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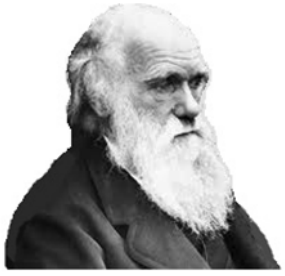

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Natural Resources, Classification of Natural Potential, Sustainable Development

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ABSTRACT

Natural resources are limited, whether as a non-renewable or renewable. Planet Earth has a natural capacity and it is given for the human community. The current pace of development of the world economy and the accelerated population growth are threatened and may soon lead to exhaustion of non-renewable energy resources and exceed the speed of regeneration of renewable resources (water, energy, food), thus leading into questioning the survival of human communities and future generations. Only through the application of the principles of sustainable development (sustainable use of resources) and implementation of logic survival one can assure safe and steady growth to be followed by present and future needs of human being.

Keywords**:** Natural resources, classification, natural potential, sustainable development

1. INTRODUCTION

Developing countries are usually deficient in physical and human capital, two important factors of production. Some of these countries have a relatively large stock of natural resources that can potentially play a crucial role in the initial stage of growth and development. However, these countries often face a difficult choice of using natural resources (or revenues from them) for current consumption or for building physical and human capital. Of course, the first choice may make the country prosperous in the short-run but will not place it on a path of sustainable growth and development. This is particularly true if the resources are non-renewable [1].

In contrast, if a country chooses to transform its natural resources into physical and human capital, it will set the country on a course of sustainable growth and development. Sometimes a country is so poor that it is forced to use its natural resources for current consumption and thus gets trapped in an abject poverty in the long - run. Thus, formulating and implementing an appropriate policy on how to harness natural resources for sustainable development could be a formidable task [2]. Mbaiwa and Darkoh [3] citing research of Wood [4] note that a holistic view of the circumstances in which people live and use natural resources is needed. These circumstances are affected by a range of socio - economic and political considerations which affect the supply of, and demand for, natural resources, and also the alternative ways in which human needs can be met. So Mbaiwa and Darkoh [3], according to Opschoor [5], propose two ways that can be adopted as a solution in situations of conflicts over natural resources and environmental insecurity. These are "technological developments that try to raise productivity levels and/or otherwise push environmental space outward" and "economic diversification". So that response to economic diversification very often is "not possible due to the marginal aspect of economic development of the communities concerned".

2. MATERIALS AND METHODS

The presented material was mainly based on the study of many international specialty papers (see references at the end of the paper), from the observation of Natural Resources, Classification of Natural Potential, Sustainable Development, on the occasion of documentation, as well as in consultation with numerous articles and studies published in Internet (see [6-7]). A number of official websites of institutions and central and local management bodies has been taken from: (WCED) [8], United Nations [9], FAO [1], R&DID [10] and others.

3. ANALYSIS AND DISCUSION

Mishra [11] citing research by Sawyer [12] indicates that the United Nations Millennium Ecosystem Assessment Synthesis Report (MEASR) [13] reveals that people now are transforming ecosystems throughout the world at a faster and more extensive pace than any other time in human history. Of particular significance: 60 percent (15 out of 24) of the ecosystems examined by the authors (of the Report) are being used unsustainably; the changes being made to these ecosystems are increasing the likelihood of “nonlinear” changes (e.g., the emergence of diseases); and poor people are disproportionately being impacted by the harmful effects of ecosystem degradation. According to Mishra [11] quote from MEASR [13]: “The structure of the world’s ecosystems changed more rapidly in the second half of the twentieth century than at any time in recorded human history, and virtually all of Earth’s ecosystems have now been significantly transformed through human actions. The most significant change in the structure of ecosystems has been the transformation of approximately one quarter (24%) of Earth’s terrestrial surface to cultivated systems… More land was converted to cropland since 1945 than in the eighteenth and nineteenth centuries combined… Between 1960 and 2000, reservoir storage capacity quadrupled…; as a result, the amount of water stored behind large dams is estimated to be three to six times the amount held by natural river channels (this excludes natural lakes)… In countries for which sufficient multiyear data are available

(encompassing more than half of the present-day mangrove area), approximately 35% of mangroves were lost in the last two decades… Roughly 20% of the world's coral reefs were lost and an additional 20% degraded in the last several decades of the twentieth century… The ecosystems and biomes that have been most significantly altered globally by human activity include marine and freshwater ecosystems, temperate broadleaf forests, temperate grasslands, Mediterranean forests, and tropical dry forests… Globally, the rate of conversion of ecosystems has begun to slow largely due to reductions in the rate of expansion of cultivated land, and in some regions (particularly in temperate zones) ecosystems are returning to conditions and species compositions similar to their pre- conversion states. Yet rates of ecosystem conversion remain high or are increasing for specific ecosystems and regions… Ecosystem processes, including water, nitrogen, carbon, and phosphorus cycling, changed more rapidly in the second half of the twentieth century than at any time in recorded human history… The distribution of species on Earth is becoming more homogeneous. By homogeneous, we mean that the differences between the set of species at one location on the planet and the set at another location are, on average, diminishing. The natural process of evolution, and particularly the combination of natural barriers to migration and local adaptation of species, led to significant differences in the types of species in ecosystems in different regions. But these regional differences in the planet's biota are now being diminished... Across a range of taxonomic groups, either the population size or range or both of the majority of species is currently declining… Between 10% and 30% of mammal, bird, and amphibian species are currently threatened with extinction… Over the past few hundred years, humans have increased the species extinction rate by as much as 1.000 times background rates typical over the planet's history… Genetic diversity has declined globally, particularly among cultivated species… Human use of all ecosystem services is growing rapidly. Approximately 60% (15 out of 24) of the ecosystem services evaluated in this assessment (including 70% of regulating and cultural services) are being degraded or used unsustainably".

Fundamental problems in the field of natural resources, according to Zaharia and Şuteu [14], with the principal elements that must be mentioned concerning the natural resources are synthesized in **Figure 1**, presented below. There are taken into account aspects on: (1) the stock of some specific vital natural resources; this is finite (e.g., fossil fuels); (2) the consumption rate of reserves; this was emphasizing in last time, having higher consumption rate in comparison with the historical consumption rate; (3) the existence of some important systems of renewable resources.

Moreover, in the field of natural resources it must be considered the following fundamental problems, interrogatively or globally enunciated, as follows: (1) How much and in what conditions the society exists with finite reserves of 'in situ' stocks, with renewable resources but destructive and limited systems of environment supervision?; (2) The placement of known natural resources; (3) The passing of humanity from the utilization of non- renewable resources to the renewable ones and reversely; (4) The evaluation of behavioral models concerning the utilization of natural resources; (5) The correct understanding of the role and importance of the natural resources and environmental services, as factors of sustainable development; (6) The emphasizing of increasing dependence of inferior natural reserves; (7) The evolution of global restrictive conditions of environment quality; (8) The role of production and consumption processes in the management of natural resources vs. time [14]. Some procedural expedients of assessing the natural resources and natural - resource potential, as used by geographical and other sciences, are considered. It is stated that there is no consensus

understanding of the content of the notions of "natural resources", "natural conditions", "natural - resource potential", "economic assessment of natural resources" and "economic-geographical assessment of natural resources" [15]. Classification of natural resources can be based on: the very nature of character to be used or be combined (natural and economic, ecological or economic). The geographical distribution of the literature of natural resources is possible with the physical - geographic or economic - geographical point of view (see [16-18]). For us it is an interesting economic and geographic classification that seeks to examine the natural resources in the context of its exploitation and use. And if this classification is not made explicit (**Figure 2**), we have shown more in **Table 1**, based on the basic principles of the valorization of natural resources and conditions. It is understood, no matter how natural resources were great, they are not unlimited and inexhaustible (see Figure 1). Therefore, their use should be planned and rational (see **Figure 3**). All the more, since many natural resources are virtually no - renew or to a very slow so the pressure of population on the environment is increasing. It is therefore necessary to determine resources, natural potential of each area (see [19-21]) as well as the ability to increase productivity which is a prerequisite for rational use [22-23].

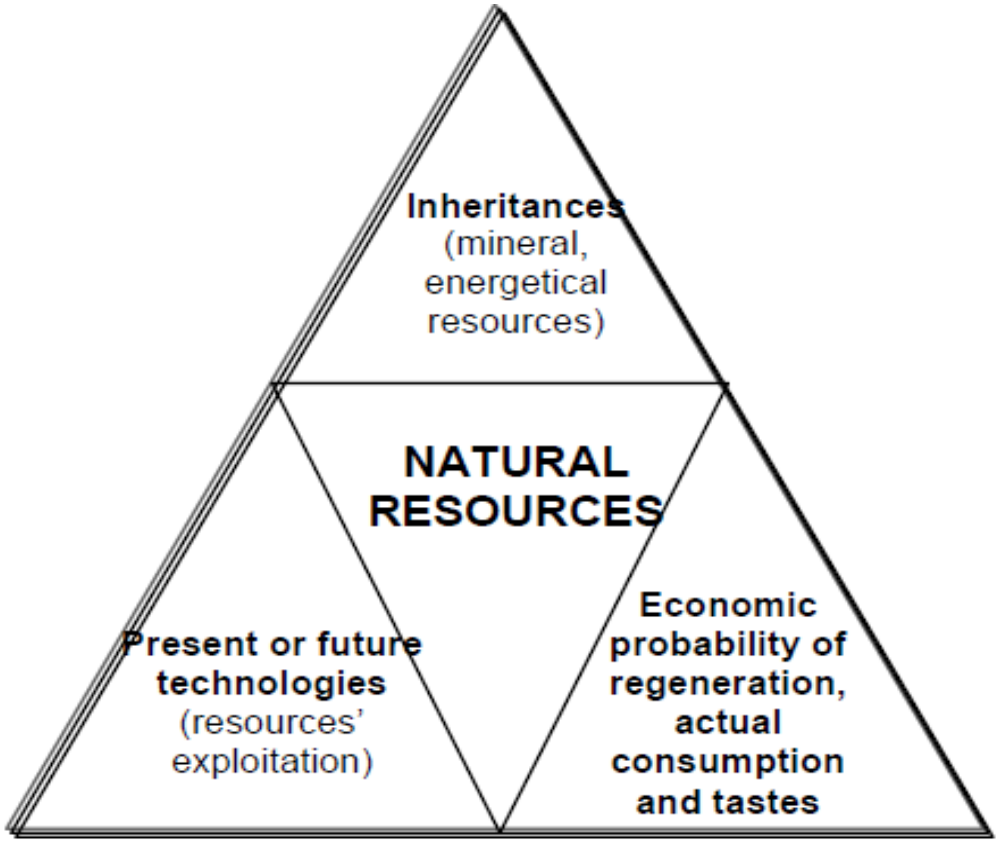


Figure 1. Principal elements concerning the natural resources [14].

Climate change might become one of the key drivers pushing integrated approaches for natural resources management into practice. The National Adaptation Programme of Action (NAPA) is an initiative agreed under the UN Framework Convention on Climate Change. An

analysis was done to find out how widely ecosystem restoration and integrated approaches have been incorporated into NAPA priority adaptation projects. The data show that the NAPAs can be seen as potentially important channel for operational zing various integrated concepts. Key challenge is to implement the NAPA projects. The amount needed to implement the NAPA projects aiming at ecosystem restoration using integrated approaches presents only 0.7% of the money pledged in Copenhagen for climate change adaptation [24].

Today, generally speaking endangered are all natural resources. According to the International Union for Conservation of Nature (IUCN) each year, as a result of environmental pollution, habitat loss and the introduction of alien species, climate change and over-exploitation of natural resources disappears 0.01 - 0.1% of the total number of species. Species extinction is a natural process, but the destructive influence of man caused him to be as much as 1.000 times faster than the so - called normal rates of extinction [25]. In **Table 2**, the structure of pollution caused from the use of fossil fuels is given.

Table 1. Classification of Natural Resources [16].

Element of Natural Environment	Natural Source	Natural Condition for
Earth of the crust	Mineral resources (metal and non - metal raw materials), mineral fuels and geothermal energy	All forms of construction to his geological engineering decisions; volcanic activity and seismic activity.
Relief		Types of agriculture, tourism, transport, development of their village: a morphometric structure (high structure, the structure of the slope and exposure, horizontal and vertical dissection) and morphs dynamic characteristics (activity of recent processes).
Climate	Wind energy and solar energy	Agriculture Like: thermal regime, rainfall, sunlight, tourism, traffic, construction activities, as a general condition of existence.
Hydrosphere (underground water, river and lake water, glaciers, global sea).	Water as: raw material (underground of sweet and mineral, river and lake water); Energy	Water supply population I utility industry (underground and river water); water agriculture

	source (thermal waters and HE-potential river); Raw material and energy sources should I submarine bottom (the mineral components of seawater, mineral wealth and energy of the submarine bottom tidal waves).	(irrigation), unwinding river, lake and maritime transport; tourism, recreation, health and wellness activities (thermal mineral, river, lake and sea water).
Biosphere (pedosphere, fitosphere, zoosphere)	Agricultural land; wood as raw material; Pastures and meadows; Forest fruits and medicinal plants; Fauna of land and sea.	Tourist, recreational and health - health resort activities, general condition existence.

Source [16].

Table 2. Overview of the environments that are affected by pollution - fossil fuel [1]

Environments, which are polluted	Description of pollution
Geological environment	There is an imbalance in the Earth's crust (landslides and underground landslides) degrade the geological environment polluted the vibration and noise during exploitation
Land	Directly destroys the land, there is a mechanical soil pollution (coal dust, coal, oil, ash). Large tracts of land are exposed to erosion (deforestation, construction and hydraulic works), due to the construction of surface dug, oil fields, water reservoirs, refineries. Land is polluting and waste products of fossil fuel: slag, fly ash, coal dust, soot, varnishes, paints, solvents, plastics, pesticides, fertilizers, acid rain. Pollute land and contaminated water produced in the process of production or processing of fossil fuels and from thermal power plants, car exhaust (lead, carbon black).

Air (atmosphere)	Global effects of pollution are manifested in the overall climate change in the country, to reduce solar radiation and the greenhouse effect occurs. Local effects manifested in the change of microclimate, appears acid rain, increased rainfall and cloudiness, relative humidity of the air is reduced, fog more often .... The first typical air pollutants are the processes of combustion in stationary energy sources (power plants, heating plants) and other typical air pollutants and no less harmful to various means of transport: cars, trucks, ships, diesel locomotives, airplanes. In developed countries, this category of pollutants exceeds the character and quantity of manufactured goods group stationary sources.
Water	In addition to biological and radioactive agents that pollute the water in the process of exploitation, processing and consumption of fossil fuels and the resulting toxic chemicals, physical agents, inorganic salts, acids and bases, as well as heat. Chemical water pollution as the most important and the most comprehensive source of artificial water pollution can be organic and inorganic (from acidic residues of soluble salts, mainly from the so-called waste water). The specific source of pollution is various means of transportation: ships, tankers, barges. Represent a great danger and damage to various means of transport and oil rigs. During the processing of coal in the so-called wet separation, i.e. in coal washing, there is a large amount of waste water full of dissolved carbon dust. Physical water pollution, through changes of basic physical properties of water (providence, temperature) occurs through thermal pollution and industrial cooling water.

	Adverse effects are directly or indirectly reflect the living world. Reduces the solubility of oxygen in water. Waste water from thermal power plants is very physically polluted, and thermal contaminated water cooled before discharge.
Biosphere	Biogeochemical cycles of some elements are more or less disrupted mining, processing or consumption of fossil fuels. A large number of different substances are released into the biosphere as a product of exploitation of fossil fuels so that the biosphere is additionally burdened by large amounts of carbon dioxide, sulfur dioxide, nitrogen oxides, acid rain and heavy metals. Eerily act anthropogenic desert arose on the site of ore dumps, tailings and ash where often unsuccessfully, over decades apply methods of biological revitalization of the area.

Source [1].

Economics as a study of choice can contribute to natural resource and environmental management by: denitrifying circumstances which generate natural resource problems; determining the causes of these problems, and identifying possible solution and comparing their cost and benefits. In making the choices, tradeoffs have to be made, that is giving up one thing in order to get something else. Economists have three main areas where trade - offs are made: what is produced with the available (natural) resources such as land, how much is produced (food crops or forest products) and for whom goods and services are produced (who will enjoy the food crops and the forest products produced from the land resource) [25].

The net sum of all the relevant WTPs and WTAs defines the total economic value (TEV) of any change in well-being due to a policy or project. TEV can be characterized differently according to the type of economic value arising. Between the two groups (use and non-use values) one can find the option value - people are not sure about their future demand for a service and they would like to maintain the environment in order to use it at a later time. This value will become a use value in the future, e.g. new sorts or drugs derived from genetic information of wild species (Thus, TEV = use value + non - use value + option value). The decision on which TEV components to take into account depends on what kind of natural resources will be evaluated.

For biotic components (chemical/physical parameters) like water or air quality, direct or indirect use values are of central interest. Non - use values may be neglected. But in the case of nature conservation where species or habitats are involved non-use values are known to make up an important part of the economic value. In this case use and non - use components have to be taken into consideration too, in any economic valuation [25].

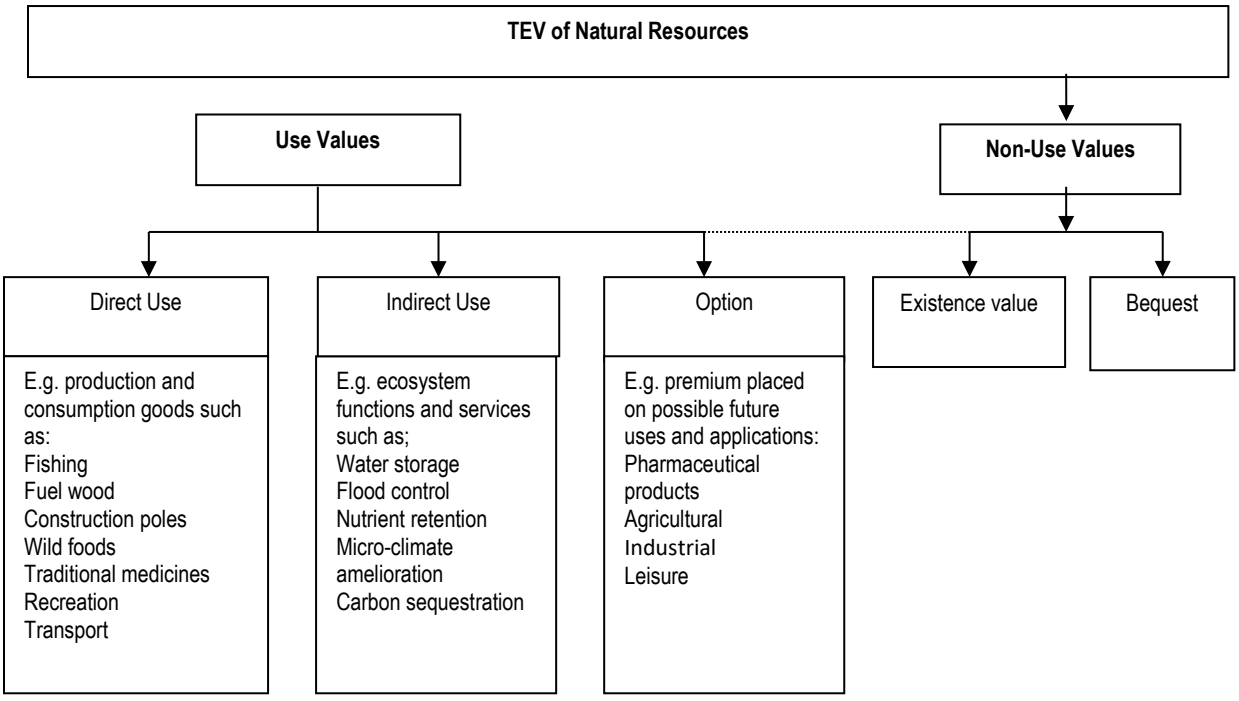
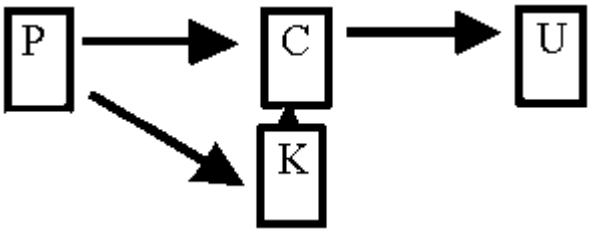
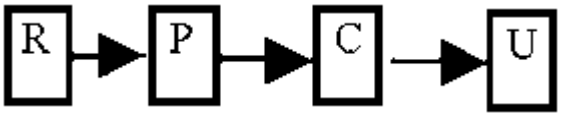
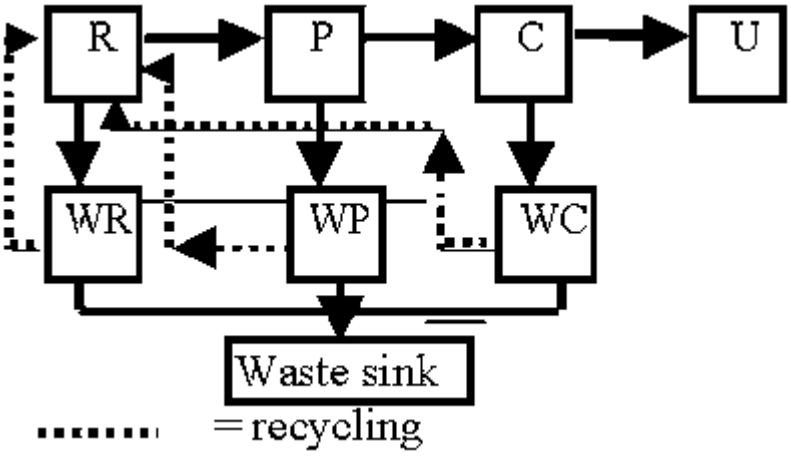
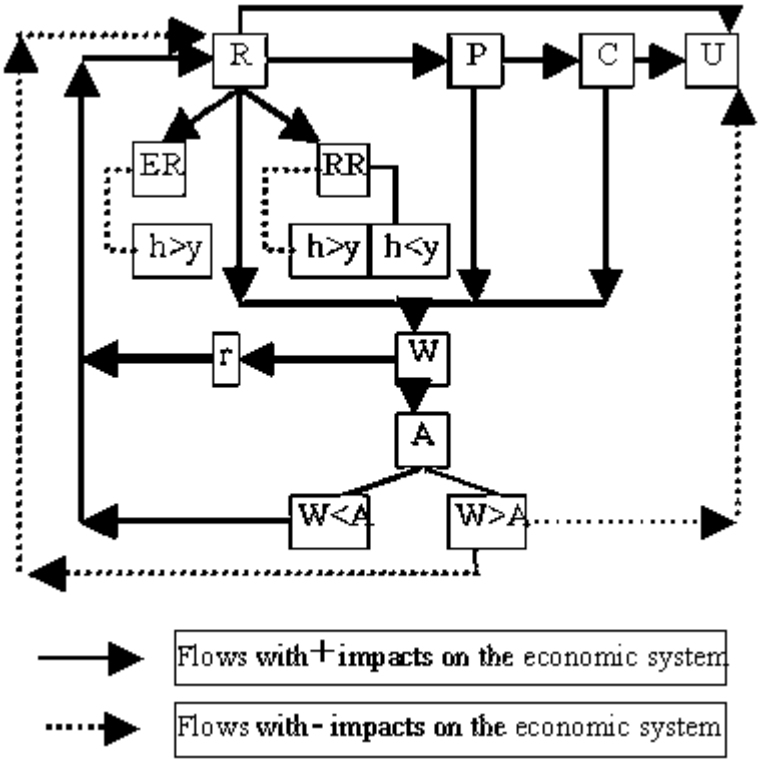


Figure 2. Classification of economic values (benefits) of natural resources [25].

1. Linear concept of the economy 	Production processes generate goods that can be either consumed (C) or invested (K). In the long term, K is also consumed. Therefore K can also be assumed to be consumer goods and will disappear from the subsequent models. Both C and K create utility (U).
2. Raw material supplier 	To produce goods, raw materials are required. These can be exhaustible (oil, coal, other minerals) or renewable (forests, water, solar energy, and so forth). All of them are provided by the ecosystem.
3. Waste absorption	All the components of the previous model produce wastes. Some of them can

	be recycled (glass, aluminum, paper and so on) but most of them are not and are assimilated (absorbed) by the environment (air pollution, industrial effluents, etc.). Environment is assumed to have a finite *absorption capacity*. If wastes are higher than the absorption capacity, the resilience of the environment will be affected negatively and the economic function of the environment as waste assimilation will be reduced.
4. Circular concept of economy 	Environment also provides direct services to consumers such as aesthetics, recreation, etc. The model beside depicts the functioning of a circular economy incorporating the economic functions of the environment.
Legend A = Assimilation	W = Waste Products r = Recycling

P = Production C = Consumption goods K = Capital goods U = Utility R = Natural Resources	ER = Exhaustible Resources RR = Renewable Resources y = Yields h = Rate of harvest

Figure 3. Environment - economy interaction [9], according to [26].

Prior to the release of the famous report "Our Common Future" in 1987, it sufficed to define sustainability in consonance with the definition of sustain - "to keep in existence, maintain, prolong". After the Brundtland Commission (World Commission on Environment and Development) was created, a new definition emerged that successfully ensconced sustainability in the development arena. Although this definition is somewhat vague and has been a source of contention, concern for sustainability is now manifestly ubiquitous [8]. Ravage *et al*., [27] with reference to Hardi and Zdan [28] indicates that governments, private organizations, and multilateral institutions strive to pursue economic development that is compatible with environmental objectives. As sustainability has become increasingly politicized, it is now widely used to refer to a systems approach that incorporates environment, economy, and society. The scope of sustainability has become so broad that it can include income distribution, gender equity, culture, and a host of other political goals of NGO's and their donors. The Commission defined sustainability as, "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [27]. Returning to the original Brundtland concept, according to Ravago *et al*., [27] sustainable development must allow for the inter - linkages between poverty, population pressure, and the degradation of environmental resources. The conclusion reached by the Commission is that the problems could be addressed only if these three are taken into account collectively. **Figure 4** depicts the interaction of population pressure and poverty as the notorious Malthusian vicious - circle and environmental degradation, which exacerbates that circle. Population growth, in the face of a limited resource base, exacerbates poverty by lowering the return to unskilled labor. This in turn prevents mechanisms whereby increased incomes and the rising productivity of human capital lower the demand for children. The population poverty cycle is exacerbated as households with limited resource-access strive to take out a living from hillsides, wetlands, and other environmentally fragile areas, thus degrading the limited natural capital available to the poor.

Mbaiwa and Darkoh [30], with reference to Mbaiwa [31] and Darkoh and Mbaiwa [32], indicate that conflicts over resource use arise when several interest groups use resources differently in the same natural system or geographical location. Shortages of natural resources also lead to competition that may result in conflict amongst the various resource user groups. State actions and policies affect natural resource use and may sometimes give rise to conflicts.

Furthermore, security and control over natural resources, or the lack of these, may prevent appropriate management of natural resources, exacerbate dissatisfaction and competition, and worsen conflict and the unsustainable use of resource utilization.

Lakićević and Tatović [33], citing research Shepherd [24] and Shepherd [35], suggest that the ecosystem approach is a strategy for the "integrated management of land, water and living resources that promotes their conservation and sustainable use in an equitable way" that is required inclusive and flexible management, which should deal with complex and dynamic nature of ecosystems and to complete knowledge about its functioning. It can unite other skills of conservation approaches or methodologies, and are to respond to the challenge of solving problems in complex situations. There is no single way to implement the ecosystem approach; its implementation depends on the local, national, regional and global conditions. The ecosystem approach is an innovative management strategy and differs from conventional approaches. **Table 3** shows the basic difference between the conventional and the ecosystem approach.

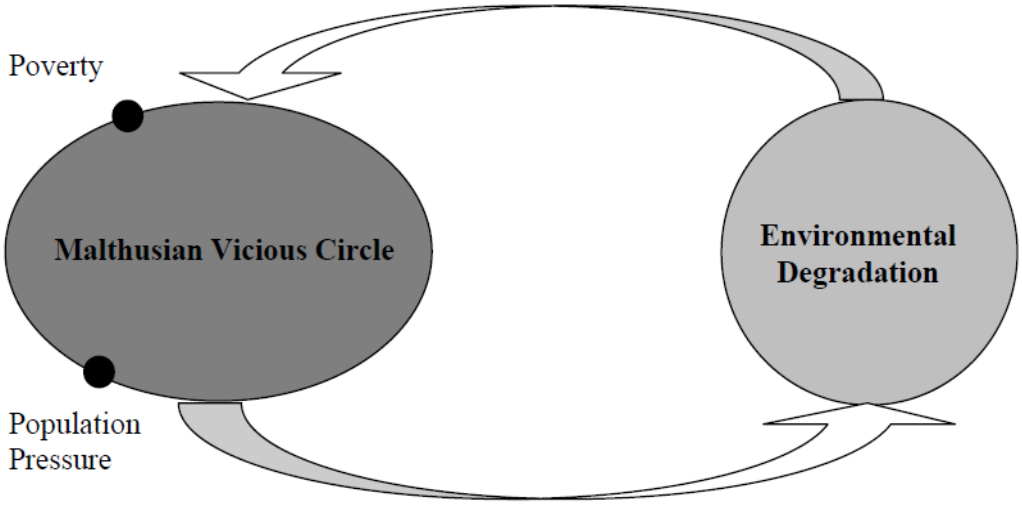


Figure 4. Brundtland vicious circle [29], according to [27].

Table 3. Conventional approaches and ecosystem approach [33, 36].

Conventional approaches	Ecosystem approach
Emphasis on conservation	Emphasis on adaptive management
Sectoral management	Integral management
Exclusively based on science knowledge	Involves other forms of knowledge
Give priority to nature conservation	Oriented toward environmental and social conservation
Top-down approach	Two way approach, top-down and bottom-up

Short-term vision	Long-term vision
Ecosystems' goods and services are considered in an independent way	Ecosystems' goods and services are considered as part of management procedure and not as the final goal

Source: Lakićević and Tatović [33] according to Pérez [36].

Lakićević and Tatović [33] were, according to Shepherd [34] and Hadley [37], allegations that for the realization of the principles of the ecosystem approach it is necessary to implement the five steps according to the schedule. Each of the steps involves a series of actions and is directly linked with at least one of the twelve principles. Step A: Determination of the main stakeholders and areas of the ecosystem; Step B: Set up mechanisms for the management of ecosystems; Step C: Identification of important economic issues; Step D: Determination of the expected impact on give and neighboring ecosystems; Step E: Deciding on long-term goals. One of the first questions to ask is: What is the size of the managed ecosystem territories should be selected on the basis of which criteria? Appropriate size is one that meets the scientific criteria, corresponding to administrative, legal and cultural boundaries, and represents a solvable task for the existing management capacity, knowledge and experience.

4. CONCLUSIONS

It is ironic that fears in the 1970s, that shortages of natural resources might halt economic growth, have given way to concern that the mismanagement of natural resource abundance intensifies environmental problems. Environmental policy makers and their advisers can benefit from a fuller awareness of how macro policy failure adversely impacts on environmental policies. They need to adapt environmental policies to the macroeconomic limitations and to recognize that some past policies may have failed because of those limitations rather than through systemic flaws in the policies themselves. They also need to be more supportive of the efforts of the IFIs to ease the constraint of maladroit macroeconomic management. The strengthening of sanctions against anti-social governance can help here.

This will improve the design of sound environmental policies guided by total economic value to price in externalities, green accounting to achieve positive genuine saving, and cost - effective pollution abatement measures to flatten the EKC. In this way, developing countries can leapfrog the environmental learning curve of the advanced economies and limit the mismanagement of natural resources and minimize the damage to environmental services [38].

"Literature is not unified, and at least two significantly different currents can be distinguished [39]. A sociological-historical current [40-45], which concentrates mainly on the transformation of systems of property rights in contextual terms, and is based on a narrative historical method. The other current is based on a hypothetical-deductive logic, and highlights the question of collective action. Craig [39] indicates that the hypothetical - deductive approach has incontestably become the dominant trend for dealing with the management of natural resources" [46]. Not only because this approach is theoretically dominant, according to Balet *et al*., [46], but also because it has developed tools for analysing the situations of natural resources management that have had a significant impact on international institutions, such as the IAD (Institutional Analysis and Development) framework developed at Indiana University by Ostrom and her colleagues. In these countries, the funding organizations, notably the Breton

Woods institutions, have made co-management the keystone of their development programs. In practice, this involves setting up projects that are subject to conditions, and require local people to be involved. Balet *et al*., [46] indicate that this means that the sphere of influence of reflexion on co - management has been significant in the developing countries via both international institutions and also some NGOs that have switched from a purely conservation-based vision to a co - management vision.

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