



Available Online at EScience Press

# Journal of Plant and Environment

ISSN: 2710-1665 (Online), 2710-1657 (Print)

<https://esciencepress.net/journals/JPE>

## Water and Air Pollution as an Emerging Problem for Pakistan: A Review

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### ARTICLE INFO

#### Article History

Received: January 11, 2022

Revised: March 19 2022

Accepted: April 07, 2022

#### Keywords

Climate change

Air pollution

Water pollution

WHO

Economic losses

Water Pollution in Pakistan

### ABSTRACT

Currently, the development of human societies is greatly affected because of global environmental problems. Pakistan is also on the list of the most affected countries facing a number of environmental issues that affect not only people health but also the economy. The present work examines with focus on secondary data and information gathered from various literature on water and air pollution. Both water and air pollution are very complex issues and their connection to measuring the exact level of pollution is an extremely difficult one. Therefore, in this review, the main sources influencing pollution risks in Pakistan are human urbanization, surface water pollution, industrial sewage pollution, air pollution, and soil pollution. This study will help to develop suitable strategies and rules for Pakistan environmental protection in the near future. Finally, the aim of this article is to raise awareness of environmental pollution, including water pollution, air pollution, and their effect on human health, animals, and agricultural activities.

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### INTRODUCTION

Today, environmental changes affect human health and other anthropological populations worldwide (Myers *et al.*, 2013; Garruto *et al.*, 2004; McMichael, 2000). Among these environmental problems, the main concerns are human populations and other aquatic life (Reid *et al.*, 2019). Therefore, the pollution of water and air in all areas and human life in the urban industrial centers of the industrialized countries is threatened (Bickerstaff and Walker, 2001). Recently, more than 80 % of contaminated water is used for irrigation purposes in both urban and semi-urban areas (Kurwadkar, 2017). Industries located in the urban and semi-urban areas are high-populated,

low-income, and also generate pollution for the public community (Bank, 2018). While focusing on these issues, global pollution has been observed to have dramatic effects on the ecosystem over the past three decades (Lazarus, 2001). Today, urban pollution levels are said to be more alarming due to human activities and many other natural forces (Vlek and Steg, 2007).

Currently, pollution control strategies are not being implemented due to poor environmental laws. suggest that public participation is urgently needed in this regard (Geng *et al.*, 2008). Pollution is exacerbated by the unsustainable anthropogenic activities that cause significant damage to public health. The US population is

heavily associated with many diseases such as cancer, birth defects, and asthma with environmental exposure. There is virtually no control over any of the 8,000 industrial companies in the US that contribute to high levels of pollution. Environmental health problems are not simply a matter of concern, including health, wastewater treatment, air pollution control, waste disposal, work-related health, etc (Donohoe and Medicine, 2003).

The recurring annual cost of environmental degradation and damage to natural resources is about \$ 365, or \$ 1 billion per day, in each country (Awan, 2013). Equally, both man-made and natural factors highly contributed to these problems due to increasing population, and poorly executed government policies. Therefore, environmental damage in form of severe health risks, food and life uncertainty as well as growing human population, which is heavily dependent on natural resources can be realized. Although, the severity of the condition is necessary for quick action to assess the causes and degree of destruction and to establish a possible mechanism for eliminating such sources of pollution from the environment (Jha *et al.*, 2011). This article explains how pollution is increasing in Pakistan and raising the question of future climate change in Pakistan.

### **Water pollution in Pakistan**

Water pollution in Pakistan Water pollution, air pollution and deforestation are serious environmental issues for human health, animals and plants. Water scarcity and the availability of surface and groundwater depend largely on the Karakoram, Hindu Kush and Himalayan rivers. Unfortunately, the country has paid little attention to water storage capacity and can only store excess river water for 30 days, which is very small compared to India, which can store water from its river for a period of 120-220 days (Naseer, 2013). In Pakistan, a large population is accordingly dependent on groundwater for domestic use and also for irrigation purposes. In addition, groundwater is declining in several parts of the country due to the mixing of saline water into non-saline water areas. In the coming years, 80 percent of the groundwater will sink to a rather alarming level. In Sindh, more than 70 percent of the groundwater surface is exposed to the same salinity (Rasul and Policy 2014). In addition, in Khyber Pakhtunkhwa Province, water pollution and its distribution has become life threatening. In Pakistan, the main cause of such problems lies in improper disposal of

urban sewage, industrial sewage and agricultural sewage. In the brief study, such forces account for the pollution of lakes, rivers and groundwater. Hence, pollution affects the soil, vegetation, sea, animals and human life. In this context, it is believed that municipal and industrial waste have contributed significantly to water pollution (Raza *et al.*, 2017). Most of the pollution comes from urban sectors and threatens human health and aquatic life. Around two million tonnes of wastes are generated in urban areas each year, and almost half of that goes into water bodies. Similarly, the other important factor in water pollution is the industrial discharge of large numbers of toxic wastes from their sewage into urban surface and groundwater (Raza *et al.*, 2017).

Many reports indicate that the unusual discharges of waste, gases, radioactive materials and toxic chemicals are polluting the water in Khyber Pakhtunkhwa, Sindh and Punjab (Mallick and Masood, 2011). In Karachi, nearly six thousand industrial companies discharge heavy metals directly into the waters every day. An early investigation showed that heavy metals and the chemical composition of soil and vegetation are above the safe limit values (Khwaja 2020). According to the World Health Organization (WHO) standard. Maximum levels of trace metals were also found in the groundwater samples taken from industrial discharges, suggesting that the groundwater is not safe for drinking water purposes. In Punjab, over a thousand industrial plants in various cities such as Lahore, Sialkot, Kasur, Sheikhupura and Faisalabad discharge more than five thousand Kusec of untreated toxic wastewater directly into the sewer system. In the same way, more than a hundred wastewater around cities and municipalities lead wastewater into channels and channels, which eventually end up in open rivers and groundwater systems (Ullah *et al.*, 2009).

Biochemical oxygen demand (BOD) is mainly released from the textile industry. The textile industry needed water-water for the processing of cotton fabrics such as dyeing, finishing the fabric, sizing, desizing, cleaning. The wastewater produced by such operations basically introduces highly polluted, toxic wastewater into industrial wastewater. In this narrative, chemical processing in industrial units is primarily responsible for about 70 percent of all industrial pollution. Polluted water affects aquatic ecosystem in a number of ways, such as reducing levels of dissolved oxygen (Raja *et al.*, 2019). In Pakistan, agricultural activities are affected due

to extensive water pollution. As we know, there is no special sewage system in an industrial area in Pakistan to treat such polluted water. In this way, the wastewater is mixed directly with irrigation water and gets into the agricultural areas and causes a lot of damage to the vegetation (Pescod, 1992). Another important factor that fertilizer is used, at an estimated cost of 5.6 million tons, can cause groundwater pollution to be deposited in lakes, rivers, and groundwater sources (Raja *et al.*, 2019).

Research has shown that the pollution of water resources from agricultural activities in Pakistan has attracted attention. Pakistan Council of Research in Water Resources (PCRWR) confirmed Punjab as one of the most pesticide-contaminated provinces due to the extensive agricultural land compared to other provinces in Pakistan. A fifth of the test samples were found to contain pesticides above the standard of the World Health Organization (WHO) safety limits (Daud *et al.*, 2017). However, highest cost of water pollution may remain in its influence on human health and can cause bladder cancer, hereditary disabilities, bone distortions, miscarriages, and infertility. Lately it can lead to typhoid, skin problems, intestinal worms, cholera, diarrhea, stomach diseases and hepatitis. The United Nation Children Funds UNICEF study found that 20 to 40 percent of people with water-borne illnesses suffer from diarrhea and typhoid. In Pakistan, the most widespread water pollution diseases are associated with annual losses of 1.6 million and 900,000 in the last years of life.

Indeed, the significant impact of polluted water on food safety livelihoods. Ironically, in agriculture, hazardous industrial chemicals, fertilizers and pesticides have affected the living conditions of thousands of farmers. Agricultural activities in the soil cause waterlogging and salinization when the water table reaches the soil surface and air stops in the soil, making it difficult to grow crops in soils. In Pakistan, 13 percent of the land is waterlogged and saline, and 2.2 million hectares of land have a water level less than 1.50m below surface (Yassir Abbas Saeed). In addition, irrigation water also comprises high levels of salts, pollutants and other toxic chemicals that evaporate from the surface and cause damage to the topsoil. It was investigated that 25 percent of the irrigated areas suffer from the different salinity, which reduces the vegetation of the areas. The salinity in Pakistani agriculture cost the damage up to 30 to 80 billion. In addition, textile fisheries and smallholders in certain areas have also suffered significant losses from alga (Yassir Abbas Saeed).

### **Air pollution**

Pakistani air pollution has become a major environmental problem in major cities in all provinces. From 1990 to 2008, carbon dioxide, methane and nitrous oxide emissions from many industrial and automotive sources rose sharply (Anwar *et al.*, 2021). Nowadays, air pollution are the focus of urban areas, and more rural areas are facing industrial pollution. The rapid urbanization of the urban population, the incineration of municipal waste, the evolution of sources of emissions from vehicles, and industrial development have observed the main factors contributing to the increase in both water and air pollution (Omer and reviews, 2008). In this regard, Environmental Protection Agencies (EPAs) have no role in setting policies to control pollution. A report from EPAs in major cities in Pakistan showed that fine particulate matter (PM) levels exceeded the above standards in Peshawar, Quetta, Karachi, Rawalpindi, Lahore and Islamabad, with highest levels being recorded in the provinces of Punjab (Lahore). and Balochistan (Quetta). A study by the Pakistani Environmental Protection Agency (EPA) in Gujranwala, Faisalabad, Lahore, Rawalpindi and Islamabad displayed that the particulate matter concentration was 6-7 times higher than recommended by the WHO (Organization 2006). Some topography experts estimate that 60 to 70 percent of urban air quality is due to emissions from vehicles. Encouraged to buy now by the unavailability of the public transport system for workers and other workers, number of vehicles registered in country greater than before from 4.303 to 5.366, (Organization, 2006).

Use of low-quality fuels and diesel with high sulfur content (0.5 to 1 percent), poor traffic management, infrequent vehicle inspections, inefficient transport control and road construction increase the impact on the environment. However, the government should take steps to reduce the toxic gases produced by vehicles. In addition, bans or restrictions on the use of two-stroke motorized rickshaws and public buses have been introduced in many cities. In 2008, Punjab Ministry of Transport restricted approval of two-stroke rickshaws in 10 cities, including Lahore, Rawalpindi, Gujranwala, Faisalabad and Multan. Despite the closure of CNG filling stations in the 2009/2010 winter season, the use of petrol and diesel again increased CO<sub>2</sub> emissions to 28.5 percent. Winter gas shortages are likely to continue to contribute to CO<sub>2</sub> releases (Bank, 2019).

In 2009, Ministry of Environment decided to apply the

Euro II emission standards to reduce air pollution sources such as hydrocarbons, carbon monoxide and nitrogen oxide. Additional factors contributing to air pollution are due to the lack of proper waste disposal systems in Pakistan. In total, an estimated 54,888 tonnes of solid waste is produced daily, which is improperly dumped and incinerated to increase air pollution (Nisar *et al.*, 2008). The incineration of solid waste produces fine dust, carbon monoxide and other carcinogenic air pollutants. Consequently, the burning of fossil fuels and industrial waste products for more energy has posed problems of air pollution in Pakistan. In general, sugar factories, steel industries and power plants have released the sulfur content into the ambient air through the use of fertilizers for agriculture, cement for the construction of roads and buildings. In addition, the recycling of steel, plastic moldings, and brick kilns have also contributed to air pollution. In this context of air pollution, particulate matter and sulfur and nitrogen oxides released into the air are of major concern for environmentalists (Organization 2006).

In Pakistan, for example, the cities and industrial areas are next to each other and only in the city of Peshawar are around 450 brick kilns around the city. These brick kilns used Mobil oil and old tires, which released a different mixture of hydrocarbons, carbon monoxide and sulfur dioxide into ambient air. Load shedding of electricity has exacerbated problem of air pollution and more industrial companies have started to use diesel for electric generators. Such phenomenal changes have had serious implications for air quality and the health of urban populations. In Pakistan, the winter fog and cross-border air pollution were increasingly observed from the beginning of October and prolonged fog durations in winter. The fog is believed to be transported from India by transboundary air pollution. Emissions from coal-fired power plants, vehicles, solid waste incineration and other sources of pollutants such as sulfur dioxide, nitrogen oxides, carbon monoxide and particulate matter that travel hundreds of thousands kilometers in the nearby regions. A new factor was heavily observed in the big cities like Lahore, the sulfur dioxide particles came from a source hundreds of kilometers (Khalid, 2019). It is believed that fog was created by coal-burning movements in northern India. As we know that Lahore is downwind from that region and affects both economic activity and human health, delayed flights, roads traffic, and rail is seriously disrupted, resulting losses of billions of rupees which also

causes respiratory diseases (Riaz and Hamid 2018). In Pakistan, both atmospheric and indoor air pollution is mainly caused by the use of fuel, crop residues, heating and cooking in and has a strong impact on agricultural productivity and global and regional climates (Khalid, 2019). Inadequately ventilated homes. It is more predominant in rural areas and has serious health implications for women and young children. It has been estimated that indoor air pollution in Pakistan causes death near 28,000 deaths annually. More specifically, the impact of air pollution on human safety is the greatest threat to air pollution. The suspended solids can make worse breathing difficulties and cause eye irritation in children, and finally the sulfur oxides can promote asthma (Colbeck *et al.*, 2008). In fact, however, long-term exposure to polluted air can cause many diseases such as lung cancer, chronic lung disease, respiratory infections, and cardiovascular disease. One study estimate that urban air pollution in Pakistan is responsible for 22,000 premature deaths in adults and 700 deaths in children (Anjum *et al.*, 2021). Poor people in rural areas who use various types of biomass for energy suffer most from indoor air pollution. (World Bank, 2006). In addition, the largest sources of air pollutants such as sulfur and nitrogen oxides are also responsible for acid rain, which leads to further health broadness, environmental problems and economic damage in every country worldwide. It causes the waters to acidify and affect marine life and damage the flora (Khwaja *et al.*, 2012).

## CONCLUSION

Pakistan is one of the most populated country with an annual growth rate of 1.9 % that will reach upto 300 million in 2025. It has been estimated that from 2020 the country will need 100 m<sup>3</sup> of water per capita per year (Jabeen *et al.*, 2015). This situation is very alarming in the Indus Basin and the scarcity of water will influence food security, economic and industrialization development in the future. Reduced water flow rate has been observed over the past 5-10 years due to the rise in temperature in Pakistan's main river systems, including the Kabul, Indus, Jhelum, and Chenab Rivers. Only 0.1 % of the wastewater is cleaned before entering in to the irrigation canal and ends up in surface water, causing serious skin diseases, reducing agricultural growth and also affecting the productivity of the fishing industry. Another important factor that will go a long way is the risk of air pollution, which is one of the emerging and most serious

environmental problems of our time. Therefore, air pollution is mainly considered due to the disposal of solid waste, incineration of waste, use of scrap tires in brick destruction, use of low-quality scrap in industry is the key factors. Poor environmental law and miss mangment of environmental protection agencies at both federal and provincial levels have greatly increased pollution. To overcome such extreme environmental problems, the government must focus more and more on providing funds for environmental departments and non governamnet organization NGOs. Environmental turbans should take serious and immediate action to save the lives of humans and other aquatic organisms. If positive steps are not taken, environmental change will destroy the country's economy.

### CONFLICT OF INTEREST

The authors declares that they have no conflict of interest.

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