). Thus, the possibility exists for the price of natural resources to be increasing while the price of a good or service is declining. Note that this observation does not take account of technological factors. For example, it is quite possible for coal to become

scarcer (hence more expensive) and prices of electricity to decline over time if power plants continue to improve on the efficiency of coal burning.

12. What are main reasons of upward trend of international food prices?

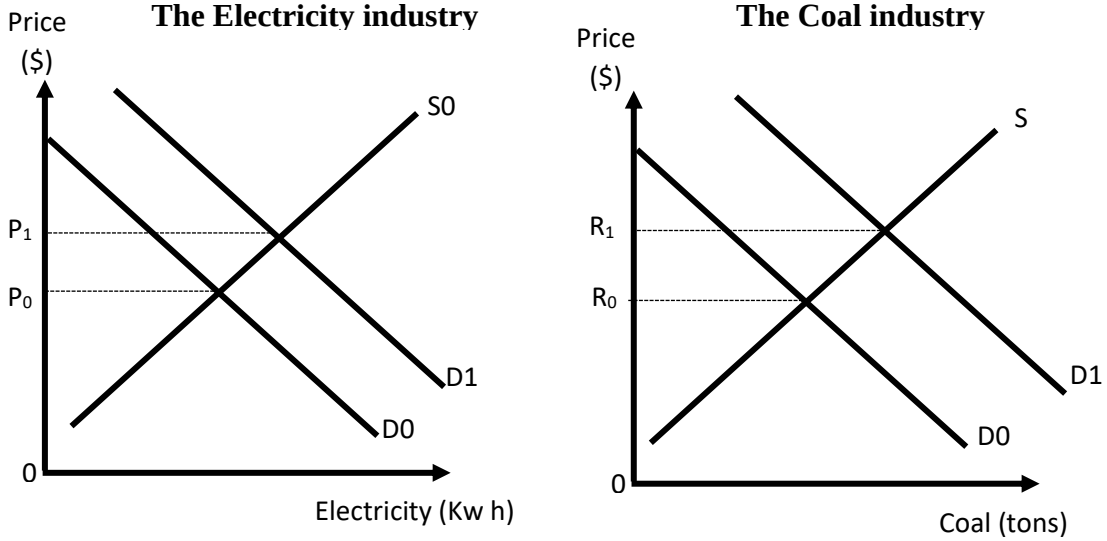
Increased bio-fuel production has contributed to the rise in food prices. Concerns over oil prices, energy security and climate change have prompted governments to take a more proactive stance towards encouraging production and use of bio-fuels. This has led to increased demand for bio-fuel raw materials, such as wheat, soy, maize and palm oil, and increased competition for cropland. Almost all of the increase in global maize production from 2004 to 2007 (the period when grain prices rose sharply) went for bio-fuels production in the U.S., while existing stocks were depleted by an increase in global consumption for other uses.

13. How could increasing production of biofuels threaten biodiversity?

Global production of liquid biofuels has grown exponentially in recent years, and 2007 production was three-fold greater than that in 2000. Biodiversity is greatly threatened by the expansion of biofuel production because land suitable for food and biofuel production is a finite resource. Moreover, the processing of biofuels can also consume substantial quantities of water. Therefore, expansion of biofuels in the world with a growing demand for food necessarily leads to increased deforestation and conversion of grasslands and savannas to biofuel crops.

14. Using illustrative figures, prove that "price of the final good is one of the most important factors in determining the demand for (or value of) natural resources.

In this situation, the new equilibrium price for electricity will be P_1. If other things are equal, this increase in the price of electricity will cause a shift in the demand for coal from D_0 to D_1. Thus, the increase in price of electricity ultimately resulted in an increase in the price of coal from r_0 to r_1. This can be shown in the following figure:



15. How do prices of other natural resources affect the demand for specific natural resource?

The effect of a change in the prices of other natural resources is manifested by a shift in the demand curve. For example, if capital and coal are considered as substitutes (this would be the case if, say, the use of more capital reduced the energy required to produce a unit of electricity), then a decrease in the price of capital will cause a downward shift in the demand curve for coal. Other things being equal, this will result in a decline in the price for coal. Therefore, decreases in the price of other natural resources that is a substitute for coal cause a reduction in the demand for, and hence the price of, coal.

16. How could a technological change directly affect the demand for specific natural resource?

The effect of a change in the technology is manifested by a shift in the demand curve. A technological change could directly affect the demand for a coal, for example, as following: A technological change could enhance the productivity of coal in the production of electricity (i.e., less coal would be needed to produce a unit of electricity). This would be the case if, for example, a new chemical additive to coal were to contribute significantly to the efficient combustion (or oxidation) of coal in the production process of electricity. Other things being equal, the effect of this would be to increase the demand for, and hence the price of, coal.

17. How could a technological change indirectly affect the demand for specific natural resource?

The effect of a change in the technology is manifested by a shift in the demand curve. A technological change could indirectly affect the demand for coal, for example, by enhancing the productivity of substitutes (e.g., natural gas). If a new technology enhanced the relative productivity of natural gas (i.e., relative to coal) in the production of electricity, other things being equal this could cause a decline in the demand for, and price of, coal. Thus, in this case the demand for coal is affected by a technological advance in the use of natural gas, which is a substitute for coal.

18. How could you justify the positive relationship between the minimum price that owners of natural resources are willing to accept and the quantity supplied to the market?

In pricing coal, for example, owners of coal mines need to cover the costs of extraction and transportation. For this reason, the minimum price owners of coal mines would require for selling a unit of coal should correspond to the cost of extracting and transporting that unit of coal.

19. What could explain the positively sloped supply curve for coal assuming that that transportation cost is negligible?

If we assume that transportation cost is negligible, a positively sloped supply curve for coal therefore implies that the extraction cost for coal is increasing. One possible explanation for an increasing extraction cost of coal or any other extractive resource is that such resources are not uniformly distributed, spatially and/or in terms of quality or grade of ore. The conventional explanation is that in a given mine, the high-grade coal is found first. Gradually, the grade tends to decline as extraction continues. Since the lower-grade coal requires further processing, other things being equal this will cause the cost of extraction to increase. Thus, the rise in extraction cost has more to do with the limits imposed by nature than anything else.

20. What are the key factors affecting the supply of a natural resource according to the neoclassical economic school?

In accordance with the neoclassical economic school, the factors affecting the supply of a natural resource can be divided into two broad categories—one pertaining to nature, and the other pertaining to technology.

Nature plays a role in determining the availability of natural resources. As, nature puts an upper limit on the reproductive (regenerative) capacity of a particular resource. Furthermore, the supply of certain resources is finite, given that the regenerative capacity of some natural resources (such as coal) is limited. Thus, by imposing upper limits to the supply of a particular natural resource, the possibility of eventually exhausting a particular natural resource is real.

21. What is the key factor affecting the supply of a natural resource according to opponents of neoclassical economic school?

As opposing view to neoclassical economic school, number of economists believe that nature has only a minor role to play in determining the supply of natural resources. According to that view, the key factor that determines the supply of natural resources is technology.

22. How could technology affect the supply of natural resources according to opponents of neoclassical economic school?

Technology affects the supply of natural resources in a variety of ways. First, the supply of a natural resource could be enhanced through a technological improvement in the methods of resource extraction. An example of this would be the possibility of extracting a higher proportion of the useful minerals from a given rock containing some known concentration of ore. Second, the supply of a natural resource could be augmented by means of conservation through technological improvements. For example, the supply of coal could be effectively increased by means of energy-saving technology. Third, the supply of a natural resource will be affected whenever, by means of technological innovation, it is possible to find a substitute resource. For example, the supply of energy would be enhanced by a technology that significantly improved the economic feasibility of solar energy for direct use in both the residential and the industrial sectors.

23. How could environment be affected by practices of the following:

a. A farmer in Egypt;

b. A business in manufacturing sector in Egypt;

c. A household in Egypt.

Open Answer

Part 4: Explain the Following Statements

1. **See fishing is characterized by non-excludability of use and rivalry in use. As a result, number of environmental problems may arise as a result of overfishing.**

Overfishing can be defined as catching too much fish for the system to support leads to an overall degradation to the system. Overfishing is a non-sustainable use of the oceans.

According to FAO, 25% of all the world's fish stocks are either overexploited or depleted. Another 52% is fully exploited, these are in imminent danger of overexploitation, i.e., maximum sustainable production level and collapse. Thus, a total of almost 80% of the world's fisheries are fully- to over-exploited, depleted, or in a state of collapse. Worldwide about 90% of the stocks of large predatory fish stocks are already gone. Thus, overfishing results in two serious problems:

• Losing species as well as entire ecosystems. As a result, the overall ecological unity of our oceans is under stress and at risk of collapse.

• Risk of losing a valuable food source that may cause further social, economic or dietary problems.

2. **Goods can be classified based on different criteria**

One classification is based on the ability of a good to satisfy human needs directly or indirectly. In this case, goods can be classified as consumer goods if they have the ability to satisfy human needs directly; or investment (capital) goods if they have the ability to satisfy human needs indirectly.

Another classification of goods is based upon the two criteria of excludability of use and rivalry in use. Types of goods based on that criteria are:

- Private goods: they are characterized by both excludability and rivalry, e.g., Pizza.
- Collective goods: they are characterized by non-excludability and non-rivalry, e.g., military protection.
- Club goods: they are characterized by excludability and non-rivalry, e.g., swimming pool.

- An open access goods: they are characterized by non-excludability and rivalry, e.g., buffet.

3. **"Oil is considered an investment good that can be used as input in the production. Although, it can satisfy human needs indirectly. it causes a lot of environmental damage"**

Most countries depend on oil as input in the production process. Most of oil products such as crude oil, gasoline, kerosene, and diesel fuel are used as sources of power sources. As a result, most countries depend on the production or the trade of oil to fuel their economies. This can cause severe damage to the environment. Using of oil can disrupt humans, and the animal and fish life in any country. Its chemical components have toxic effects on the surrounding wildlife and habitat. It threatens the extinction of several plants, and has already harmed many land, air, and sea animal and plant species.

4. **People tends to apply the so-called economic principle in order to influence the relation between the amount of goods used, on the one hand, and the degree of satisfaction of needs, on the other.**

In general terms, the economic principle recommends that the goal at hand be achieved at the maximum level possible given the means available. This is known as the maximum principle. The economic principle can be formulated from another perspective as well. The minimum principle requires that a goal be achieved to a given level using the minimum amount of resources. A situation in which the economic principle is fulfilled is called an “efficient” situation. Efficiency implies the absence of any wasting of goods. Each economic agent attempts to maximize the degrees of satisfaction of needs by rationally adopting the minimum principle or the maximum principle in order to face the problem of scarcity.

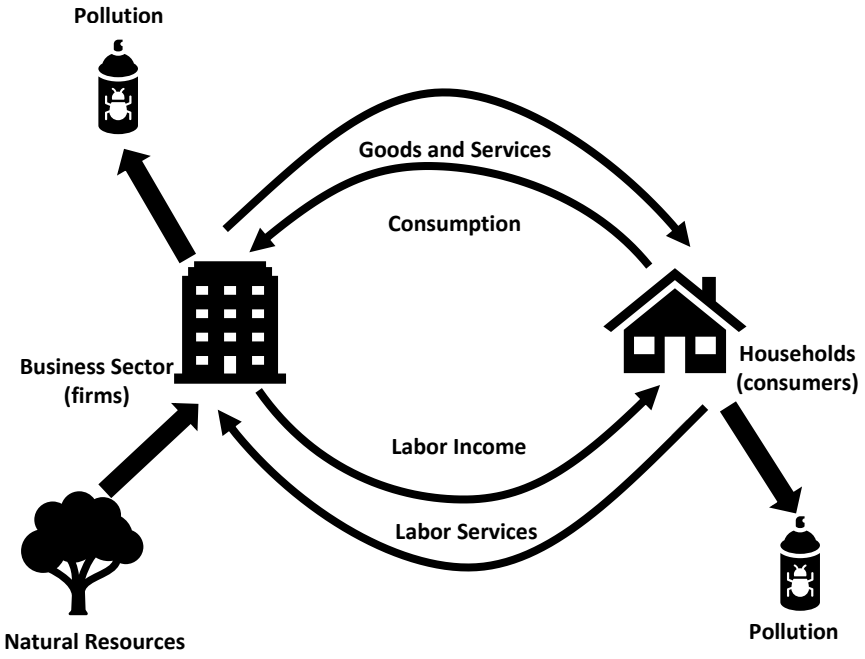
5. **The standard circular flow model shows the real-financial interactions between two types of economic agents, i.e. consumers and firms. However, it is essential to integrate environment in such model.**

Land is considered one of the factors of production used in the production process. the classical economic concept of "land" is used by economists to represent all natural resources used in economic production, including soils, water, forests, species, minerals, fossil fuels, and other such resources. Only

recently, with the increasing urgency of environmental and resource problems at local, national, and global levels, economists once again focused on the issues of natural resource constraints and the issue of what has come to be called natural capital. Natural capital includes all natural resources as well as the environment. The standard circular flow model does not deal adequately with natural capital or activities influencing environment. Although households and firms may own or use natural capital, (e.g. energy, minerals, soils, water, forests, species), they do not "create" it. Therefore, there is a need to introduce natural capital as a major actor in the circular flow.

6. **Draw a chart that explains the circular flow that shows the role of environment as a vital economic actor.**

The Circular Flow and the Three Goals of Resource Management



7. **Growing awareness of environmental issues and their relationship to the economy has led to the emergence of three main policy goals in natural resource management**

The three main policy goals are: efficiency, equity and sustainability. The previous three goals are important elements in any sustainable development. Efficiency means using the Earth's limited resources in a sustainable manner

while minimizing impacts on the environment. It allows us to create more with less and to deliver greater value with less input. Thus, It implies the absence of any wasting of goods or resources. Equity means the situation in an economy in which the apportionment of resources or goods among the people is considered fair. Sustainability means meeting the needs of the present without compromising the ability of future generations to meet their own needs. This requires balancing the demand for natural resources with the protection of ecosystems that also contribute goods and services necessary for economic growth.

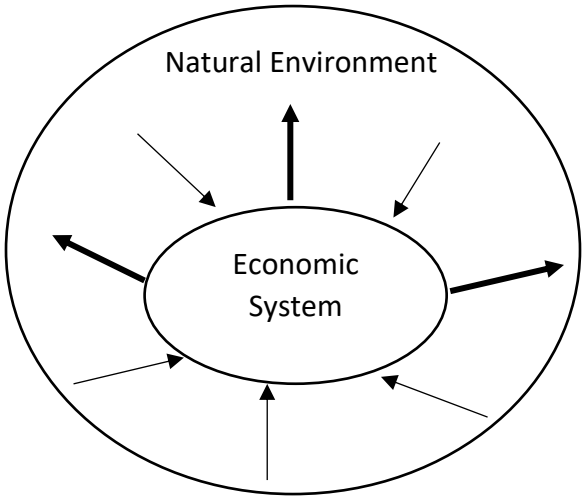
8. **Environmental problems are multidisciplinary in nature. Development policies cannot be implemented without considering harmful effects of economic activities. This suggests the existence of a strong link between sustainable development strategy and major environmental problems.**

Sustainable development can be defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This requires balancing the demand for natural resources with the protection of ecosystems that also contribute goods and services necessary for economic growth. Certainly, not only does the environmental pollution strongly affect the current generation, but the environmental degradation affects future generations as well. Distortion occurs when those who cause pollution do not bear its costs but instead impose them on society. Therefore, it is important to take into account the environmental impact of any economic activity.

9. **graphically explain the relationship between the natural environment and economic system.**

The arrows in the following figure represent the diverse interdependencies between the natural and economic systems. The arrows going into the economic system may represent the extraction of productive factors from their stocks, which are part of the natural environment (wood, minerals). The arrows coming out of the economic system may stand for waste emissions or for changes in landscape caused by productive activities.

The Natural Environment and Economic System



10. "Two problems may arise from the productive use of natural resources."

First, the stocks of the natural resources used as productive factors become depleted and may decline over time. This may severely restrict human economic activity. Second, the stocks of other natural resources not involved in production at all are used up as well; for example: greenhouse gas emissions into the atmosphere caused by burning fossil fuels.

11. "Natural resources can be classified based on their ability to make a direct or indirect contribution to the satisfaction of human needs"

In this case, they are classified as consumer goods or investment goods. Numerous natural resources make a direct contribution to the satisfaction of human needs and, therefore, can be interpreted as consumer goods, such as gold and diamond. Their contribution to the satisfaction of human needs can be considered within Maslow's framework of various levels of needs. There are many natural commodities that directly satisfy humans' needs at the basic level. However, it is much harder to find any example of natural resources which directly contribute to the satisfaction of needs at the top levels Maslow's framework such as human belongingness and love needs, or esteem needs. Other natural resources contribute indirectly to the satisfaction of human needs enabling the production of consumer goods. They are used as factors of production and constitute investment goods. Fossil fuels, wood, metals and water are productive factors in the production of energy, furniture, in the metalworking industry and in agriculture.

12. **"Natural resources can be classified based on the criteria of excludability of use or rivalry in use."**

In this case, many natural resources can be classified as private goods, which are characterized by excludability and rivalry. Natural gas may serve as an example. Other natural resources can be classified as natural club goods, which are characterized by excludability and non-rivalry. A beach accessible only via a certain hotel may serve as an example. Also, natural goods can be classified as collective goods (non-excludability, non-rivalry) such as the purity of the atmosphere; or as open access goods (non-excludability, rivalry) such as sea fish.

13. **"Natural resources can be classified into renewable and non-renewable resources."**

Renewable resources are generally living resources (fish, coffee, and forests, for example), which can restock (renew). Non- renewable natural resources are non-living renewable natural resources include soil, as well as water, wind, tides and solar radiation, etc.

14. **"Natural resources can also be classified on the basis of their origin."**

In this case, many natural resources can be classified as biotic and abiotic resources. Biotic resources are derived from animals and plants (i.e., the living and organic resources). Biotic is a living component of a community obtained from the biosphere, i.e. organisms such as plants and animals. Examples of these natural resources: the foods, sugars, tea, coffee, medicines are obtained from the plants; and fossil fuels such as coal and petroleum. Abiotic resources are derived from the non-living materials e.g. land, water, air, mineral and power resources.

15. **"Natural resources are also classified based on their availability for commercial use as potential resources and actual resources."**

Potential Resources are known to exist and may be used in the future. For example, petroleum may exist in many parts of Saudi Arabia 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 is actively being obtained from the Ghawar Oil

Field. 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.

16. **"For billions around the world—especially the world's poorest—healthy oceans mean jobs, food and protection"**

FAO estimates that fisheries and aquaculture assure the livelihoods of 10-12 percent of the world's population with more than 90 percent of those employed by capture fisheries working in small-scale operations in developing countries. Oceans are equally important for food security and jobs. Fisheries secure access to nutrition for billions of people and accounting for 16 percent of total global animal protein.

17. **"Healthy oceans, coasts and freshwater ecosystems are crucial for economic growth and food production."**

FAO estimates that fisheries and aquaculture assure the livelihoods of 10-12 percent of the world's population with more than 90 percent of those employed by capture fisheries working in small-scale operations in developing countries. Fisheries secure access to nutrition for billions of people and accounting for 16 percent of total global animal protein. Coastal areas within 100 km of the ocean account for an estimated 61 percent of the world's total Gross National Product (GNP). In addition, these areas participated significantly in the international trade.

18. **"A healthy ocean is also fundamental to the global effort to mitigate climate change."**

Ocean resources have a vast potential to unlock growth and wealth but human activity has taken a toll on ocean health. Warming oceans and atmospheric carbon resulting from human activities are causing ocean acidification that threatens the balance and productivity of the ocean. It is necessary to promote "Blue carbon" sinks such as mangroves and other vegetated ocean habitats that sequester 25 percent of the extra CO2 from fossil fuels and protect coastal communities from floods and storms.

19. **“Although fish stocks have deteriorated due to overfishing it is possible to restore the productivity of the ocean in developing countries”**

The FAO estimates that approximately 57 percent of fish stocks are fully exploited and another 30 percent are over-exploited or depleted. Fish stocks are further exploited by illegal, unreported and unregulated fishing, responsible for roughly 11 to 26 million tons of fish catches or US$10-22 billion in unlawful or undocumented revenue. In fact, poor fisheries management squanders roughly US$80 billion annually in lost economic potential. Fish habitats are also under pressure from pollution and destructive fishing practices that undermine fish population rehabilitation efforts. Proper management of fisheries, investment in sustainable aquaculture and protection of key habitats can restore the productivity of the ocean and return benefits to billions of people in developing countries.

20. **"Consumers and producers in a market-oriented economy are viewed as being single-minded in their economic behavior."**

Consumers and producers are pursuing their own self-interest in a market-oriented economy. For consumers, this means maximizing the level of satisfaction (utility) they attain from the consumption of final goods and services. From the producers’ viewpoint, self-interest implies ensuring that they earn the “highest” possible profit (utility) from the services they render to society. Producers’ profit is affected by the degree of competition that exists in the market.

21. **"The effectiveness of an economy is judged by how well it satisfies the material needs of its consumers".**

Given that resources are scarce, an effective economy is one which is capable of producing the maximum output from a given set of basic resources (labor, capital and natural resources). This is possible if, and only if, resources are fully employed and no misallocation of resources exists. In other words, if the economy is operating on its production possibility frontier, that automatically ensures efficiency.

22. Evaluate the potential environmental impacts of coal-fired power plant.

Coal plants are considered the nation's top source of carbon dioxide (CO2) emissions, the primary cause of global warming. Burning coal is a major concern for public health. As, burning coal is a leading cause of smog, acid rain, and toxic air pollution. Some emissions can be significantly reduced with readily available pollution controls; however, many countries abstained from adopting such controls because of their high costs.