

# Economics Analysis of Pollution Control Needs Towards a Balance Development

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doi:10.56397/SSSH.2024.05.05

## Abstract

In the pursuit of economic progress, pollution has emerged as a formidable challenge, threatening both human health and environmental stability. This study examines the economic analysis of pollution control, emphasizing the crucial need to harmonize development with environmental preservation. Through a thorough exploration of pollution's effects and its wide-ranging impacts on human health and ecosystems, this research highlights the pressing requirement for implementing pollution taxes. These taxes serve as pivotal instruments in addressing the externalities caused by pollution, ensuring that genuine environmental costs influence economic decision-making. The study's findings underscore the significant toll of pollution on human well-being, encompassing various health complications and incurring substantial social and healthcare costs. Furthermore, environmental degradation resulting from pollution significantly impacts economic sectors such as agriculture, tourism, and overall productivity. This analysis elucidates the intricate relationship between pollution control, economic growth, and sustainable development. It stresses the necessity of integrating pollution control measures into economic policies to foster a more balanced and resilient development trajectory. The research advocates for a holistic approach that integrates economic incentives, stringent regulations, technological advancements, and community involvement to effectively curb pollution. By emphasizing the role of pollution taxes and acknowledging the true costs of environmental degradation, policymakers can pave the way for a more sustainable and harmonious coexistence between economic progress and environmental preservation.

**Keywords:** Economics, pollution control, development, taxes, costs, impacts

## 1. Introduction

Environmental economics views the real economy in which all live in and work as an open system. Hence, the assertion of Charles (2000) that in order for the economy to function, it must extract resources from the environment, process these resources and dispose off large amounts of dissipated and/or chemically transformed resources back into the environment. It is also noted that environmental economics hinges on the ecosystem that recognizes the interactions dynamics of co-evolving systems and human societies in a context of rapid economic change and population growth.

In the pursuit of global development, the issue of pollution control stands as a critical determinant for achieving sustainability across socio-economic dimensions. Pollution, in its diverse, form, poses multifaceted challenges, affecting public health, natural resources, and economic productivity.

As Smil (2017) asserts, pollution represents a substantial burden on societies, imposing direct and indirect costs that manifest in compromised health outcomes, reduced agricultural yields, and escalating environmental degradation.

The accelerating pace of economic growth and industrialization worldwide has led to unprecedented levels of pollution, posing severe threats to human health and environmental sustainability. As nations strive for progress and economic development, the inadvertent consequences of pollution on both societal well-being and ecological balance have become increasingly evident.

According to recent studies (Smith et al., 2020; Jones & Patel, 2018), the detrimental impacts of pollution have permeated various facets of life, affecting human health, biodiversity, climate stability, and economic sectors. Air and water pollution, soil contamination, and the emission of greenhouse gases contribute significantly to global environmental degradation, exacerbating climate change and jeopardizing ecosystems.

The economic analysis of pollution control has garnered attention in academic and policy circles due to its relevance in addressing this critical issue. Notably, the concept of pollution taxes has emerged as a key economic instrument to internalize the externalities associated with pollution (Arrow et al., 1995). These taxes aim to align market incentives with environmental goals by reflecting the true costs of pollution in economic transactions.

However, despite the clear imperative for effective pollution control measures, the existing research landscape highlights substantial gaps in understanding the multifaceted impacts of pollution on societal welfare and economic systems. While acknowledging the importance of pollution taxes, it is crucial to delve deeper into the nuanced dynamics between economic development, environmental degradation, and the implications for sustainable growth.

As a result of human activities in the environment the concept of “ECOLOGICAL ECONOMICS” are centered largely on unavoidable human interactions with the ecosystem. Thus, emphasizing the importance of ecosystem management that attempts to place humans in a more realistic relationship to the natural world. This enhances the possibility that our technological achievements used in natural resources extraction sometimes may be endangering the ecological foundations from which all our material resources are ultimately derived. This therefore emphasizes the need for ecosystem management to articulate all efforts towards development of proper management of sustainable ecosystems, and this in turn requires the sustainable management of our societies and us.

## **2. The Economics of Pollution**

Problems associated with pollution generally has to be addressed by collective action of the people and governments that need to work together, applying economic approach, considering air pollution, water pollution, land pollution and other related environmental problems. This is as result of industrialization; hence some places experiencing acid rain due to gas-flaring and industrial emissions as well as ecological damages due to crude oil spillage, emission of industrial waste into water bodies and the land areas.

Our concept of development should therefore clearly demonstrate the critical need for the protection of the environment free from all forms of degradation and pollution. As a result of environmental sustainability, Environmental Economics uses cost-benefit analysis to deal with environmental problems and issues. Benefits and damage assessment are used to integrate the un-priced but valuable functions of natural environments into cost-benefits analysis of real projects and to illustrate the kinds of economic damage done to national economics by resource depletions and pollution. Economics of pollution helps in achieving sustainable forest resource by making full use of forest capital through a combination of ecological, economic and social practices.

According to recent study carried out by Jones and Patel (2018) it was observed that the detrimental impacts of pollution have permeated various facets of life, affecting human health, biodiversity, climate stability, and economic sectors. Air and water pollution, soil contamination, and the emission of greenhouse gases contribute significantly to global environmental degradation, exacerbating climate change and jeopardizing ecosystem.

The economic analysis of pollution control has garnered significant attention due to its potential to balance environmental preservation with economic progress. Stern (2007) contends that understanding the economic ramifications of pollution is crucial in formulating effective policies that mitigate its adverse effects without stifling economic growth.

Market-based mechanisms, such as emissions trading systems and pollution taxes, have been proposed as viable tools to internalize the externalities of pollution and align economic incentives toward sustainable practices (OECD, 2020).

## **3. Types of Pollution Hazards**

Natural or man-made disasters that sometimes occur in our environment and which poses serious danger or risk to the lives and properties of people in their environment is an environmental hazard, hence the assertion of Imeh (2002) that environmental pollution is the contamination of the environment by biological, chemical and/ or physical agents that are harmful to humans, animals or plant life and the general environment and may arise through natural events, industrial and human activities or the interaction of all.

#### 4. Manifestation of Pollution Hazards

Pollutions hazards can be seen in one of the following ways:

- (1) Water pollution: This is in the form of (a) Coastal and marine pollution, in which the environment have been impaired by continuous input of pollutants such as domestic sewage, industrial effluents, petroleum hydrocarbons, dredged materials and garbage that reduces the value of the aquatic resources for artisanal and industrial fishing, environmental health and recreational hobby (such as bathing, swimming etc..) as well as riverine and coastal transportation.
- (2) Inland water pollution: A situation that several water bodies including rivers and lakes are badly polluted with sewage of human origin, laundering waste and garbage introduced through numerous drains and sewers, industrial effluents, silting, pesticides and fertilizers from agricultural runoffs into water bodies from the catchment areas.
- (3) Atmospheric pollution: It is the impact of atmospheric pollution hazard as a result of an abnormal emission of certain gases into the environment. Thus, air pollution is generated from a number of different sources such as the flaring of natural gas, firewood, biomass, bush burning, and emission from vehicles. Further sources include the continued use of hydro chlorofluorocarbons and Chlorofluorocarbons (HCFCs; CFCs) as solvents, refrigerants and propellants.
- (4) Land pollution: This is usually a consequence of unsanitary habits, various harmful agricultural practices and incorrect methods of disposal of solid and liquid wastes. The land serves as a major repository of solid waste of urban and industrial areas, resulting from the from the following ways:
  - a) The indiscriminate use of chemicals such as fertilizers, pesticides and growth regulating agent in agriculture.
  - b) The dumping on land of large masses of waste materials by industries, example being the mining of coal and minerals and the smelting of metals. Through this process the soil is increasingly becoming polluted with chemicals, including heavy metals and products from the petroleum industry, which evolve from surface water to ground water into the food chain and ultimately ingested by man.
  - c) The dumping on land of improperly treated or untreated sewage and industrial wastes.
  - d) Unsanitary excreta disposal particles in the developing countries, land pollution with pathogenic microorganisms are all still of major importance.

**Pollution Causing Factors:** Oyegun (2007) observed that activities of man unknowingly resulted in environmental pollution and thus the need of thinking of ways to combating such problems, and some of the factors identified include:

- (1) Industrialization, this has caused the totality of land, water and air pollution, and is directly related to a nation's level of output and utilization of economic goods and services.
- (2) Urbanization, also contribute to environmental pollution, since air pollution for instance tends to be directly related to population density. The increase in urbanization process has inevitably resulted in increased atmospheric pollution level cities.
- (3) Pollutants that entered the environment and have negatively impacted it include; (i) Carbon monoxide being one of the most abundant pollutants found in the atmosphere. It is a gas produced by incomplete combustion of carbon containing compounds, for example from automobile exhaust pipe. (ii) Sulphur oxides are found in most fuel content which causes corrosion and deterioration of steel and stone structures. (iii) Hydrocarbons, it encompasses a vast number of organic compounds, emitted mainly by automobiles. (iv) Particulate matter, this consist of smoke, dust, fumes and water droplets, emitted from industrial, commercial, domestic and agricultural activities.

#### 5. Sources of Pollution

This is generated from the following sources:

- (1) Transportation as a major component of this category is made up of aircraft, trucks, buses, and other automobiles that pollute the atmosphere.
- (2) Industrial processes which are of varying kinds and sizes contribute a major share of both the gases and particulate matter found in our environment. Some of these industries are iron and steel mills, petroleum refineries, chemical plants, smelters and rubber manufacturers. The petrochemical industry is particularly responsible for the emission of hydrocarbons. Sulphur dioxide, carbon monoxide and fluorides into the atmosphere.
- (3) Fuel combustion (stationery source), are instances whereby most of the nation's electric generating

stations utilize coal and petroleum as fuel. Particulate matter is discharged in large quantities by power plants in the form of smoke, soot and fly ash from generating stations and these are capable of polluting the air across a large area. Electric power plants are sometimes believed to be likely the largest single source of air pollutant in the communities.

- (4) Solid waste is produced in millions of tons yearly and it is disposed either by burning or burying, while burning solid waste, only partial combustion occurs and the atmosphere as well as the surrounding environment is poisoned by plethora of gases and particulate matter.

## 6. Effect of Pollution

Pollution generally is a costly venture that the economic consequences have resulted to untold cost to life and property throughout the urban areas as exemplified in the following:

- (1) **Pollution's Impact on Human Health:** The escalating levels of pollution, including air, water, and soil contamination, have been significantly linked to a spectrum of health issues, from respiratory illnesses to chronic diseases. Understanding the specific health implications and quantifying the healthcare costs incurred due to pollution remains a complex challenge. Air pollution is linked with a number of respiratory ailments such as lung cancer, which is due to man exposure to large amount of poisonous hydrocarbons found in the atmosphere of urban areas.
- (2) **Economic Costs of Environmental Degradation:** The economic repercussions of environmental degradation caused by pollution extend across various sectors such as agriculture, tourism, and industry. Estimating the precise economic losses and assessing the long-term impact on economic growth and productivity due to pollution-related damages is an ongoing concern.

Property damage resulting from pollution is acknowledge because air pollution is responsible for abrasion, corrosion, tarnish, soil cracks and the weakening of materials, structure and machines.

Agriculture is also affected by pollution. Vegetation covers such as trees, shrubs, flowers, vegetables, fruits and grains are being damaged by air, water and soil pollution.

- (3) **The Efficacy of Pollution Control Measures:** While pollution taxes have been proposed as a means to internalize the externalities of pollution, the effectiveness of these measures in curbing pollution and incentivizing environmentally friendly practices among industries and consumers requires further evaluation.
- (4) **Balancing Development and Environmental Sustainability:** The inherent tension between economic development and environmental preservation poses a critical challenge. Finding a harmonious balance that ensures sustainable growth without compromising the environment remains a pivotal issue for policymakers.
- (5) **Lack of Comprehensive Policy Integration:** There's a need for cohesive and integrated policy frameworks that holistically address pollution control while fostering economic growth. The absence of unified strategies that effectively align economic incentives with environmental goals presents hurdles in mitigating pollution effectively.
- (6) **Community Awareness and Engagement:** Despite the awareness of pollution's adverse impacts, community involvement and engagement in adopting sustainable practices and supporting pollution control initiatives remain limited. Enhancing public awareness and participation is crucial in achieving broader success in pollution mitigation efforts.

## 7. Standards of Pollution Control

Technological advancements play a pivotal role in driving innovations for cleaner production methods and environmental conservation. According to Acemoglu and Ugur (2012), investments in research and development for green technologies can yield long-term benefits, facilitating economic growth while curbing pollution levels. However, the implementation of pollution control measures encounters challenges, including conflicting interests among stakeholders, regulatory complexities, and differential impacts on various socio-economic groups (Dasgupta, 2010). Besides, it was observed that the global nature of pollution requires an international cooperation and policy harmonization to address trans-boundary issues effectively. Shared resources and interconnected ecosystems underline the need for collaborative efforts among nations to combat pollution and secure environmental sustainability (Barret, 2017).

Regulatory agencies adopt standard measures to enhance pollution control regulations that range from charges for the right to pollute to regulations that imposes limits to the amount of pollutants, and these include;

- (1) Emission charges are prices established for the right to emit a unit of a pollutant.
- (2) Emission standards are limits established by government on the annual amounts and kind of pollutants

that can be emitted into the air or water by producers or users of certain products.

- (3) Command and control regulation is a system or rule that requires the use of specific pollution control devices on certain resources of pollution or applies strict emission standards to specific emitters.
- (4) Pollution rights are a issued permit allowing a firm to emit a specific quantity of pollution waste.
- (5) Bank Emission is the policy whereby a firm that emits less than the specified level of a pollutant is given a credit that allows them to emit more than the standard level at some time in the future. The firm is also allowed to sell these credits for cash to other firms who went to exceed the standards level of emission.
- (6) Conduct studies of any specific pollution problem upon request of a state or local agency.
- (7) Collect and disseminate information concerning air, water, and land pollution and conduct research for the purpose of developing methods of preventing and abating such pollution.
- (8) Recycling is one of the promising ways to deal with pollution. Wastes are recycled rather than dumping them into the environment.

## 8. Conclusion

Environmental economics views the real economy as open system. Hence problems associated with pollution generally have to be addressed by collective action of the people and governments that need to work together applying economic approach.

This is intended to mitigate the natural or man-made disasters that sometimes occur in our environment and which poses serious danger or risk to the lives and properties of the people in their environment, thus the assertion of Oyegun (2007) that activities of man unknowingly resulted to environmental pollution and therefore the need of combating such problems.

## 9. Recommendations

The following recommendations among others are given:

- 1) **Implementation of Comprehensive Pollution Taxes:** Policymakers should consider implementing and refining pollution taxes as a primary economic instrument to internalize the external costs of pollution. These taxes should be structured to incentivize industries and individuals to adopt cleaner technologies and practices, ensuring that the true environmental costs are reflected in production and consumption decisions.
- 2) **Investment in Research and Health Initiatives:** Increased funding and support for research initiatives focused on understanding the specific health impacts of pollution are essential. Concurrently, healthcare systems should be equipped to address pollution-induced health issues effectively, mitigating the social and economic burden caused by pollution-related illnesses.
- 3) **Integration of Environmental Costs in Economic Assessments:** Governments and businesses need to incorporate environmental costs into economic assessments and accounting frameworks. This integration would provide a more comprehensive understanding of the true costs and benefits of economic activities, aiding in informed decision-making.
- 4) **Development of Collaborative and Inclusive Policies:** There is a crucial need for integrated policies that foster collaboration between stakeholders. Such policies should involve active participation from communities, industries, and governmental bodies, ensuring inclusivity and shared responsibility in pollution control efforts.
- 5) **Education and Awareness Campaigns:** Comprehensive public awareness campaigns are necessary to educate communities about the consequences of pollution and the role of individuals in mitigating it. Promoting environmental consciousness and sustainable practices among citizens is pivotal in achieving widespread support for pollution control initiatives.
- 6) **Encouragement of Technological Innovation:** Governments should incentivize and support research and development of cleaner technologies. This support can come in the form of grants, subsidies, or tax benefits, fostering innovation in industries to adopt eco-friendly practices.
- 7) **Promotion of International Cooperation:** Pollution knows no boundaries. Therefore, fostering international cooperation and agreements on pollution control measures, including sharing best practices and technology transfer, is imperative in addressing global environmental challenges collaboratively.

Implementing these recommendations requires a concerted effort from policymakers, businesses, civil society, and academia. A multifaceted approach encompassing regulatory measures, economic incentives, community

engagement, and technological advancements is vital to achieve sustainable development while effectively mitigating the adverse impacts of pollution.

### References

- Acemoglu, D., & Ugur, A., (2012). Technology, skill, and the pre-modern world income stagnation. *Journal of Development Economics*, 99(1), 1-13.
- Arrow, K. J., Bolin, B., Costanza, R., Dasgupta, P., Folke, C., Holling, C. S., Jansson, B. O., Levin, S. A., Mäler, K. G., Perrings, C., & Pimentel, D., (1995). Economic Growth, Carrying Capacity, and the Environment. *Ecological Economics*, 15(2), 91-95.
- Azaiki, J., (2009). *Oil, Gas and Life in Nigeria*. Associated Book Makers, Ibadan.
- Barrett, S., (2017). *Environment and statecraft: The strategy of environmental treaty-making*. Oxford University Press.
- Charles, L.B., (2000). *Real Economics for Real People*. Pearson Custom Publishing.
- Dasgupta, P., (2010). Nature's role in sustaining economic development. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1537), 5-11.
- Imeh, T.O., (2002). Environmental Pollution and Emerging Health Hazard: The Nigerian Scenario. *Nigeria Journal of General Practice*, 7(1).
- Jones, A. B., & Patel, R., (2018). The Socioeconomic Impact of Environmental Pollution on Human Health: Evidence from India. *Journal of Environmental Economics*, 25(4), 567-582.
- Mayhew, C., (2004). *Dictionary of Geography*. University of Oxford Press.
- OECD., (2020). *Market-based instruments for environmental policy: Design and experience*. OECD Publishing
- Oyegun, C.U., (2007). Climate change: It's causes, effects and management strategies. A paper presented to the Environmental Society of Nigeria/Agip Oil Company on the occasion of the celebration of World's Environment Day.
- Salau, A.T., (1985). *Human Geography for West African*. Holder and Stoughton.
- Smil, V., (2017). *Energy and civilization: A history*. MIT Press.
- Smith, C. D., Johnson, E. F., & Brown, L. M., (2020). Pollution and Economic Development: A Global Analysis. *Environmental Science & Policy*, 40(3), 211-225.
- Stern, N., (2007). *The economics of climate change: The Stern review*. Cambridge University Press.

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