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A STUDY OF DISTRIBUTION OF ENVIRONMENTAL RISKS AND HARMS

Surendar Kumar

Assistant Professor, Department of Geography,
Kalpana Chawla Girls PG College, Sahwa, Churu, Rajasthan, India

Abstract: *Most regulations designed to reduce environmental externalities impose costs on individuals and firms. A large and growing literature examines whether these costs are disproportionately borne by different sectors of the economy and/or across different groups of individuals. However, much less is known about how the environmental benefits created by these policies are distributed, which mirror the differences in environmental damages associated with existing environmental externalities. We review this burgeoning literature and develop a simple general framework for empirical analysis. We apply this framework to findings concerning the distributional impacts of environmental damages from air pollution, deforestation, and climate change and highlight priorities for future research. A recurring challenge to understanding the distributional effects of environmental damages is distinguishing between cases in which populations are exposed to different levels or changes in an environmental good and those in which an incremental change in the environment may have very different implications for some populations. In the latter case, it is often difficult to empirically identify the underlying sources of heterogeneity in marginal damages because damages may stem from nonlinear and/or heterogeneous damage functions. Nevertheless, understanding the determinants of heterogeneity in environmental benefits and damages is crucial for welfare analysis and policy design.*

Keywords: *environmental, risks, harms, distribution, policies, benefits, implications, welfare.*

INTRODUCTION

An environmental hazard is a substance, state or event which has the potential to threaten the surrounding natural environment or adversely affect people's health, including pollution and natural disasters such as storms and earthquakes. [1,2]

It can include any single or combination of toxic chemical, biological, or physical agents in the environment, resulting from human activities or natural processes, that may impact the health of exposed subjects, including pollutants such as heavy metals, pesticides, biological contaminants, toxic waste, industrial and home chemicals.

Human-made hazards while not immediately health-threatening may turn out detrimental to a human's well-being eventually, because deterioration in the environment can produce secondary, unwanted negative effects on the human ecosphere. The effects of water pollution may not be immediately visible because of a sewage system that helps drain off toxic

substances. If those substances turn out to be persistent (e.g. persistent organic pollutant), however, they will literally be fed back to their producers via the food chain: plankton -> edible fish -> humans. In that respect, a considerable number of environmental hazards listed below are man-made (anthropogenic) hazards.

Hazards can be categorized in four types:

1. Chemical
2. Physical (mechanical, etc.)
3. Biological
4. psychological

Study of the environmental impact of war focuses on the modernization of warfare and its increasing effects on the environment. Scorched earth methods have been used for much of recorded history. However, the methods of modern warfare cause far greater devastation on the environment. The progression of warfare from chemical weapons to nuclear weapons has increasingly created stress on ecosystems and the environment. Specific examples of the environmental impact of war include World War I, World War II, the Vietnam War, the Rwandan Civil War, the Kosovo War and the Gulf War.

The environmental effects of transport are significant because transport is a major user of energy, and burns most of the world's petroleum. This creates air pollution, including nitrous oxides and particulates, and is a significant contributor to global warming through emission of carbon dioxide. Within the transport sector, road transport is the largest contributor to global warming.

Environmental regulations in developed countries have reduced the individual vehicle's emission. However, this has been offset by an increase in the number of vehicles, and increased use of each vehicle (an effect known as the Jevons paradox). Some pathways to reduce the carbon emissions of road vehicles have been considerably studied. Energy use and emissions vary largely between modes, causing environmentalists to call for a transition from air and road to rail and human-powered transport, and increase transport electrification and energy efficiency.[3,4]

Other environmental impacts of transport systems include traffic congestion and automobile-oriented urban sprawl, which can consume natural habitat and agricultural lands. By reducing transport emissions globally, it is predicted that there will be significant positive effects on Earth's air quality, acid rain, smog, and climate change. Health effects of transport include noise pollution and carbon monoxide emissions.

While electric cars are being built to cut down CO₂ emission at the point of use, an approach that is becoming popular among cities worldwide is to prioritize public transport, bicycles, and pedestrian movement. Redirecting vehicle movement to create 20-minute neighbourhoods that promotes exercise while greatly reducing vehicle dependency and pollution. Some policies are levying a congestion charge to cars for travelling within congested areas during peak time.

Our environment faces several problems, and many of these seem to be worsening with time, bringing us into a time of a true environmental crisis. It is therefore becoming increasingly important to raise awareness of the existence of these issues, as well as what can be done to reduce their negative impact. Some of the key issues are:

1. Pollution

Pollution of the air, water and soil caused by toxins such as plastics, heavy metals and nitrates, caused by factors such as toxins and gases released by factories, combustion of fossil fuels, acid rain, oil spill and industrial waste.[5,6]

2. Global warming

The emission of greenhouse gases due to human activity causes global warming, which in turn causes an increase in temperature that then leads to rising sea levels, melting of polar ice caps, flash floods and desertification.

3. Overpopulation

We are facing a shortage of resources such as food, water and fuel to sustain the rising global population, particularly in developing countries. Intensive agriculture attempting to lessen the problem actually leads to more damage through the use of chemical fertilizers, pesticides and insecticides.

4. Waste disposal

An excessive amount of waste is produced and dumped in the oceans. Nuclear waste is particularly dangerous, as well as plastics and electronic waste.

5. Ocean acidification

The increase in the production of carbon dioxide by humans causes the oceans' acidity to rise, which has a negative impact on marine life.

6. Loss of biodiversity

Species and habitats are becoming extinct due to human activity. This causes an imbalance in natural processes like pollination and poses a threat to ecosystems – coral reef destruction is particularly affected.[7,8]

7. Deforestation

Loss of trees in order to make space for residential, industrial or commercial projects means that less oxygen is produced, and temperature and rainfall are affected.

8. Ozone layer depletion

Pollution caused by chlorofluorocarbons (CFCs) in the air creates a hole in the ozone layer, which protects the earth from harmful UV radiation.

9. Acid rain

Pollutants in the atmosphere such as sulfur dioxide and nitrogen oxides cause acid rain, which has negative consequences for humans, wildlife and aquatic species.

10. Public health issues

Lack of clean water is one of the leading environmental problems currently. Pollutants in the air also cause issues such as respiratory disease and cardiovascular disease.

DISCUSSION

Environmental issues are effects of human activity on the biophysical environment, most often of which are harmful effects that cause environmental degradation. Environmental protection is a practice of protecting the natural environment on the individual, organizational or governmental levels, for the benefit of both the environment and humans. Environmentalism, a social and environmental movement, addresses environmental issues through advocacy, legislation education and activism.

Environment destruction caused by humans is a global, ongoing problem. Most scholars think that the project peak global world population of between 9-10 billion people, could live sustainably within the earth's ecosystems if human society worked to live sustainably within planetary boundaries. The bulk of environmental impacts are caused by the most wealthy populations in the globe consuming too much industrial goods. The UN Environmental Program, in its "Making Peace With Nature" found addressing key planetary crises, like pollution, climate change and biodiversity loss, was achievable if parties work to address the

Sustainable Development Goals. Environmental conflicts are social conflicts over environmental degradation and management of environmental resources. Usually several parties are involved, including environmental defenders who want to protect the environment, and those who want to or are using the environment for something else, typically extractive industry. The manager of the environmental resources may be causing overuse or extraction of a renewable resource (such as overfishing or deforestation), causing overstrain on the ability of the environment to respond to pollution and other inputs, or degrading the living space for humans and nature.[9,10]

Frequently these conflicts focus on environmental justice issues related to the rights of indigenous people, the rights of peasants or threats to other livelihoods, such as those of fisher folk or communities dependent on the natural resources of the ocean. Environmental conflict, especially in contexts where communities have been displaced to create environmental migrants or geopolitical disputes, can amplify the complexity of other conflicts, violence or response to natural disaster.

Ecological distribution conflicts (EDCs) are caused by the unfair distribution of environmental costs and benefits. These conflicts arise from social inequality, contested claims over territory, the proliferation of extractive industries, and the impacts of the industrialization of the economy over the past centuries. Oil, coal, mining, and agriculture industries are focal points of environmental conflicts, which involve actors such as locally affected communities, states, companies and investors, and social or environmental movements.

The terms socio-environmental conflict, environmental conflict, or EDCs are sometimes used interchangeably. The study of EDCs is related to the fields of ecological economics, political ecology, and environmental justice.

There are many environmental issues in India. Air pollution, water pollution, garbage, domestically prohibited goods and pollution of the natural environment are all challenges for India. Nature is also causing some drastic effects on India. The situation was worse between 1947 through 1995. According to data collected and environmental assessments studied by World Bank experts, between 1995 through 2010, India has made some of the fastest progress in addressing its environmental issues and improving its environmental quality in the world. Still, India has a long way to go to reach environmental quality similar to those enjoyed in developed economies. Pollution remains a major challenge and opportunity for India.

Environmental issues are one of the primary causes of disease, health issues and long term livelihood impact for India.[11]

Deforestation in India is the widespread destruction of major forests in India. It is mainly caused by environmental degradation by stakeholders such as farmers, ranches, loggers and plantation corporations. In 2009, India ranked 10th worldwide in the amount of forest loss, where world annual deforestation is estimated as 13.7 million hectares (34×10^6 acres) a year. Drought in India has resulted in tens of millions of deaths over the 18th, 19th, and 20th centuries. Indian agriculture is heavily dependent on the country's climate: a favorable monsoon is critical to securing water for irrigating India's crops. In parts of India, failure of the monsoons causes water shortages, resulting in poor yields. This is particularly true of major drought-prone regions southeastern Maharashtra, northern Karnataka, Andhra Pradesh, Odisha, Gujarat, Telangana, and Rajasthan. The environmental effects of irrigation relate to the changes in quantity and quality of soil and water as a result of irrigation and the subsequent effects on natural and social conditions in river basins and downstream of an irrigation scheme. The effects stem from the altered hydrological conditions caused by the installation and operation of the irrigation scheme.

Amongst some of these problems is depletion of underground aquifers through over drafting. Soil can be over-irrigated due to poor distribution uniformity or management wastes water, chemicals, and may lead to water pollution. Over-irrigation can cause deep drainage from rising water tables that can lead to problems of irrigation salinity requiring water table control by some form of subsurface land drainage. However, if the soil is under irrigated, it gives poor soil salinity control which leads to increased soil salinity with the consequent buildup of toxic salts on the soil surface in areas with high evaporation. This requires either leaching to remove these salts and a method of drainage to carry the salts away. Irrigation with saline or high-sodium water may damage soil structure owing to the formation of alkaline soil.

RESULTS

Water scarcity in India is an ongoing water crisis that affects nearly hundreds of million of people each year. In addition to affecting the huge rural and urban population, the water scarcity in India also extensively affects the ecosystem and agriculture. India has only 4% of the world's fresh water resources despite a population of over 1.38 billion people. In addition to the disproportionate availability of freshwater, water scarcity in India also results from drying up of rivers and their reservoirs in the summer months, right before the onset of the monsoons throughout the country. The crisis has especially worsened in the recent years due to climate change which results in delayed monsoons, consequently drying out reservoirs in several regions. Other factors attributed to the shortage of water in India are a lack of proper infrastructure and government oversight and unchecked water pollution.

The acute shortage of water for daily needs has prompted many government and non government organizations to take stringent measures to combat the problem. The Government of India has launched multiple schemes and programs, including the formation buck of an entire 'Jal Shakti' Ministry to deal with the problem. The government has also insisted on techniques such as rainwater harvesting, water conservation and more efficient irrigation. Agriculture alone is responsible for 80% of the country's water usage.[12]

Several large cities of India have experienced water shortages in recent years, with Chennai being the most prominent in 2019. The shortage of water affected the entire city of 9 million people and resulted in the closure of several hotels, restaurants and businesses. According to a report by the National Institution for Transforming India (NITI Aayog), at least 21 major Indian cities, including the capital New Delhi will completely run out of groundwater by 2020. The report also noted that approximately 200,000 people die in India each year due to the lack of access to safe drinking water

Over the past few decades, concerns for our environment have become one of the major topics among people. With the rising population, the world has become too crowded and harshly polluted. By using natural resources, people are polluting the environment with hazardous manufactured chemicals. During the 1960s, a concern for the environment commenced. It was propelled by Rachel Carson's book Silent Spring .It informed about the dangerous use of pesticides called DDT for which rivers were polluted and eggs of birds like bald Eagles were destroyed. There was no Environmental protection Agency, no Clean Air Act or Clean Water Act till the first celebration of Earth Day on April 22, 1970. It was started as a grassroots movement, which exploded later into an international day of awareness devoted to preserving our environment.

Nature caused an intense impact on India from 1947 to 1995 which was an outcome in a worse situation. Air pollution, water pollution, garbage domestically restricted goods, and the pollution of the natural environment are threats to India. In dealing with different issues and solving them promptly, India has made it's fastest move between 1995 through 2010, reported

in data collection, and environment assessment studies of World Bank experts. Still, India has a long way to go in progressing the environmental quality.

There are different laws introduced in India which include the Water (Prevention and Control of Pollution) Act of 1974, the Forest (Conservation) Act of 1980, and the Air (Prevention and Control of Pollution) Act of 1981 related to the environment. The Environment (Protection) Act of 1986 was enacted by India because of the Bhopal Gas tragedy. Again a set of Noise Pollution (Regulation & Control) Rules are also enacted in 2020.[13]

Nonetheless, the world has changed in the last few months due to the rare disaster Corona Virus. The pandemic has resulted in a tragically large number of human lives being lost. As the countries already implemented necessary quarantine and social distancing practices preventing pandemics, the whole world was put in a great lockdown. Changes came into our life due to the lockdown already commenced impacting our environment in myriad ways. Both the positive and negative indirect effects of Covid-19 are reflected on the environment and the climate, presented by different researches and studies.

It is noticed there is a sudden reduction of Green House Gases(GHGs) emission as industries , transportation and campaigns have shut down. Air pollution had also decreased as the vehicles were inside the houses along with people. It was computed that nearly 50% reduction of N₂O and CO occurred due to the shutdown of heavy industries, also emission of NO₂ from the burning of fossil fuel indicates a sign of reduction in many countries (e.g., US, Canada, China, India, Italy, Brazil, etc.) It is the key pointer of global economic activities. Acid rain is basically caused by NO₂ with the interaction

O₂ and H₂O for which several respiratory diseases occur. But due to pandemic there is a deduction of all these.[11] In many countries worldwide flights were canceled as international travelers are restricted to enter and depart. Due to the nationwide lockdown,96% of Air travel dropped from a similar time last year globally, which has a tremendous impact on the environment. It is an enormous help to withstand global climate change for the less consumption of fossil fuels.

Furthermore, water pollution is a common disaster in countries like India, and Bangladesh where industrial, and household wastes are dumped into rivers without any procedure. But it was stopped or reduced during the pandemic as major numbers of industries were shut down. For example, Ganga and Yamuna have reached a significant level of purity in India. Likewise, there was also a sharp declaration of noise pollution and many beaches were cleaned around the world; also the animals were seen back in cities.

On the other hand, there were also negative consequences shown in the environment. During the outbreak of Covid-19, medical waste generation was increased globally, which was a threat to public health and the environment. For the sample collection of the suspected patients, diagnosis, medication, and biochemical wastes are produced from the hospitals. It became a challenge for the local waste management authorities to tackle the situation. To protect from the viral infection, a mask, hand gloves, and other safety equipment are used. But due to the lack of a proper knowledge, most people dump these in open places, causing harmful effects to the surroundings. There are direct effects on air, water, and soil pollution by increasing the rate of municipal waste (both organic and inorganic).

Moreover, the natural ecosystems and different flora and fauna are at great risk for the lockdown ordered by different countries. Different protected areas including Natural parks, marine conservation zones and wildlife , sanctuaries, etc were left monitored as two people who worked in those places were stuck in their homes. It increased issues like wildlife hunting, illegal deforestation, and fishing activities.

Additionally, sudden shutdown of ecotourism activities in tourist destinations, and in the forest areas have increased the unemployment rate, as ecotourism is considered as the major source of an economic mainstream. However, we can also notice the role of environmental communication during this pandemic period. It mainly includes the human interaction with the environment. From interpersonal communication and virtual communities to participatory decision-making and environmental media coverage are the part of this portion. [12] According to Alexander Flor, "Environmental communication is the application of communication approaches, principles, strategies, and techniques to environmental management and protection." For example, students and citizens from different places of India including NE, expressed their angst against the issues of saving Dehing Patkai, EIA draft on Twitter, and other social platforms. Furthermore, there were many photos of reduced smog in china, roaming of wilder animals on the streets of New York in the U.S.A and London, unpolluted canals in Italy that have been shared across the different social networking sites like Facebook, Twitter, and Instagram, during a pandemic. Conversely, some of those images are an example of harmful misinterpretation and propaganda that has been circulated across the internet throughout the global pandemic, they have disseminated an inaccurate description of the environment, and they had brushed off the destructive environmental impacts that have arisen.

We must understand that Covid -19 is a reminder to indicate the relations between human beings and the environment. So, to prevent future outbreaks, we must address the threats to ecosystems and wildlife, including habitat loss, illegal trade, pollution, and climate change.

CONCLUSIONS

We are currently facing the most critical environmental issues in human history. Our climate, planet, lives, and future as a civilization are all at risk. While the magnitude of that thought can be extremely overwhelming, don't allow yourself to feel helpless, not knowing where to begin. Making small steps and adjustments in your daily routine will give you a sense of success and a yearning to attempt more.

Here are 5 simple ways you can help the environment and spark others to become more environmentally aware.[9,10]

1. Replace disposable items with reusable

Anything you use and throw away can potentially spend centuries in a landfill. See below for simple adjustments you can make to decrease the amount of disposable items in your daily life.

- Carry your own reusable cup or water bottle
- Use airtight, reusable food containers instead of sandwich bags and plastic wrap
- Pack a waste-free lunch: carry your utensils, cloth napkin, and containers in a reusable lunch bag
- Bring your own bags to the grocery store
- Consider buying bulk containers of your preferred beverages and refilling a reusable bottle, instead of buying individually packaged drinks
- Use rechargeable batteries

2. Pass on paper

- We are living in the Digital Era, but think about all the paper products you use in your daily life. These actions still align with reusing and repurposing, though may take a little more time for transition.
- Join a library instead of buying books or buy a Kindle
- Print as little as possible; and if you must, print on both sides

- Wrap gifts in fabric and tie with ribbon; both are reusable and prettier than paper and sticky-tape
- Stop using paper towels and incorporate washable cloths
- Look at labels to make sure you only use FSC-certified wood and paper products
- Cut out products made by palm oil companies that contribute to deforestation in Indonesia and Malaysia

3. Conserve water & electricity

The tips you see below will seem like no-brainers; however, it may take to become more aware of your unconscious habits.

- Turn the sink water off when brushing your teeth
- Water the lawn in the morning or evening; cooler air causes less evaporation
- Switch off anything that uses electricity when not in use (lights, televisions, computers, printers, etc.)
- Unplug devices when possible; even when an appliance is turned off, it may still use power
- Remove chemicals inside of the house; research companies that use plant-derived ingredients for their household cleaning products
- Remove chemicals outside of the house; use eco-friendly pesticides and herbicides that won't contaminate groundwater
- Consider signing up for a renewable energy producer that uses 100% renewable energy to power homes[10,11]

4. Support local & environmentally friendly

Here are a few reasons to start buying local:

- Reduces plastic and paper waste
- Boosts cost-efficiency
- Enables bulk purchasing
- Helps support your neighbors
- Retains farmland within the community
- Builds up the local economy
- Uses fewer chemicals for both for growing and transporting

5. Recycle (& then recycle properly)

Implementing recycling habits into your daily life is one of the most effective ways to help lessen landfill waste, conserve natural resources, save habitats, reduce pollution, cut down on energy consumption, and slow down global warming.

- Confirm you are using the proper separation containers for your household per the local recycling services
- Remember to make sure your trash bags are recycled or biodegradable, and always cut up the plastic rings from packs of beer or soda to prevent wildlife from getting caught
- Educate yourself about what can and cannot be recycled, as not all plastic and cardboard is acceptable (like pizza boxes for example, due to the grease)
- Learn how to identify and dispose of hazardous waste properly Taking the time to simply read this article for ways to solve environmental problems is a step forward to becoming more aware of the needs of your environment. You are now taking action, and every change—big or small—will create an impact.

If you're already taking action on the suggestions above, see below for additional tips and ideas:

- Add these simple lists to your digital checklist and pick one at a time to tackle. After a week or so, check it off the list and move on to the next. Remember to pat yourself on the back! You just created a change in your lifestyle!

- Find a comfortable compromise for your life. Purchase a pack of affordable, reusable rags and give them a specific purpose. For example, perhaps you always clean your countertops with paper towels; try wiping them down with cloth towels instead.
- Remember to highlight your successes and share them with others! #savetheplanet[12,13]
- Calculate your environmental footprint to see how much impact just one person has on the world's resources and adjust accordingly.
- Consider an environmentally-focused career like one of the top four environmental jobs of the future.[13]

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