International Journal of Academic Multidisciplinary Research (IJAMR)
ISSN: 2643-9670
Vol. 6 Issue 5, May - 2022, Pages: 292-304

Environmental Economics Theories and Sustainable Use and Management of Ecosystem Services: An Application in Ethiopia

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Abstract: *Environmental economics aims to ensure that ecosystems are recognized as major contributors to human well-being and economic growth goals. Ethiopia has a degraded and deteriorated environment. This is worsened by lack of implementation of environmental economics theories to mitigate the problems. This study is a qualitative research study, which mainly depends on document analysis and the observations and personal experiences of the authors. We explore and critically analyze the theories of the environmental economics and identify a relevant theory that suits for sustainable use and management of ecosystem in Ethiopia. The justification is provided using a systematic review of the theoretical literature regarding environmental protection. The study concludes that these theories are applicable and there are inspiring reasons for Ethiopia to adopt in order to protect the continuing degradation of ecosystem, ensuring socio-economic progress, creating equitable, just society and achieving sustainable development.*

Keywords: Environmental Economics theories, negative externalities, ecosystem services, Ethiopia

1. Introduction

Environmental economics appeared in the 1960s as public concerns with environmental pollution grew. Environmental economists argue that external costs and benefits should be internalized by regulating prices so that the person buying the goods or services causing the external cost is obliged to pay for it. This specific view of environmental problems is now reflected in government policy around the world including the use of extended cost benefit analyses, contingent valuations, environmental charges and emissions trading(Beder, 2011).

Ethiopia is gifted with varied ecosystems in which diverse flora and fauna are abundantly found(Wassie, 2020). The common ecosystems encompass Afro-alpine, scrub, sub-afroalpine, Montane dry forest, Acacia-comiphora woodland, Montane moist forest, lowland humid forest, Combretum-Terminalia woodland, Montane grassland Aquatic, wetland, desert and semi-desert ecosystems(EBI, 2019). Ethiopia faces some serious environmental challenges including climate change and aspects of ecosystem degradation such as deforestation, loss of biodiversity, and soil fertility decline(Admassu, Getinet, Thomas, Waithaka, & Kyotalimye, 2013).

Since the 1950s, several major policies for national development and environmental conservation have been implemented in Ethiopia(Ango, 2016).The Ethiopian government has put in place a number of policies, strategies and laws that are crafted to support sustainable development and to move towards a greener economy. However, there are gaps between the environmental commitments made and the actual implementation to improve environmental outcomes due to weak capacity in environmental management and enforcement are the key challenges (César & Ekbom, 2013).

The historical and current destruction and degradation of soil and forest resources, on which this development model is based, poses a significant policy and practical problem. soil erosion and land degradation, deforestation and forest degradation, water scarcity, biodiversity loss, and other sorts of pollution are the key environmental challenges impacting Ethiopia, aside from climate change(Daley, 2015).

This study reviews theories of environmental economics with respect to providing solutions to environmental problems for Ethiopia. The concepts, methods, theories and assumptions of Environmental Economics are critically analysed and the extent to which they depart from the dominant neoclassical paradigm of economics was assessed. The solution to environmental problems is thus seen as a matter of ensuring that the environment is properly priced to reflect the relative scarcity of natural resources and assets and to ensure that environmental values are incorporated into the market.

The areas the authors covered include environment, economic and social which are major components of sustainable development spanning the development of environmental economics theories from neoclassical to post-neoclassical consists of seminal works such as the neoclassical theory, Pigovian theory, Coasian theory, theory of environmental valuation, and the economic theory of pollution control. Each theory has observed ways in which environmental externalities have an impact on the environment and therefore sees environmental quality as a part of a larger context of sustainable development.

The main purpose of the article is to analyze the ideas advanced by several theorists whose contributions have caused significant impact within the domain of environmental economics. The specific objectives include: to explore and critically analyze five major environmental economics theories forming the modern foundation of environmental economics, to compare and contrast theories of the environmental economics practices in externalities such as the neoclassical theory of environment, Pigouvian taxes: theory of policy intervention for negative externalities, Coasian theory to environmental externality, theory of environmental valuation and the economic theory of pollution control: the optimal level of pollution, to evaluate how theories of environmental economics can be applied in environmental protection practices in Ethiopia as remedies for the prevailing major environmental issues, to highlight tools that can be applied in the valuation of the economic values of ecosystem service in Ethiopian context and finally to provide policy suggestions of how these theories can be applied more effectively within the environmental protection practices that are existent in Ethiopia.

1.1 Ethiopian Experience

Ethiopia has a degraded and deteriorated environment (Figure 1). In order to curb the problem, the government has been taking various actions through enacting environmental policies. These regulatory frameworks are helpful to facilitate the protection of the environment only if they are adequate, their application can be sought by everyone, and they are applied to everyone. However, the existing environmental regulatory frameworks suffer from various defects due to weak implementations of policies, rules and laws which affect their ability to promote environmental protection.

This problem is worsened by absence of environmental economics in which GDP supposed to be weighed by considering depletion of national assets. The Gross Domestic Product does not account for the depletion of national assets, such as soil, forests, water, minerals, etc. In the economic appraisal of projects, the costs of environmental and natural resource benefits forgone as a result of the projects' activities are rarely incorporated in the calculations. The various economic benefits that are provided by natural ecosystems is underestimated in decision making(Gebretsadik, 2016). Weakness in conducting impact assessment, practical non-compliance of standards and lack of technology to evaluate observance of environmental standard are also observed (Fitiwi, 2014). This led to lack of sustainability in the management of natural resources**.**

The general lack of recognition of these values in decision making is caused by a variety of factors. First, these benefits are often difficult to specify, as they are widely varying in terms of the type of benefit supplied, and as they operate over a range of spatial and temporal scales. Second, several of these benefits have a public goods character and are not traded in a market. Third, there is often a mismatch between the stakeholders that pay the opportunity costs of keeping an environmental benefit and the beneficiaries of that benefit.

This problem, necessary requisite some changes to the existing environmental framework and application of Environmental Economics theories in Ethiopia's ecosystem for sustainable use and management of ecosystem services. Ethiopia needs to introduce more clear Environmental legal frameworks for better protection of the environment. The Ethiopian experience in application of environmental economics theories ecosystem service valuation empirical studies reveals that limited studies have been conducted on ecosystem services valuation. Therefore, the authors critically analyse and evaluates Environmental Economics theorists' ideas for their relevance and practical applications and viewpoint of some Environmental valuation theories techniques.

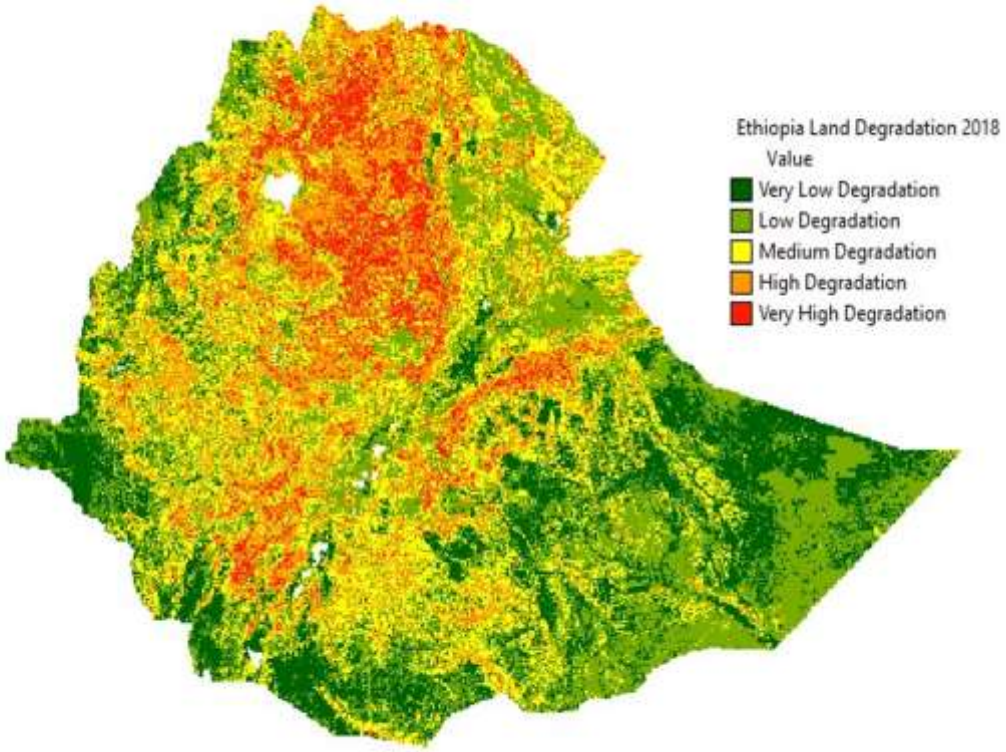

Figure 1: land degradation assessment Of Ethiopia, 2018
Source: Authors, based on ESRI data

2. Materials and methods

2.1 Study area

Ethiopia is one of the oldest nations in the world and is the second most populous country in Sub-Saharan Africa (Mohajan, 2013). Ethiopia's UTM coordinates is 37P 664696.35702821 1011687.2112385 (Figure 2).The wide range of ecological difference coupled with the corresponding diverse socio-culture has made Ethiopia one of the important rich in diverse land (Arjjumend, Shibata, & Fakana, 2018).With a wide range of latitudinal position and topography, Ethiopia has significant traditional, cultural, and natural diversity. The East African rift valley stretches from Afar junction to the Sudanese border. The plants and fauna in the southwest direction are diverse. The country's terrain includes mountains, valleys, and plains. Varied elevations, resulting in a wide range of climate conditions(Getahun, 2018).

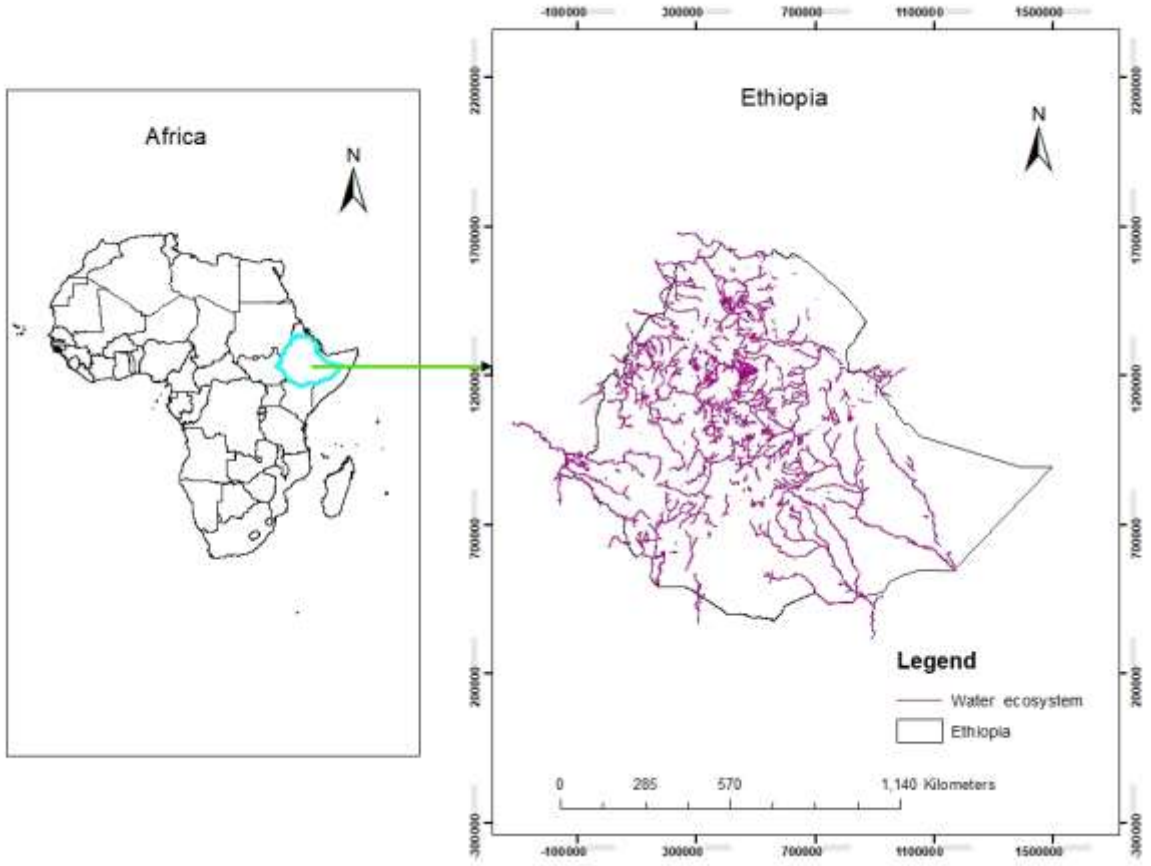

Figure 2: Study area location
Source: Authors, 2021

2.2 Data sources and processes

The article used qualitative research approach based on an exhaustive content analysis of available literature on theories of Environmental Economics. A systematic literature review has been attempted using Publish or Perish(PoP) software developed by (Harzing, 2007) using Google Scholar as the source. Most important theories and empirical works are chosen on the basis of their importance indicated by rank as well as the recent papers. Accordingly, we have chosen five most important theories and the empirical papers keeping Ethiopia as the reference point. Government policy related legal and policy framework documents at both the local and national levels have also been reviewed. The study is based on an in-depth review of the theories and applications of environmental economics and the existing experiences with ecosystem services management. Secondary data sources include articles, books, websites, seminar papers and newspapers and the information were synthesized. Some resource persons from Federal Democratic Republic Commission of Environment, Forest and Climate change were consulted to obtain the data from the secondary sources. A synthesis has been made based the collected data and the review of related literature. Arc GIS version 10.5 was used for presenting spatial pictures.

3.Results

3.1. Theories of Environmental Economics

3.1.1 Neoclassical Theory of the Environment

The application of neoclassical theory to the environment is what defines environmental economics. It focuses on identifying situations when the market is likely to fail in its role of efficiently allocating resources among competing users, as well as developing regulations that allow the government to interfere to fix the market failure (Jacobs, 2013). The

most efficient way to achieve the necessary level of environmental protection, according to this idea, is to price environmental costs and benefits in the marketplaces where they occur. In the actual world, where decisions are made, the importance of the environment may be seen. This can be accomplished in two ways: first, by changing the prices of current market activities by taxing environmental damage; second, by changing the prices of existing market activities by taxing environmental damage.

New study factors formed part of the theory, according to (Dragulanescu & Dragulanescu, 2013), such as the dynamic efficiency acknowledged the importance of externalities, pollution costs, and the necessity to internalize external costs. Environmental economics is rooted in typical neoclassical notions of efficiency, according to this view. It's an offshoot of the externality's theory, and it's primarily concerned with maximizing the social benefit of resource utilization and internalizing negative externalities. Like the neoclassical theory of the environment the following theory i.e., Pigouvian theory emphasized the importance of interrelationships between externalities costs and here it is briefly presented below as follows.

3.1.2 Pigouvian Taxes: The Theory of Policy Interventions for Negative Externalities

The solution to the problem of negative externalities, according to economist Arthur Cecili Pigou, is to impose a tax on each unit of output equal to the marginal external cost. As a result, negative externalities are internalized by enterprises and consumers, and society is compensated for absorbing the external costs of production. Pigouvian taxes improve allocative efficiency by internalizing externalities(Gilpin, 2000).Pigouvian taxes alter the market's incentives for producers and consumers. Taxes, of course, are a source of money for the government. In an ideal world, these funds would be utilized to compensate persons who have been damaged by pollution, as well as to remediate environmental damage caused by the pollution that is being taxed(Hackett, 2011).

Although most economists accept the principle of externalities, not everyone agrees that externalities are huge or significant. If external costs are tiny and inconsequential, there is little to be gained by dismissing them as trivial side effects of market affluence. While this may be true in certain instances, it does not appear to be true in all cases. According to the US Environmental Protection Agency, the Clean Air Act of 1970 resulted in significant savings in the form of avoided external expenditures. Clean air, in example, averted an estimated $22.2 trillion in pollution impact to human health, agriculture, and the environment between 1970 and 1990(Greenstone, 2002).

In the actual world, measuring external costs requires taking into account the relationship between pollution and the impact, such as reduced human health, as well as the relationship between the impact and the economic cost (e.g., health care expenditures, the value of foregone production, and the value assigned to diminished quality of life). In the instance of the United Kingdom, an example of anticipated external costs per unit output was shown. The quantity of pollution emissions at the source is limited by command-and-control regulations, which often specify the emissions-control equipment to be utilized(Beattie, Longhurst, & Woodfield, 2001).

According to the aforementioned theory, environmental economics has a strong foundation in Pigouvian welfare economics, which focuses on reducing negative externalities for environmental conservation. When compared to command-and-control policies, pollution charges have numerous advantages. They allow for the lowest-cost abatement, are more dynamic in general, and provide incentives for both producers and consumers. Environmental taxation, then, might be defined as an endeavor to change damaging human behavior by imposing taxes that can be avoided or reduced by more ecologically friendly activity. As a result, policymakers in Ethiopia must look for efficient ways to implement pollution levies. Unlike the neoclassical theory of the environment and Pigouvian theory Coasian theory argued that to correct market failure and internalize externality no need to state intervention and beliefs that negative externality can be solved through assigning property rights only. So, Coasian theory as possible solution to environmental problems is briefly presented below.

3.1.3 Coasian Theory to Environmental Externality

Economist Ronald Coase challenged the concept of externality taxes and proposed an alternative theory based on property rights. This approach may lead to the seemingly contradictory conclusion that, if property rights are properly defined, it may be preferable to tax the polluter rather than the polluted. Because Ronald Coase addressed the reciprocal character of the externality problem, this is the case. There must be at least two parties for a negative externality to exist: one whose action (production or consumption) causes the externality (injurer) and one who is impacted by the externality (victim)(Baumol et al., 1988).

(Coase, 1960) in his renowned article the problem of social cost noted that "the injurer feels an advantage and the victim perceives a cost as a result of both parties' actions. Both parties place a monetary value on their perceived costs and advantages. Although it is evident that the injurer causes harm to the victim, it is equally true that the injurer would suffer (lose advantages) if the victim prohibited or restricted the injurer's acts. Potential bargaining positions of both the victim and the injurer should be assessed in order to resolve the problem of externalities.

The use of property rights to internalize externalities is promoted by Ronald Coase. If transaction costs are zero, the bargaining process between the polluter and those impacted will produce the most efficient solution, regardless of who owns the initial property rights. He stated that when there are significant transaction costs, negotiation is often unable to attain the best possible outcome(Groosman, 1999).Another alternative to Pigouvian philosophy is to let polluters and those affected by pollution to discuss and resolve their differences without the intervention of the government. The hypothesis is founded on a straightforward and intuitive argument(Gilpin, 2000).

Ronald Coase appears to address the possible injustice of making the polluter face the cost of pollution by arguing that the polluter bears the cost through private bargaining. In this situation, the polluter or injurer bears the expense of pollution(Fitiwi, 2014).According to this idea, government intervention to limit externalities is unnecessary if market transactions are zero and property rights are explicitly assigned and protected. The government must identify and enforce environmental property rights, as well as reduce transaction costs(Berck & Helfand, 2011).In the case of transition economies in general, and Romania in particular, a Pigovian and Coasian externality theory framework for understanding corporate social responsibility demonstrates that there is a need to obtain a better understanding of the variables increasing plant environmental behavior. They emphasize the necessity to rethink environmental levies in order to obtain better results, which has already begun to be applied(Sova, Rault, Caporale, & Sova, 2014).

Based on the exhaustive search made on different literatures the study has deeply understood that to correct market failure it is necessary to internalize the externality concept. The state, which consists of three branches of government: the legislature, the judiciary, and the regulators, must use the two major types of environmental regulation, namely economic incentive and command and control, to try to persuade a polluter to take socially desirable actions that are ostensibly not in the polluter's best interests. As a result, government involvement is required to achieve the appropriate level of pollution for society. Despite the fact that Coasian theory claims that government intervention to regulate externalities is unnecessary, the theory of environmental valuation presented below claims that assigning environmental goods and services in monetary terms through the use of a series of techniques to assess the economic value of natural resources is critical to reducing environmental damage.

3.1.4 Theory of Environmental Valuation

Ecosystem service research based on economic theory provides a new research avenue for moving toward a more structured collaboration between biophysical science, social science, and policy(Fisher, 2008). Estimating the value of environmental goods and services is becoming increasingly important to environmental economists. Natural issues are increasingly prominent in decision-making at both the micro and macro levels of economic policy formation in many nations, resulting in rising demands for sustainable development and improved environmental resource management.(Grove-White, 1997). Over the last few decades, economists have made significant efforts to value environmental goods and services. This has boosted the confidence of economists who use non-market valuation as a primary tool to aid decision-making (Hanley, Shogren, & White, 2016). Economists assign a total economic value to natural resource flows(Tietenberg, 2003).

Environmental goods and services are not exchanged; therefore, their market value cannot be assessed. As a result, non-market valuation methodologies are required for the value of environmental products and services by economists. To assign economic values to non-marketed economic resources, economists established a variety of valuation methodologies. Included are indirect preference methods, such as revealed preference methods, as well as directly expressed, stated preference methods. The indirect, or revealed preference, approaches rely on observable demand for comparable merchantable commodities and services to infer unobservable demand, and hence the value of environmental goods and services. To put it another way, economists try to estimate demand for environmental products and services by analyzing market transactions for related goods and services(Freeman, 1993).

When used in conjunction with other valuation methodologies that capture the non-economic value components of nature, an economic valuation can be a powerful information tool(Gómez-Baggethun & Ruiz-Pérez, 2011). Economic valuation is neither a simple or conflict-free task. It is frequently influenced by human choices(Lambert, 2003).

The worth of environmental resources should be taken into account in economic decision-making processes to promote sustainable development, according to this idea of environmental valuation. Because it is impossible to give a value to environmental products and services, they were taken into account because they have zero or low values. In practice, businesses impose a cost on other members of society, and these costs are not entirely reimbursed. This is a classic example of negative externality, in which the cost is external to the market. These are instances where prices have failed to account for negative consequences, implying that the price has failed to regulate the use and benefit of the environment. It may be impossible to return to the status quo once an ecosystem has been lost. As a result, the need to value changes in biodiversity levels in order to properly educate policymakers is critical for environmental sustainability and social transformation. Despite the differences in the remedies for improving the environment in the above-mentioned

theories of environmental economics, the Economic theory of pollution control also argues that an optimal level of pollution is critical to improving environmental quality and is presented in detail as follows.

3.1.5 The Economic Theory of Pollution Control: The Optimal Level of Pollution

Pollution control or abatement costs are the monetary costs incurred by a society in order to improve environmental quality or reduce pollution. Pollution control costs include sewage treatment facilities, smokestacks, soundproof walls, and catalytic converters on passenger automobiles, to name a few. These costs may be borne only by private individuals, such as soundproofing costs incurred by households living near an airport. Government agencies, on the other hand, may undertake sewage treatment facilities as a project. The costs are split among the many government agencies(Hussen, 2004).

In general, we anticipate that when environmental quality or cleanup activities improve, the marginal pollution control cost will rise. This is because gradually increasing levels of environmental quality necessitate large expenditures in high-cost technologies. A basic sewage treatment facility, for example, could reach a specified level of water quality. The purpose of such a facility is to screen away solid and visible garbage. A greater degree of water quality may necessitate an additional investment in secondary or tertiary treatment(Harris & Roach, 2017).

Environmental pollution caused by either private market or public economic operations has become a significant source of public concern. This issue has spawned a slew of measures, including cap-and-trade schemes, effluent limits, and monetary penalties, all aimed at reducing pollution by putting the brakes on polluters(Edelstein, 2014).

From the above theory it can analyze that Pollution damage costs are quantifiable in terms of losses or damage to plants and animals and their habitats; aesthetic impairments; quick deterioration of infrastructures and assets; and other adverse effects on human health, mortality, and morbidity. We need to go beyond accounting for physical damage to assess damage costs. Damage that is measured in physical terms must be translated into monetary values. Estimating environmental damage and costs is a difficult endeavor that takes a lot of imagination and a creative approach. As a result, as a society aiming for a better living, we must devise a technique that will give us with a framework for improving our understanding of pollution damage costs in order to minimize negative environmental externalities.

3.2 Comparison of environmental economics theories in addressing negative externalities

To compare and contrast these five environmental economics theories for negative externalities, it is very important and helpful to know their strengths and weakness in order to identify the best and most favorable theory that can be applied in the Ethiopian context.

Environmental economics of negative externalities has been explained by different theorists in terms of its causes and consequences for social change and these theories are crucial in helping us to understand their importance in bringing environmental quality. The interconnection between the five theories for social change is for achieving the environment and biodiversity sustainability. They are interconnected in their remedies and ways for enhancing social changes. And their combined impact in achieving sustainable development. The difference among the various explanatory theories of environmental economics is on the solution to negative externalities.

Piguou shares the neoclassical solutions for most environmental problems internalizing of externalities and come with specific theory of policy interventions for negative externalities. However, this theory does not show the setting of tax that will match with the amount of damage and the fact that the tax may not be used to benefit those affected but may not flow into general revenue. But Ronald Coase is criticized due to the public good nature of the environment and the problem of free ridership worsen the problem of private bargain in solving environmental pollution as it is difficult to know the extent of the right of individuals, the extent of damage and the person who caused the pollution. Therefore, there are environmental problems which can be addressed by neither free-market instruments nor purely regulatory rules, but by environmental tax. Pigou differs from Coase despite the internalization of negative externality by the use of property rights not in the presence of the problem of social cost, but on the solution for such problem polluters and those impacted by pollution negotiate with one another and resolve their conflict without government intervention. He believes that such problem can be solved by proportional environmental tax

From the optimistic view of the Coasian theory in order to deepen the relationship between the economic system and the environmental system, poses as a basis the assumption of capacity of self -regulation of free markets and unconstrained. It is therefore, of self-limiting process generated by negative feedback on a problem of lack of resources. Any decrease in the availability of a resource results in an increase in price which will lead to the gradual abandonment of its usage, at least in those productions where it may be replaced by another at a lower cost. In this way, the demand drops to levels compatible with the availability of the resource in question.

Environmental valuation theory aimed for bringing environmental quality by estimating the value of environment and uses is a series of techniques that economists use to assess the economic value of market and non-market goods.

Environmental valuation and the incorporation of such values in decision-making is a way of caring for future generations. Reasoning from a general-equilibrium framework, the valuation of environmental services and how society cares for the future are interdependent. With sufficient caring for the future, valuation yields different results both because the incremental value per period is different. Economic valuation brings a society closer to its goals by increasing the efficiency of the economy.

The economic theory of pollution control it is about pollution control strategy. The level of pollution that maximizes social welfare is achieved by equating the marginal cost of additional pollution with the marginal benefit. If there is an optimal level of cleanliness then there is also an optimal level of pollution. If the marginal cost of pollution abatement is just equal to the marginal benefit from pollution abatement, then we have reached the point where society's welfare has been maximized with respect to environmental quality.

To synthesize theories of environmental economics is important and helpful to see environmental issues from different points of view by blending the ideas and contributions of a number of writers into a coherent whole. The theories are designed to consider pollution, natural resource depletion and are of the same phenomenon and focus on solutions to environmental problems. They provide a fuller picture through multiple comparisons, descriptions, and explanations and clarify the boundaries of environmental economics. Involves the processes, tools, and institutional arrangements devise and implement that shape how humans interact with its natural world. Often the aim is to secure and protect the natural resources needed for survival, growth, and enjoyment. In additions to this, the theories aim about how to address or prevent problems created by human use of natural resources management. Therefore, to bring about a myriad of changes in various aspects, we must be effective as agents of positive social change through introducing environmental economics theories.

The topic and theories of environmental economics analyzed on negative externality of environment is timely and have played in recent year’s paramount importance because of the increasing attention given to environmental protection by many governments in view of the considerable social costs resulting from environmental deterioration. Environmental economics theories help to reduce complexity and give us lenses to focus inquiry and understanding and directing the observer about what to see, how to categorize, and how to relate problems. Therefore, the environmental economics theories offer excellent perspectives to explore and compare different theoretical insights. It also helps to think critically and build bridges amongst different scholars in the field of study.

3.3 Key Environmental issues and possible solutions in Ethiopia

3.3.1 Major Environmental issues in Ethiopia

Ethiopia's ecological predicament is becoming worse. It is thought to be the outcome of incorrect and uncontrolled environmental change in Ethiopia, particularly in the areas of plants, soils, and natural ecological processes. Increased human and animal populations whose livelihoods rely on the use of natural resources, particularly renewable natural resources, has resulted in rapid depletion and catastrophic deterioration of these resources. Their exploitation has been and continues to be beyond their ability to self-replicate(Gebretsadik, 2016).

Soil erosion and land degradation (including effects on forests, agricultural, and pastoral land), deforestation and forest degradation, water scarcity, biodiversity loss, and other types of pollution are among Ethiopia's key environmental challenges. In Ethiopia, environmental degradation is a pervasive concern in both rural and urban areas, however it is unevenly distributed and manifests itself in different ways in different regions(Daley, 2015).The most extensively dispersed activity in Ethiopia is land use change, mostly through the conversion of natural forests to agricultural land and settlement. According to existing records, dense woods covered around 40% of the country's land area at the turn of the twentieth century(Molla, Gebrekidan, Mamo, & Assen, 2010).

Ethiopia has ‘poor environmental sanitation, insufficient and hazardous water supply, urban sewerage system, and inadequate access to essential infrastructure services,' according to the situation on the ground. This is a reflection of the inadequacy of the environmental regulatory structure and the difficulty in enforcing environmental regulations(Fitiwi, 2014). The rapid expansion in human population, combined with dire poverty and rising consumption levels, is depleting natural resources on which present and future generations rely for survival. Growing population trends, as well as the resulting need for food, energy, and housing, have significantly altered land-use patterns and badly deteriorated the country's ecosystem (Gebretsadik, 2016).

3.3.2 Possible solutions

3.2.1 Application areas of theories of Environmental Economics in Ethiopia

Ethiopia's environmental profile suggests that the country's environment is being destroyed primarily as a result of human activity. As a result, by taking the proper steps, these degradations can be controlled. The right to a clean and healthy

environment is recognized in the FDRE Constitution. As a result, environmental preservation must be provided in order to enjoy this constitutional right(Janka, 2014).

Application of ecosystem services valuation to support sustainable land management

Sustainable land management is essential for guaranteeing an adequate and long-term supply of food, raw materials, and other natural environment services to human society. It entails both the long-term management of agricultural lands' productive capability and the long-term usage of natural and semi natural ecosystems. It is feasible to raise stakeholders' and decision-makers' knowledge of the economic benefits coming from sustainable land management by assessing the economic value of the many benefits supplied by land and ecosystems. Given the importance of economic concerns in decision-making, it is expected that economic valuing of environmental benefits will help to more sustainable and efficient decision-making.

Assessing the costs and benefits of land use change

This entails a continuous assessment of the impact of land degradation on ecosystem service supply and the accompanying economic costs. This is accomplished by using a method to assess the advantages of improving or sustaining ecosystem service supply through sustainable land management. The tool is based on a quantitative examination of the relationship between degradation and ecosystem status, and ecosystem state and ecosystem service supply. Basic ecological economic modelling can be used to examine these relationships.

Natural Resources Damage Assessment

Anthropogenic intervention, unrestricted grazing, and resource overuse are all common causes of natural resource deterioration in Ethiopia. Ethiopia has a variety of lakes, rivers, and wetlands in various agro-ecologies. Sediment deposition, agricultural development, nitrates, and grazing pastures are all threats to most lakes and wetlands. Over-exploitation of natural resources, expansion of agriculture and grazing lands, climate unpredictability, and other variables are all intimately tied to the loss of ecosystem resources, which is directly or indirectly related to human meddling(Getahun, 2018).

The efficient utilization of natural capital is widely acknowledged as critical to economic development. In recent years, both industrialized and developing countries have made headway in quantifying progress toward "sustainable development" and applying valuation methodologies to the examination of the environmental implications of investment projects and public policies. Human actions aren't the only thing threatening natural capital (or inactions). Natural hazards may also cause environmental (quantity or quality) alterations, which, in addition to affecting natural capital's intrinsic 'productivity,' may have a detrimental impact on people's 'capacity to utilize' environmental features(Dosi, 2001). Ex-post analysis can help to improve the estimation of the social costs of technical disasters. Disasters are often very visible and have the potential to cause significant economic disruption. Ex post evaluations can help people understand the scope and distribution of the social costs associated with technical disasters. In circumstances where culpability is a concern, such valuations can be used to establish compensation estimates(Cohen, 1995).

Eutrophication Control

Eutrophication caused by humans is occurring all throughout the world. Eutrophication lowers water quality and changes the structure and function of freshwater ecosystems. The biological effects of eutrophication are well established, but the extent and costs of eutrophication are not. Social, ecological, and policy-related responses all have the potential to cause economic losses(Dodds et al., 2009). The ever-increasing population in rural and urban areas puts a strain on natural resources by overusing the endowment and changing the environment to accommodate various developmental activities. The vegetation cover of Ethiopia's highlands becomes bare and vulnerable to water and wind erosion, resulting in increased sediment deposition in water bodies and broad flat fields. The runoff water transfers soil nutrients into bodies of water, resulting in eutrophication, which pollutes aquatic living organisms and plants. Conversion of wet lands, marshes, and swamp areas to grazing and farming also results in the extinction of biodiversity in wetland ecosystems as well as the introduction of exotic weeds(Getahun, 2018).

Growing industrialization trends in Ethiopia have created worries about water pollution, particularly in lakes. Due to harmful anthropogenic activities in the catchment, Ethiopian lakes have been experiencing major ecological difficulties. Intensive deforestation, livestock grazing, and conventional farming have all contributed to the basin's diminished plant cover and increased soil erosion. Runoff from polluted roadway surfaces is unregulated and released straight into bodies

of water(Berehanu, Lemma, & Tekle-Giorgis, 2015).The goal of eutrophication management has been to reduce phosphorus levels by using an environmental management plan. Costs of pollution mitigation and abatement (sewage treatment plant facilities, good soil management methods, nutrient source regulation, biological research). More efforts are needed to properly prevent water eutrophication in Ethiopian lakes.

The Economics of climate change

Ethiopia's economy and ecological system are both fragile and climate-vulnerable(César & Ekbom, 2013).Quantifying the economic effects of climate change is a critical step in Ethiopia's adaptation planning. The expected economic effects of climate variability and climate change in Ethiopia are concerning. Agriculture, Ethiopia's most climate-sensitive economic sector has a low adaptive capacity. Furthermore, the economy's total adaptive capacity is limited. Ethiopia has a low per capita income, making it a low-income country. Given these circumstances, climate change is expected to have a negative influence on the country's economic prospects(Yalew, Hirte, Lotze-Campen, & Tscharaktschiew, 2017).

Ethiopia should undertake an assessment exercise to understand better the economic value of the ecosystem services into the development and implementation of the country's plan. The value of ecosystem services is currently not adequately captured under System of National Account. The contributions of ecosystem services are missing and the depletion of ecosystem stocks is not captured. Therefore, there is a need to carry out an assessment to understand the economic valuation of the ecosystem services in the country. The ecosystem services economic valuation will provide the country with a better understanding how ecosystem contributes to national income to calculate their annual national income measured as GDP. Therefore, economic valuation of ecosystem services in conjunction with various types of valuation methodologies can be practical in the Ethiopian context.

4. Conclusion

The analysis in this study is based on theoretical considerations and overview on the existing key environmental issues in Ethiopia. Knowledge of the current status of key environmental issues in Ethiopia and determination of its mechanism are prerequisites to devising a sound solution to the problem. Based on reviewing the literature, this paper elaborates on the theories of environmental Economics and their contribution /possible solution in the Ethiopian context.In this paper, the authors explored, analyzed and evaluated the theoretical part of environmental externalities from social, economic and environmental perspectives of neoclassical theory of environment, Pigovian taxes: theory of policy intervention for negative externalities, Coasian, theory, theory of environmental evaluation and economic theory of pollution control. These theorists all emphasized the importance of environmental economics in realizing environmental quality in order to influence of human behavior and to introduce techniques and strategies to decrease environmental damages. Further, the strengths and weaknesses of the different theories in explaining contemporary environmental economics for societal developments are clearly identified. The in-depth reviewed literatures/ secondary commentaries on the theories of Environmental Economics have paramount impact on protection of environmental deterioration and enhancing the environmental qualities.

Environmental and natural resources such as air, water, forests and wild animals give many advantages to human beings. However, the absence of market for these resources negatively affects the well-being of human beings by reducing the benefits that can be generated from these resources. In this case, economic valuation method helps to find the price or economic values attached to natural resources. Therefore, the proper environmental valuation of non-market environmental commodities has significant policy implications.This study is initiated with a goal of fostering positive social change for rural and urban communities in Ethiopia. Proper implementation of theory of Environmental Economics theories improve the quality of life, protecting from disease and improve human health in terms of decreased mortality and morbidity, bringing environmental quality and increase in agricultural productivity, social justice, reducing environmental damages, preserve environmental assets for the enjoyment of both the present generation and future generations, aesthetic preservation, and sustenance of ecological diversity is helpful to foster positive social changes.

Placing an economic value on environmental goods and services, particularly the theory of environmental valuation has become accepted and adopted by many institutions, organizations and in many developed and developing countries in the area of environmental and natural resources such as air and water quality improvement, agricultural lands, urban residents, on wildlife conservation and protected areas services. It is becoming an increasingly important aspect of decision-making. But, the application of environmental valuation is not developed in Ethiopia like other developing countries and not much work has been done before. Placing an economic value on environmental goods and services, an efficient resource allocation is possible along with a balanced economic, social and environment.

5.Policy Implications

The theories of environmental economics can offer possible solutions to negative externalities that have an adverse impact on the environmental sustainability and human health. They have significant practical policy implications. Theories of environmental economics are effective and exciting as experienced by many countries. But the application of these theories is relatively less in Ethiopia and a lot need to be done in this area. Based on the findings of this study the following policy suggestions can be made:

Ethiopia has embarked on an ambitious structural transformation. However, this transformation requires better integration of environmental and sustainability considerations into the country's policy and institutional frameworks to achieve efficient use of resources that contribute sustainably to economic development, poverty reduction, and quality of life. The economic value of ecosystem services should get due attention and feed this information into the country's developmental policies. Therefore, there is a need for alternative policies to ensure the sustainable provision of ecosystem services.

Different studies on Ethiopia revealed that the main drivers of environmental degradation include: high population growth, high urbanization rate, as well as an economic growth that is largely driven by agricultural production, infrastructure expansion and increasing energy demand. Although some progress has been made, Ethiopia faces many challenges towards achieving the sustainable development goals. Environmental problems in Ethiopia are a constraining factor for sustainable development and improvement of people's livelihoods. Efforts have to be made to apply environmental economics in mitigating these problems. The existing regulatory frameworks are not sufficient in addressing environmental externalities in the country. Environmental Economics theories are on the other hand, a middle ground solution for the environmental problems in Ethiopia. Moreover, the application of these theories can have significant role in complimenting the existing regulatory frameworks. The advantages of environmental economics theories beg for the existence of sufficient legal framework in Ethiopia.

This study is important for decision makers on the application of environmental economics, and specifically the analysis and valuation of ecosystem services, to analyse the costs of land degradation and the benefits of sustainable ecosystem management. The economic valuation of ecosystem services can support land use policy making and implementation in various ways. First, it can reveal the economic costs and benefits of land use conversion of different types of land management. In this way, it can also show the trade-offs in land management, i.e., the economic benefits lost and gained, and the stakeholders benefiting and losing from different policy alternatives.

Secondly, it can present the interests of different groups of stakeholders in ecosystem management, thereby providing a basis for conflict resolution and integrated, participatory planning of natural resource management. Third, the approach allows calculation of economic efficient land management options. Fourth, it can provide the basis for setting up payment for ecosystem services (PES) type of schemes. On the other hand, the recognition of these remedies creates the impression that they can contribute to the effective protection of the environment if used properly. Environmental protection organs have not been fully authorized to take some important administrative measures against violators of environmental regulations. Therefore, it is recommended that all relevant environmental laws should incorporate theories of environmental Economics.

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Acknowledgements

We would like to express our gratitude to those institutions and individuals at the national, regional, and district levels that provided us with the data we needed for this study.

Declaration of interest

The authors declare that they have no competing interests.

Ethics approval

Not applicable.

Consent to participate

The authors need to accept and confirm the manuscript have read and agreed to its content and are accountable for all aspects of the accuracy and integrity of the manuscript. The article is original, has not already been published in a journal, and is not currently under consideration by another journal.

Consent for publication

The authors are volunteer for publication of original research findings entitled "**Environmental Economics Theories and Sustainable Use and Management of Ecosystem Services: An Application in Ethiopia** ". The authors grants the Journal a license to publish the article and identify itself as the original publisher.

Authors' contributions

1. The Author (Shishay Kiros) made contribution to the conception, design, acquisition and analysis of data.
2. The Co-author (Gollagari Ramakrishna**)** revised critically the content of the draft helped in improving the review of literature.
3. The Co-author (Temesegen Disassa) helped by relooking in to the draft and finalizing the content.

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