International Journal of Advanced Engineering Research and Science (IJAERS)
Peer-Reviewed Journal
ISSN: 2349-6495(P) | 2456-1908(O)
Vol-9, Issue-2; Feb, 2022
Journal Home Page Available: https://ijaers.com/
Article DOI: https://dx.doi.org/10.22161/ijaers.92.25

The cause of Kabul's environmental problems is its impact on economic and human health

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Received: 23 Dec 2021,

Received in revised form: 16 Feb 2022,

Accepted: 23 Feb 2022,

Available online: 28 Feb 2022

***Keywords*— Kabul Afghanistan, Environmental Problems, Health effect, Economic Effect.**

***Abstract*—** *A careful examination of the current situation of shows that the Kabul capital of Afghanistan suffers from many environmental problems such as solid waste management, Destruction of protected areas, and air/water pollution. over the past two decades, are acceleration in urbanization, population growth, poverty, war, unhealthy management, and the government's lack of attention to the environment are the main causes of environmental problems in Kabul, at cause A rapid increase in energy consumption, Fossil fuels, and biofuels, and motorization, Elimination of green areas. main air pollution Particulate matter (PM) is the most serious air pollutant in Kabul levels were several times higher than the World Health Organization. one-third of its population has access to the water supply network. public sanitation system does not exist in the city, which leads to contamination of the groundwater in the city. Another major environmental problem in Kabul is the management of solid waste, as well as wastewater management, which has polluted the soil and air/water, there is no type of wastewater treatment without any treatment wastewater entering the stream. also, there is no solid waste collection, disposal, and recycling mismanagement in Kabul. According to assessments, air/water pollution, solid waste and wastewater pollution is the cause of death and morbidity also have an economic effect. Environmental problems can be curbed by enforcing environmental laws Cooperation between the government and national and international organizations and people's participation in protecting the environment.*

I. INTRODUCTION

The effects of human activities on the environment is one of the most important global issues today. Human activities have caused environmental problems. Global warming due to greenhouse gases, air/ water pollution, erosion, etc. Population growth, growth Improper urbanization, substandard agriculture has destroyed the environment. [1] Environmental pollution is directly related to the country's economy; a stable environment is needed for a sustainable economy.[2] Environmental degradation endangers the security of future generations and negatively affects present generations. Pollution of water, soil, air, solid waste, sewage, causes various diseases such as malaria,

encephalitis and also causes the death of children and the economy of the people. And endanger the country economic. [3] Kabul is capital of Afghanistan suffer from many environment problems such as air/water pollution, solid waste, swage management, Deforestation and erosion.[4] Water pollution in Kabul due to discharge of sewage in the sea and streams and excessive abstraction of groundwater is the main cause of water pollution in the city. [5] Kabul groundwater Between 2008 and 2016, it decreased by an average of 1.7 meters per year. [6] Air pollution in Kabul is serious and in recent years has been on the headlines of national and international news. The health of the people of the city has brought diseases such as respiratory, heart disease, pus diseases, cancer, asthma in Kabul city due to air pollution and the main causes of this pollution are cutting down trees, fossil fuels, using old cars. [7] Waste solids in Kabul city is a big problem of the government that in recent years with population growth and influx of people from other provinces to the city center for other different reasons, the production of solid waste has increased because there is no sound management. It has caused many problems for the people of Kabul due to the collection and disposal of waste. [8] Lack of sewage collection and treatment system is a big crisis in Kabul city because sewage has entered the water stream without treatment and because of this Kabul city is facing water pollution. Death of children, various diseases due to this water pollution.[9] In this article, we analyzed the environmental problems of Kabul city, as well as the causes and factors of the problems and its impact on the health and economy of the people of Kabul.

II. DATA COLLECTION AND METHODS

A baseline analysis of urban environmental problems in Kabul is founded on data collected through online interviews and questionnaires, as well as an examination of relevant, existing, and relevant literature. We obtained the data for this study from various sources of existing literature, government policy documents, and reports of international and national organizations concerned with urban environmental problems. These documents demonstrated the current state of environmental problems in Kabul. A web search in electronic databases, can provide various concepts related to urban environmental issues. reports and policy documents of international and national organizations provide data on environmental problems, pollutions, population, Poverty in Afghanistan, especially in the city of Kabul (BBC, WHO, UN, UNSEF, UNESCO, AIE) reported. Published documents on issues related to urban environmental problems including existing articles, books and TV reports Was reviewed for this study.

III. SCOPE AREA OF KABUL AFGHANISTAN

Kabul capital of Afghanistan with area of 1008.7km2, with 1791 m high above the see level it makes one of high city around the world. Kabul is located between 69.2 degrees east and 34.5 North degrees. Kabul has 22 districts, which 19 It has an area of more than 130 km. In this article, the study of environmental problems in the specific geographical area**.**

Fig. 1: location map of the study area and some air, soil, water, sewage and solid waste pollution.

IV. MAIN ENVIRONMENT PROBLEMS IN KABUL

Kabul has seafaring from many environmental problems such as air pollution, water pollution soil pollution, noise pollution, swage and solid waste management and degradation of protected areas.

1.1. Air Pollution of Kabul City

Kabul city is one of the top ten air polluted city in the world. [10] During the last two decades, there has been enormous acceleration in urbanization, population growth, poverty, industrialization, as well as a rising level of energy use and motorization. As a result, air pollution has deteriorated significantly due to a variety of increased sources. Due to Afghan government in capabilities to manage air quality and lack of standards for indoor and outdoor air quality, air pollution remains a significant environmental and health threat. PM2.5 and PM10 (Kabul main air pollution) were the most serious pollutants, followed by nitrogen dioxide (NO2) and sulfur dioxide (SO2). Particulate matter (PM), sulfate of nitrogen (SO), and nitrogen oxide (NO) levels were several times higher than WHO air quality guidelines, whereas the levels of zone (O3) and carbon monoxide (CO) were below WHO standards. the air quality index shows in **Table:1.**

Table:1. average air quality index. (WHO 2020[11])

pollutants	Unit	Time-weighted average	in real time Kabul air quality	WHO recommended limit
PM2.5	*µg/m3*	*24 hours*	*195*	*25*
PM10	*µg/m3*	*24 hours*	*178*	*50*
O3	*µg/m3*	*8 hours*	*54*	*100*
NO2	*µg/m3*	*1 hours*	*305*	*200*
SO2	*µg/m3*	*24 hours*	*75*	*20*
CO	*µg/m3*	*1 hours*	*18*	*30*

The average PM2.5 and PM10 are concentration in Kabul air was 195&178 µg/m3 (24 hours) which exceeded the WHO recommended limit of 25&50 µg/m3 (24 hours) it shows eight and four time higher for PM2.5&PM10 then WHO limit recommended The principal sources of particulate matter in Kabul are vehicular emissions, particularly from diesel vehicles, burning coal and wood, dust, thermal generators, and residential combustion processes. PM2.5 is considered to be more hazardous to human health than PM10.

The average NO2 concentration in Kabul air was305 µg/m3 (1 hour). which exceeded the WHO recommended limit 200 µg/m3 (1 hour). NO2 is produced by electric generators, combustion processes, but primarily from the vehicular exhaust. NO2 level is higher in urban areas due to vehicle traffic. In addition, it is an important ingredient in the generation of smog which spreads in most areas of Kabul and has harmful effects such as damage to the upper respiratory system and lungs.

The average SO2 concentration in Kabul air was 75 µg/m3 (24 hour). which exceeded the WHO recommended limit 20 µg/m3 (24 hour). it shows four time higher then WHO recommended. Factors like an increase in population growth and the number of vehicles are responsible for raising the SO2 levels.

The average O3 concentration in Kabul air was54 µg/m3 (8 hour). which exceeded the WHO recommended limit 100 µg/m3 (8 hour). The main sources of O3 pollution in Kabul are old and smoky cars (cars with expired use date in country of origin and imported to Afghanistan) and power generators. An analysis of NEPA data indicates that the amount of O3 in Kabul has increased by 20% since 2015.

The average CO concentration in Kabul air was 18 µg/m3 (1 hour). which exceeded the WHO recommended limit 30 µg/m3 (1 hour). the main source is vehicular emissions, particularly from diesel vehicles, burning coal and wood, thermal generators, and residential combustion processes.

1.2. Water Pollution of Kabul City

Several factors threaten Kabul's water supply, including over abstraction of surface and groundwater and pollution by sewage. [12] The water overuse is partly due to poor management and Deforestation due to poverty, and instability in Afghanistan. Recent years have seen shallow wells being installed and financed by aid programs, but with a high population growth rate, groundwater has also been over utilized. Around 85% of residents obtain their water from groundwater, mainly from shallow aquifers, which is obtained by hand pumps. The status of groundwater shows that groundwater levels are declining quickly (1.8 m/year) from 2003 up to 2020 and several wells are already dry in fig.2. Moreover, water quality analyses of the Kabul aquifers show a negative trend in groundwater quality in respect to concentration of nitrates, borates and faucal microbes (indicated by the coliform bacteria). **Table:2** shows Physical and Biological

Assessment of the Kabul city Groundwater.it shows water quality it higher then WHO water quality index.

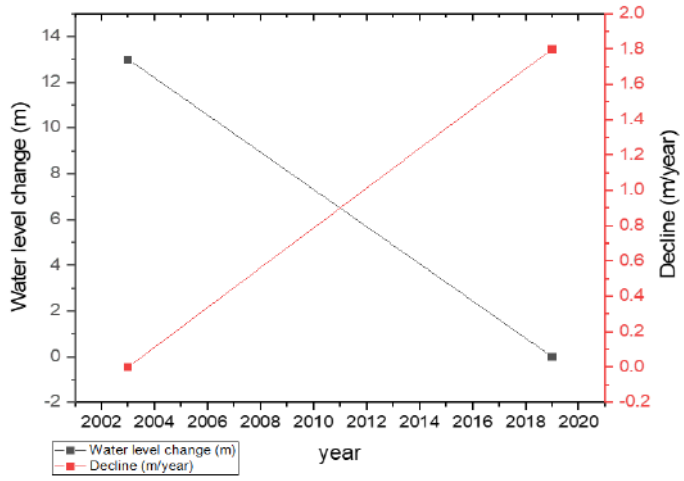

Fig.2. Availability of drinking water resources between 2003-2020. [13,14,6]

Table 2: water quality index par year (WHO, UNICEF [15,16.17]*).*

Parameter	Afghan National Authority Standard(ANSA)	WHO Standard	Kabul water qualityH/L/Average
pH	6.5–8.5	6.5–8.5	8.4/6.8/8.2
TDS(mg/l)	1000	500	1940/360/830
TH	500	500	580/290/385
Turbidity	5NTU	5–25	0.48/24/12
Calcium(mg/l)	75	75	140/22/102
Sulfate(mg/l)	250	250	224/18/103
Sodium(mg/l)	200	200	149/19/83
Magnesium(mg/l)	30	50	100/17/64
Fluoride(mg/l)	<1.5	1.5	0.2/202/1.1
Nitrate(mg/l)	50	10	12/63/37
EC(µS/cm)	1500	1500	3900/1200/2700
Potassium(mg/l)	.	12	17/3/9.7
Iron(mg/l)	0.3	0.1	0.9/0.06/0.1

1.3. Soil Pollution of Kabul City

Land degradation in Kabul is the result of xenobiotic (human-made) chemicals and other changes in the natural soil environment, such as soil contamination. Land contamination in Kabul is primarily due to industrial activity, agricultural chemicals or improper waste disposal. Petroleum hydrocarbons, polynuclear aromatic hydrocarbons (such as naphthalene and benzo), solvents, pesticides, lead, and other heavy metals are the most common chemicals used during the manufacturing process. Contamination is correlated with the degree of industrialization and intensity of chemical substance. The concern over soil contamination stems primarily from health risks, from direct contact with the contaminated soil, vapor from the contaminants, or from secondary contamination of water supplies within and underlying the soil.[17]

1.4. Kabul Swage and Solid Waste Management

In detail, a review of the current situation shows that waste management in Kabul is not appropriate and there

are a number of challenges within the system. Most of them do not know how to separate and recycle hazardous waste. In Kabul, municipal solid waste management has been neglected by the government and the general public. Solid waste generation and improper management have had a huge impact on Kabul city. Over 4 million people live in the city of which 3,050 tons of solid waste are generated each day, however only 1800 tons was collected for disposal. Some of these substances have been accumulating, damaging public health and the environment, according to Kabul Municipality. In Kabul, there is no modern waste disposal facility. In the city, there are no proper collection, transportation, and incineration facilities. There are many challenges associated with domestic waste as well as hospital waste and hazardous waste. There are no controls on the burn process, so toxic gases are released, which can lead to various problems. In table3, you can see the amount of waste produced by Kabul in 2018. With a rapidly growing population, Kabul faces infrastructure challenges. [19] wastewater management is one of the biggest problems. Most of Kabul does not have this infrastructure, allowing waste and potable groundwater to mix, leading to the smell of stench causing health risks for the citizens.in **fig .3** is show the solid waste produce par day in Kabul city in 2018.

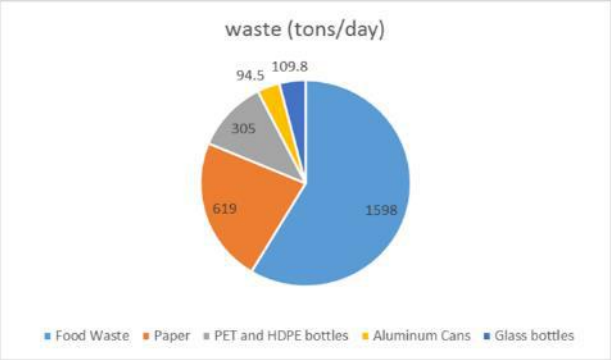

Fig 3: solid waste producing tons/par in Kabul.

1.5. Degradation of Protected Kabul Areas

The Heshmat Khan Park is a protected area and national park in Kabul, Afghanistan.[20]In June 2017, the Ministry of Agriculture, Irrigation and Livestock named Kol Heshmat Khan the fourth national park on the occasion of World Day. Kol Heshmat Khan covers an area of 191 hectares and is located at the base of Shirdaravazeh and Bala Hesar mountains, southwest of Kabul. Waterfowl have nested at this col since the past, and the area has been a hunting ground for kings in the past. It is estimated that about 30,000 migratory birds and waterfowl, all related to 157 species, hatched at this col in 1980. Using both nutrition and bathing. In a large part of the Kol Heshmat Khan land, land grabbers had already occupied land. By placing booths and car washes in this area, and building roads, this land had lost its natural beauty and created environmental problems for this ecosystem. Kol Heshmat Khan suffered from everything from pollution of the Logar Sea to domestic animal grazing, cutting of reeds, brutal bird hunting, irrigation, and finally laundry before the recent civil war. From 1979 onwards, the Kol Heshmat khan area was closed for security reasons. The birds that were present in this area in 1370 were threatened with cruel and reckless hunting and most of them escaped. Cole itself was used for irresponsible interventions and more water was used for irrigation. In recent years, these threats have taken on a different form, with more areas being illegally owned by individuals and turned into residential areas. **Fig 4(a&b, c**) it's shows the changes of Kol Heshmat khan.

Fig 4. a and b show the Kol Heshmat khan before and c is the after degradation Kol Heshmat khan.

2. Important Factors in Environmental Degradation in Kabul

2.1. High Urban Kabul Population

The population of Kabul has grown since the new administration and the US invasion of Afghanistan in 2001, and the intensity of the war in other Afghan provinces and the relative security in Kabul as well as health care, good education and Business, from Different parts of Afghanistan migrated to Kabul, also return of migrants from Pakistan and Iran and the relocation of the majority in Kabul intensified this process. As shown in Fig 5, Kabul Afghanistan's population level and growth rate between 1950 and 2022. [22] UN population projections for 2034 are also included. From 2001 to 2021, the population has grown by about 60%. With increasing population, it has destructive effects on the environment. The city with its old master plan only has a maximum capacity of one million people, but now the existing figure is four times more than the standard capacity of the city. The main environmental problems in Kabul are from the environmental point of view is Most of the agricultural land and deforestation became housing for shops and roads, which in addition to beautifying the environment, helped land to absorb water, regulate the climate, and protect the land from soil dispersion also responsible for absorbing greenhouse gases and producing oxygen, in which case rainwater and snow are not absorbed by the ground, groundwater is reduced, greenhouse gases are increased, and soil erosion is increased. Increased population Water consumption also increased The city of Kabul is using 100 million cubic meters of underground water every year, which re-feeds about 60 million cubic meters of water to underground sources from the rains, and as a result, we have a reduction of 40 million cubic meters of water in the balance every year. groundwater in some parts of Kabul has been reduced to ten meters due to excessive consumption. the average groundwater depletion in Kabul was 15 meters, with Khairkhaneh facing a 45-meter decrease in groundwater, with more water shortages with the increase in population, energy consumption, waste materials, wastewater were also increased About 3,050 tons of garbage is produced daily in Kabul, and the municipality of this city has the ability to move 1,800 tons of this garbage out of the city. There are 800,000 cars in Kabul. The fuel of these cars is the main cause of air pollution because the fuel is not standard and is of poor quality. the increase in the population of Kabul is one of the main reasons for the environment of Kabul.

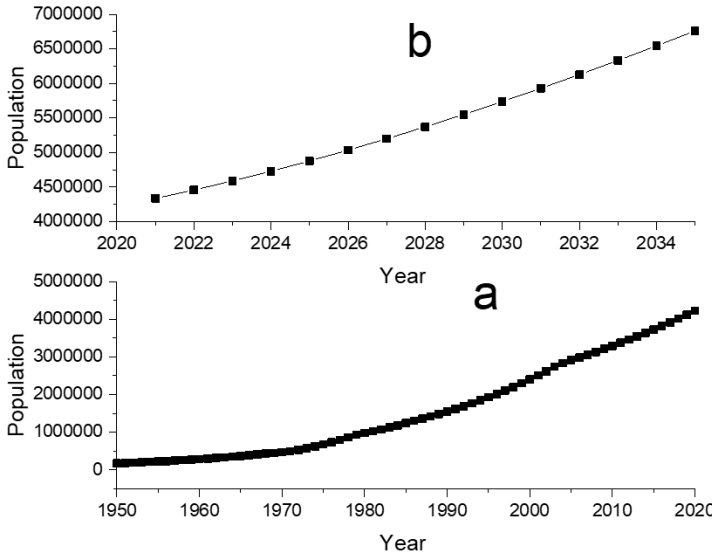

Fig 5: a shows the population growth between 1950-2020, b show population growth rate between 2020-2034.

2.2. Poverty

Kabul province is located in the east of the country and the center of Kabul is its center. Kabul Province has a population of more than four million. Kabul is located in a valley surrounded by mountains and at the intersection of trade routes from north to south and east to west. Therefore, Kabul province is the economic and political center of the country. At the district level, poverty outcomes show some differences in poverty rates in Kabul. The poverty rate in the districts of Kabul province varies from 29.2 to 87.6 percent. Kabul is the most populous province of Afghanistan. The province alone makes up 13 percent of Afghanistan's population and 10 percent of Afghanistan's poor. A large proportion of the country's poor is in Kabul. Given the relatively high poverty rate of 34.6% and the very large population size in central Kabul, the absolute size of the poor population is large.[23] In central Kabul, despite the majority of the poor living in central Kabul, Poverty and environmental degradation are directly related. As poverty increases, so does environmental degradation, and this relationship operates in a cycle. The dependence of poverty on the fact that the livelihood of the majority of people depends on natural resources; Lack of access to healthy goods and energy and a clean environment play an important role in the destruction of vegetation and wildlife. Trees, by producing oxygen and absorbing carbon dioxide from the air, also play a major role in the air, providing rainfall, preventing soil erosion, and protecting plant and animal species. Due to the poverty cutting of trees in Kabul create the deadliest to the environment. Not only trees but also plastic coal of

motor beams are used for cooking and heating of houses, which has caused gas production and air pollution. Due to poverty, people use the non-mechanized system of agriculture, which causes more water consumption, and the use of fertilizers causes water pollution and excessive water consumption.

2.3. Environmental Degradation due to War in Kabul

Since 1964, Afghanistan is under continuous conflict. The history of contemporary war can be traced back to 1979 when Afghanistan was occupied by the former USSR. The attack on the World Trade towers brought more miseries in terms of US attacks. Due to continuous engagements in war, care about environmental protection and resource conservation was less. This has got bad impacts on water and forest resources. The present forest cover has been decreasing up to 2% against the international standard of 25%. Before 1970, eight hydropower plants were functional and were irrigating 118500 hectares of land. With the passage of time, there was a decrease and Afghanistan could not continue the same progress. Now Afghanistan has planned 12 dams on the Kabul River system. Due to huge water extraction, this may bring another ecological disturbance in Afghanistan as well as in the neighboring countries. [24]The war has directly and indirectly created environmental problems in Afghanistan, especially in Kabul. The lack of business has led to poverty, which in turn causes environmental problems. Chemical weapons have been used during the war in Afghanistan, causing severe short-term damage to Afghanistan's environment and ecosystem. There is no data on their long-term effects. Migration: is another problem (both inside and outside Afghanistan migration) associated with war. It has also a negative impact on the environment. On one hand, there is a burden on the resource-base of the area, on the other hand, they leave resource/s unattended and unused. In this way balance between resource distribution, availability, and use is disturbed, ultimately affecting the environment in terms of resource loss and waste production.

Fig6: effect of war on environment in AFG [25]

2.4. The Unhealthy Management Urban Planning System

unhealthy management and lack of attention of the environmental government One of the problems of Afghanistan's environment, especially in Kabul, environmental problems in different parts such as solid waste management not only affect human health and economy also Kabul looks like a bad landscape. Lack of proper landfills and lack of recycling system has a high impact on water and the economy. Lack of wastewater treatment system results in polluted water. lack of attention of the government on environmental awareness programs. Incomplete traffic system. Lack of master Urban plan as a result of unplanned houses in Kabul. Non-implementation of environmental laws. for reducing environmental problems need a strong Environmental Strategy The goal of the National Environmental Strategy is to improve the quality of life of the Afghan people through the protection, maintenance, and improvement of the country's environment. This strategy uses a coherent approach to providing guidelines to include environmental issues and policies in Afghanistan's development priorities, in order to help the country's growing economy and reduce poverty. As a result of implementing the national environmental strategy, the following goals should be achieved, providing a clean and healthy environment for the people of Afghanistan Achieving sustainable economic and social growth while preserving the country's natural resources and environment Ensuring effective management of the country's environment through the participation of all interested departments One of the environmental problems of Afghanistan, especially the city of Kabul. the main reason of unhealthy management and lack of attention of the environmental government are Prolonged wars and widespread corruption in institutions and the lack of global attention to environmental protection in Afghanistan.

2.5. Natural impact on urban environmental resources

natural events including floods, droughts, and windstorms in urban is worth mentioning that floods occurring as a result of poor planning and non-adherence to planning requirements are more human-induced than natural event.

3. the impact of Kabul's environmental pollution on economics and health

pollution direct and indirect impact not only on the Human health also impact on the economy. Thousands of people die every year due to air and water pollution, tens of thousands of people get sick and infections by pollution, treating the highest drug consumption. Air pollution caused 51,600 deaths in Afghanistan in 2016, according to a report from the Health Effects Institute's State of Global

Air project. The country's air pollution is among the worst in the world, killing 406 people per 100,000 people every year. Data on PM2.5, ozone, and indoor air pollution caused by solid fuel combustion are combined in this report. [26] The weather and geography influence air circulation in Kabul, which is exacerbated by high levels of manmade emissions. Fuels such as leaded gasoline and poor quality fuels are used in vehicles and domestic generators, light industrial plants, and waste, plastics, coal, and rubber is burned. A combination of rapid population growth and insufficient urban planning, as well as the lack of available green spaces in Kabul are also contributing factors. In the winter, when residents rely on wood and coal for heating, the problem is particularly acute. Several studies have shown that air pollution affects education and economic income, the New York Times reported. An individual's performance at school, university, or at work is impaired when they are in a bad mood. Depressed individuals are less productive. If, however, a person's performance at school and at work is affected by health problems, then the threat is long-lasting and has a detrimental effect on educational and economic productivity." On the other hand, greater air pollution has been a major challenge for the entire world in recent years. Not only does this challenge affect the health and lives of individuals, but also the world economy as it destroys 225 billion dollars a year. The most affected countries are those in South Asia. An OECD study has found that air pollution costs the world economy billions of dollars in lost revenue each year, and that number will be multiplied by 2060 as air pollution increases. The organization writes that air pollution affects human health and agriculture. In addition, it has a variety of other effects. Many of these effects will be seen more widely in the coming years. An increase in economic activity and energy demand will cause air pollution to rise sharply. Emissions of ozone and PM2.5 have been detrimental to the economy in recent years. Air pollution will cost 176 billion dollars in 2060, up from 21 billion dollars in 2015. Globally, air pollution will also cause 3.7 billion lost working days in 2060, which directly impacts labor productivity. The estimated cost of air pollution is billions of dollars. Pollution of water is an unpleasant and unfavorable situation that has many negative effects and is hazardous to both living organisms and the economy, as well as causing many kinds of diseases among the general population. The health effects of water pollution vary depending on how long they last and how short they last. It is believed that the substances that enter the body through water pollution destroy a variety of tissues and are responsible for causing a wide variety of diseases in human beings. Having to dispose of waste as quickly as possible is crucial when it is contaminated. In recent years, environmentalists have described waste as dirty gold from an economic point of view. This implies that waste can play a crucial role in the national economic cycle of countries as a source of income and employment. There are several countries in Asia, including China, that have large waste recycling plants that recycle waste, providing raw materials to other production units whose products are sold internationally. Thousands of items may be made from waste, such as shoes, paper, foil, and thousands of other things with efficient management and recycling systems. Solid waste disposal which is not based on scientific principles puts at risk the population in areas without proper waste disposal methods, especially pre-Scholar's; waste workers or workers in facilities that produce toxic and infectious materials. A high-risk population may also include those living close to waste dumping sites and those whose drinking water has become contaminated as a result of waste dumping or leakage from landfill sites. An increase in infection and injury is also associated with uncollected solid waste. Children are more susceptible to health effects resulting from hazardous waste exposure. By the very act of releasing chemical waste into the environment, direct exposure to chemicals can lead to diseases. Toxic chemicals can be found in the environment. The disappearance of protected areas has a direct impact on the country's economy. In the past, thousands of people came every year to see the beautiful area of Kol Heshmat Khan, because Kol Heshmat Khan was an area for migratory and native birds and was a beautiful and natural sight. In general, pollution has a direct impact on the economy and health of the people of Kabul The relationship between economy and health is directly related to pollution. The lower the pollution, the higher the economy of the people and the healthier the people and reflect.

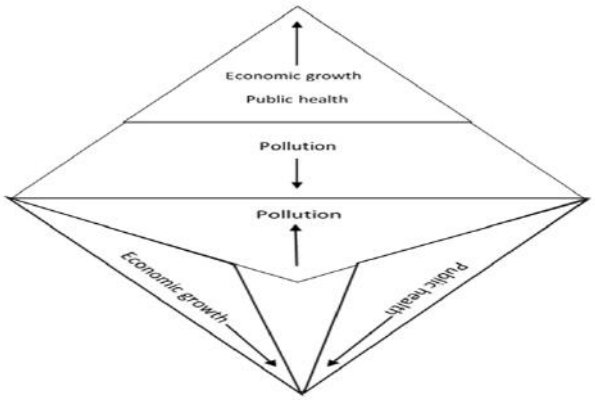

Fig7: relationship between economic/health and pollution.

V. CONCLUSION

After analyzing the data, Kabul city has problems such as soil erosion, protected area degradation, water pollution, air pollution, solid waste and wastewater management, which not only caused various diseases and deaths, but also severe damage to the economy of the country and people. The main causes of these environmental problems are population growth, poverty, long wars, lack of government attention and unhealthy environmental management. Kabul was built according to the master plan for one million people, but its current population is more than four million. Kabul is one of the most polluted cities in the world. The ongoing wars of the last half century have caused the government to pay no attention to the environment and the effects of the chemicals used during the wars have not been addressed. Poverty has led people to cut down trees for cooking and heating, or to use plastic and coal, which has destroyed green buildings and increased air pollution. Corruption in government offices and the lack of attention of the government and the people is another major cause of environmental problems in Kabul. Environmental problems can be curbed with a sound national strategy and management, international cooperation and raising public awareness.

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