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A review on consequences of climate change in Pakistan

Aiman Shah, Rabia Naveed, Iqra Khalid, Aisha Khan *

Abdullah Wali Khan University, Mardan, Pakistan, University of Engineering and Technology, University of Engineering and Technology, Lahore, Pakistan.

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Abstract

PAKISTAN is the seventh-most vulnerable country to climate change according to German watch, a think tank advocating for measures to combat climate change. People from across the country often discuss the unbearable heat everyone has been experiencing — an everyday topic in every household and workplace. Not only that, it is also a hot global debate. We often hear our politicians talking about Pakistan's vulnerability to climate crises, but how much the government and its subjects act upon it, is more contestable than questionable. Besides war in different parts of the world, climate change is the biggest concern that we all have, not only for the security of this generation but also for the survival of the next. Some of the repercussions that we are already seeing are frequent heat waves, floods, melting glaciers, drought and famine. This research paper is qualitative in nature which described the current situation and consequences which climate change is bringing in Pakistan. The Paper also discusses the way forward to be adopted.

Keywords: Threat; Pakistan; Paris Agreement; Crisis; Finance

1. Climate change threat to Pakistan

The climate beast is hitting Pakistan far more often and at far too many places than we know extreme climate events have become a regular phenomenon. The heat wave that took more than 1,200 lives in Karachi only two years ago has since been visiting us with greater frequency and intensity. At 50.4°C, Nawabshah in Sindh recorded in April 2018 the highest temperature ever recorded globally. Floods and hydro-disasters since 2010 when 20 million Pakistanis were directly affected have become an annual feature. Riverine communities routinely get wiped away without even a mention by media. And if it is not the floods, the calamity of drought is afflicting misery in Tharpakar and several other regions particularly in Baluchistan. In one end of the country we are fast losing our coastline to seawater intrusion, while at the other, glaciers are fast melting, resulting in permanent reductions in water flows in our rivers. With the changing cropping calendar, and more erratic and unpredictable monsoon season, Pakistan's food insecurity is also under increasing threat of climate change. The swelling unpredictability in river flows has made planning for hydro-energy much more difficult and unreliable. As environmental degradation takes place, livelihood options shrink, forcing people to migrate to cities in search of economic opportunities. Climate-induced migration has already made Pakistan one of the most urbanized counties in South Asia.

A World Bank report, Pakistan's Hotspots. The Impact of Temperature and Precipitation Changes on Living Standards, released in July 2018, claims that by 2050, annual average temperatures are projected to increase to 2.5°C under the climate 'sensitive scenario' (which represents a future in which some collective action is taken to limit greenhouse gas emissions) and up 3.0°C under the carbon 'intensive scenario' (in which no serious actions are taken). Approximately 49 million, or 25 percent of Pakistan's total population, lives in locations that will become 'moderate hotspots' by 2050

* Corresponding author: Aisha Khan

University of Engineering and Technology, Abdullah Wali Khan University, Mardan, Pakistan University of Engineering and Technology, Lahore, Pakistan.

under the carbon intensive scenario. Containing the temperature is essential to prevent major areas of Pakistan from becoming uninhabitable in a future not too far away. The impact from global climate change has the potential to threaten our security as well. But in order to meet the challenges, the country will first have to learn how to negotiate and follow words with action.

Climate change poses a serious threat to the living standards of the vast population of Pakistan. The report further indicates Sindh province as the most vulnerable hotspot. With a GDP per capita of US \$1,400, Sindh is the second-largest economy of Pakistan and contributes 30 percent to the national GDP. Its economy is highly diversified, ranging from heavy industry and finance centered in and around Karachi to a substantial agricultural base along the Indus River. Changes in precipitation and temperature threaten to impede the future growth of this region. According to the report, Hyderabad district in Sindh emerges as the top hotspot, followed by Mirpur Khas and Sukkur districts.

The second most vulnerable hotspot is the densely populated province of Punjab. Punjab has the largest economy, contributing 53.3 percent to Pakistan's GDP, and is known for its relative prosperity with the lowest poverty rate of all the provinces. However, its wealth is unevenly distributed, with the northern portion being relatively well off economically and the southern portion being one of the most impoverished areas in the country. Long-term climate vulnerability thus carries implications for both shared prosperity and poverty reduction of this province.

Interestingly, some of the most densely populated cities including Lahore, Multan, and Faisalabad emerge among the top 10 hotspot districts. This indicates the importance for preparing not only the more impoverished areas for the adverse effects of climate change, but also protecting the economic hubs of the province. With a limited and fast-closing window of opportunity to tackle this global challenge, it is more important now for Pakistan to engage in global climate change discourse and accordingly adjust its development agenda. There is no better place than international climate negotiations to learn what's really at stake for us and our society.

The world climate has changed fundamentally since the Earth Summit that was held in Rio de Janeiro in 1991 where the United Nations Framework Convention on Climate Change (UNFCCC) was adopted, together with two other conventions — the Convention on Biodiversity (CBD) and Convention on Combating Desertification (CCD). Both CBD and CCD stand, but the thrust of their work now focusses on mitigating the adverse impacts of climate change. The UNFCCC has emerged as the centerpiece of global action on climate and development, or climate compatible development, through the annual Conference of the Parties, or the COP as it is generally called now.

2. Who can lead change?

China and India have come closer in negotiations as the world's fastest growing economies with the fastest rate of increase in emissions. They are now in direct competition with the US, Europe and Japan historically the world's worst polluters in both absolute as well as per capita terms. Both are often joined by Brazil and Russia, the so-called BRIC countries. Middle-income countries like Indonesia, Mexico, Nigeria, Pakistan and Philippines, who have stunted growth rates but potential to become major emitters in coming decades, presently are not significant players in negotiations even while Indonesia and Mexico have hosted important COPs. Many of these countries have rarely demonstrated the technical capacity to develop their own negotiating positions or form their own negotiating blocs or interest groups. They usually end up setting up their pavilions to showcase projects from their respective countries.

Middle-income countries like Indonesia, Mexico, Nigeria, Pakistan and Philippines, who have stunted growth rates but potential to become major emitters in coming decades, presently are not significant players in negotiations. It has become almost impossible for developing countries like Pakistan to prepare for complex COP processes that are subservient to divergent national interests and influential interest-group priorities. The success and failures of most developing country negotiating parties can best be determined by understanding their defined interests and immediate political objectives.

The first was finalizing a Rulebook for the implementation of the Paris Agreement. It was a hard ask as the Paris Agreement was purposefully constructed to be ambiguous and aspirational. The second was to control the damage caused by climate-deniers and populist leaders such as President Donald Trump and newly-elected President Jair Bolsonaro of Brazil who argue that climate change is merely propaganda. The American administration has already communicated its intent to withdraw from the UNFCCC and the notice period will be completed in 2020. The third was to accept or — to put in negotiator's lingo — 'acknowledge' the urgency for action highlighted by the Special Report that was commissioned by the UNFCCC to determine the difference in impact on the planet of temperature rises of 1.5°C or 2.0°C. The study was undertaken by several thousand scientists on behalf of the Inter-governmental Panel on Climate Change (IPCC), the world's most respected scientific entity. The report has given the world governments 12 years to

reduce their overall net emissions by 45 percent if the global temperature is to be stabilized at less than 2°C. Ironically, three close friends and allies of Pakistan — United States, Saudi Arabia, Kuwait, and a new-found friend, Russia — were the only four countries in the world who were willing to accept the report to serve as the basis for negotiations. The fourth was to rapidly increase and streamline Nationally Determined Contributions (NDC) for reductions in greenhouse gas emissions and their implementation mechanisms, particularly financing, reporting, and monitoring to stabilize global temperature increase.

COP succeeded in giving a Rulebook for the implementation of the Paris Agreement. The purpose of having the Rulebook is to have an instrument that lays out how the Paris Agreement would be implemented and monitored when it takes effect in 2020. The NDCs, already submitted by all countries, including Pakistan, will be updated and re-submitted every five years. Like the Five Year Development Plans that Pakistan used to have, the revised NDCs will set new 5-year ambitions for emissions by undertaking low carbon and climate compatible development. For this to be done globally by all, nations will require explicit procedures to monitor and evaluate progress towards meeting the national commitments and global goals. The Rulebook encompasses three processes: 1) the framework for transparency 2) the mechanism for compliance and 3) the yardstick for global stock take or stocktaking. The Rulebook will provide guidelines that will ensure that countries provide complete, comprehensive, reliable and detailed information necessary to build confidence in the Paris Agreement's five-yearly cycles.

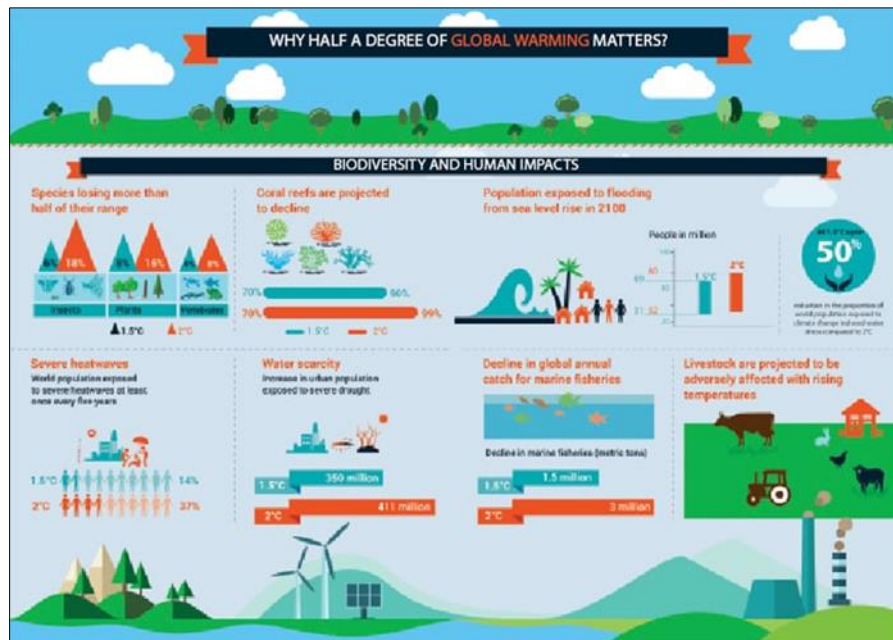
A moot point of the negotiations was the extent to which developing countries should have more flexibility compared to the developed countries in their reporting. In light of the limited capacities of developing countries, the final agreement has allowed the interested developing countries the requested flexibility. The reporting period for the interested developing countries can begin later when they join the reporting system. Some countries are more likely to postpone reporting for one reason or the other. India has already announced that it will not request postponing the reporting by invoking limited capacity. But countries wanting to avail this facility would need to state why, and for how long they wish to avoid reporting and, also, how they will improve their reporting capacity. Many developing countries like Pakistan will need to strengthen their reporting capacity or else will need to plan their negotiating position before the next COP scheduled for December 2019.

Some of the most densely populated cities — including Lahore, Multan, and Faisalabad — emerge among the top 10 hotspot districts. This indicates the importance for protecting the economic hubs of the province. These rules are now the key to the climate game for some decades to come. The Rulebook has thus ushered a new era of climate negotiations that, in coming years, will focus on ramping up climate action, culminating at COP 26 in 2020 a time by when all countries, including Pakistan, are scheduled to update their climate pledges. In all, the Rulebook delivers more of what was possible and less of what was necessary. In other words, there will be so much more to negotiate at the future COPs.

3. Financing climate

There were no commitments at the COP for scaling up of the long-term finance goal of mobilizing US\$ 100 billion per year to the developing countries, as was committed earlier in Copenhagen at COP 15 in 2009. There was also no new commitment to enhance financial transparency; the lines between the climate finance commitments and government aid continue to be blurred as they are between public and private-sector financing. Therefore, the availability of climate finance, or its absence, will continue to cast a long shadow on the viability and implementation of NDCs. No country can afford to miss this stark message. Pakistan's NDC submitted to UNFCCC in 2016, for example, had calculated the need for US\$ 40 billion for reducing its emissions by 40 percent. A new calculation will be in order for submission in 2020.

Some developed countries or multilateral development banks made additional commitments, but outside the negotiation rooms. Hence, these were not part of the negotiations at the COP. Since these commitments are outside the UNFCCC process, these are subject to different rules and accountability parameters. The World Bank, for example, announced to double its climate change commitments to US\$ 40 billion a year between 2021 and 2025. Likewise, the European Bank for Reconstruction and Development announced to halt its funding for coal projects and decrease lending to fossil fuels. Germany announced to double its commitment to the replenishment of the Green Climate Fund. Such pledges, however, did not indicate any progress within the negotiation corridors. In all, while the expectation is to ramp up the ambition and commitments, the developed countries did not come forward with any climate finance proposals. Countries like Pakistan are expected to mobilize private-sector funds and investments from domestic and international markets and this will require mainstreaming climate change or climate compatible development across all sectors and planning departments.



Source: LEAD Pakistan

Figure 1 Climate finance

3.1. The takeaway

As one of the most climate vulnerable countries, Pakistan needs to embark on low carbon and climate compatible development. A recent UNDP study, undertaken by the Leadership for Environment and Development (LEAD) Pakistan, has shown that the federal and provincial governments are already spending more than eight percent of their budgets on climate change-related interventions and projects. Sadly, these investments are fragmented and uncoordinated. Climate Compatible Development will require a coherent strategy and investment plans that the ministries of climate change and planning, development and reform can develop in consultation with others. An early capping of emissions is in Pakistan's interest. In fact, an early capping will attract direct foreign investment, bring new technologies, generate additional jobs and spur growth rate. It is in Pakistan's interest that the IPCC's Special Report on 1.5 degrees Celsius serves as the basis of urgent climate actions by Pakistan's neighbours as well as its development partners. This needs to be an important plank of Pakistan's external relations and international diplomacy as climate change has emerged as the most immediate non-traditional threat to our security.

Finally, as countries need to put in place compliance mechanisms in their national settings, Pakistan will also need to undertake immediate actions before the key messages are blurred or forgotten. For this, the Prime Minister needs to convene on a priority basis the first meeting of the recently constituted Pakistan Climate Change Council. After all, protecting the planet is important for everyone. COP 24, as an event, will not protect the planet — only our actions can.

4. Adapting To Climate Change

Keeping Pakistan in mind, there are many aspects of the changing climate and global heating that are affecting this country. Two major areas suffering the impact are health and crop production. It is rather unusual to experience heavy windstorms and rainfall in the months of May and June. At the same time, this June was recorded as one of the hottest in the past few years — in Pakistan and elsewhere. These unusual rains and then the heat wave have affected crop production. We know this because we have not tasted the best mangoes of the season. It rained just when the crops were ready for harvesting.

Planting trees and banning plastics alone won't lessen our vulnerability to the changing climate.

One of the drastic effects of the changing climate is that it ultimately affects our GDP. What about health? Poor people in Sindh die not only due to malnutrition, but also because of the unbearable heat. Several have died in the recent heavy rains because the appropriate infrastructure is not in place. The smog that hits Lahore each year affects the health of so many. Yet we fail to understand the dangers of the changing climate.

4.1. What have we done so far?

We have planted a billion trees in KP, and we are planting more under the 10 Billion Tree Tsunami project. That's good news. However, is that enough? No, it isn't. For one, the project hasn't reached completion yet. Secondly, trees will take time to grow and show their positive effect on the environment. Thirdly, there is speculation that not all the trees being planted are fast growers and helpful for the underground water table. Is that enough to compensate for and balance out the deforestation that is taking place in hilly areas such as Murree and Abbottabad, to accommodate the rising population? In fact, it isn't enough.

Recently the authorities announced the Plastic Bag Se Azadi campaign. That surely gives hope, but from what we have witnessed in the past, such schemes are never implemented properly in Pakistan. Unless there is strict implementation of the law, we cannot be too optimistic. If the rules are enforced it would be a good start to gaining control over plastic pollution. This does not directly help decrease global heating but will contribute positively to sustaining land and marine life.

The government's next step should be to ban one-time-use plastics, which include disposable cups, straws and food boxes. That has a direct relation with global heating as a lot of energy is consumed in their production. All plastics are bad, but some alternatives are better than the one-time-use (polyethylene terephthalate) plastics which can be replaced with high-density polyethylene. An example is that of tumblers which are easily available in the market. Styrofoam is yet another culprit, and although a bill was formulated by the Punjab Food Authority in 2018 to ban styrofoam as food packaging, it is yet to be approved, and we see its rampant use in local food markets as well as high-end restaurants.

4.2. Our energy systems

While discussing climate change and its effects, we cannot leave out energy systems. Pakistan is heavily reliant on energy generation via fossil fuels for its power needs. Our total energy mix largely includes oil, gas and coal, while a small amount constitutes renewable resources of energy. The Alternative Energy Development Board has been tasked by the government to generate at least five per cent of the total national power generation from renewable resources including solar, hydel, biomass, wind and nuclear by 2030.

Our largest solar PV Park, the Quaid-i-Azam Solar Park in Bahawalpur, has a total installed capacity of 1,000MW, yet we do not quite see its benefits. Pakistan also has the potential to utilize its biomass as a source of alternative energy, but there have been many challenges on this front. One such challenge has been the low price of petroleum in the past. Nonetheless, with rising fuel prices and a declining economy, it seems there is a future for biomass as an alternative source of fuel, particularly for the industrial sector.

The recent signing of new contracts to import oil and gas from countries including Russia and Saudi Arabia does not solve our energy crises, and, in fact, will only increase our vulnerability to the changing climate. One can clearly note the geopolitics of energy here. Besides that, the reluctance of people to switch to renewable energy due to their lack of understanding of its benefits is also a huge challenge for the implementing agencies. It is high time that we attempt an attitudinal shift. Planting trees and banning plastics alone won't lessen our vulnerability to the changing climate. There is a dire need to wake up to this alarming issue on an individual level and to play our part. We don't have to do too much other than being eco-conscious and responsive to our natural surroundings and taking ownership of the latter.

5. A change for the worse

Greenhouse gasses (GHG) are pollutants, which are produced by human activities. They cause an increase in surface temperatures and have a serious impact on the climate. Climate change impacts production factors, causes a decrease in marginal productivity of capital and total aggregate output. This strongly affects long-run growth.

We are currently adding CO₂ at the level of 3ppm (parts per million), which is likely to build up to 750ppm by the end of the century causing a rise in global temperature by 4°C. According to climate change experts a rise in temperature by 3°C will have far-reaching socio-economic repercussions. It would result in the loss of five per cent of the global GDP annually. Experts concluded that most market sector impacts of climate change have a hill-shaped relationship with temperature. The colder countries of the world will in fact initially benefit from warming due to reduced heating costs and cold-related health problems. Temperate countries will see a moderate impact and the worst hit will be the warm, tropical countries of the global south.

Extreme weather events, desertification, gradual global warming, collapse of forests and biodiversity, storm surges from oceans and the rise in sea level are some of the physical risks to humanity and macro-economy. They can affect the

macro economy through various supply and demand or transmission channels. On the demand side, extreme weather catastrophes not only reduce household wealth, but also make people more risk averse and increase their propensity to save so that they can safeguard themselves against anticipatory losses caused by climate change (Fankhauser and Tol, 2005). Perceptions of uncertainty in the international business community also reduce foreign investments.

Pakistan is a prime example of a country in the global south that, despite contributing less than 0.8 per cent to the global GHG emissions, is the eighth most vulnerable country to climate change (Akram and Hamid, 2015). The changing patterns of precipitation due to global warming hit South Asia significantly. Pakistan has been suffering from recurrent flooding over the last several years. During the 2010-11 floods, consequences were worse because the land departments were inefficient. There were unlawful constructions of even schools, buildings and settlements on the flood plains, causing mass destruction of capital stock.

As a result of these floods the country's agricultural heartlands, its rice, corn and wheat crops were destroyed; roads and other infrastructure were damaged and so were the lives of 22 million other Pakistanis. These floods killed 1,7000 people and displaced millions. These extreme weather events led to a refugee crisis in the country, protests against government inaction and un-fulfilment of rehabilitation promises. These floods made at least 7.8 million people in Pakistan food insecure and inflicted an economic loss of US\$ 16 billion on the economy.

The frequency of these floods increased due to the rapid melting of the Himalayan glaciers. The temperature change also caused droughts, desertification, water stress and flooding. A heat wave hit Karachi in 2015 leading to a subsequent water shortage that exists to date and drought in Balochistan and Tharparker that caused many deaths.

Rise in the levels of tropospheric ozone (O₃) has led to lethal levels of smog in India and Pakistan (UNEP, 2000). The current smog levels in Pakistan are critically high. Sea level rise is another significant impact of climate change that affects the global south more severely. This may cause saltwater intrusion, flooding, further damage to infrastructure, and especially a detrimental impact on the tourism industry. The higher population density concentration in these countries and their poor flood control infrastructure and planning make them more vulnerable. These natural disasters prevent governments from pursuing their developmental policies as they cause political unrest, social turmoil and a shift of resources and investments from current productive capital and technological advancements to reconstruction and climate change adaptation.

Climate literature shows us that global warming will affect the physical and cognitive performance of workers and thereby cause a decrease in effective labour supply. Extreme temperatures are detrimental to health, making the labour morbid and cause increasing mortality rates through the spread of diseases such as malaria. (Fankhauser and Tol, 2005).

To avoid these effects, we need to transition to more environment-friendly modes of production, enhance the efficiency of existing products and reduce carbon intensive production and consumption (Batten 2018). These, however, have their own macroeconomic and financial burdens called transition risks. Transition impacts are more severe for economies that have a greater dependency on fossil fuels. Almost all of the countries where fossil fuels account for more than 90 per cent of their total exports are in the global south, including Azerbaijan, Iraq, Libya, and Venezuela (Hutt, 2016).

The developed countries, despite having the capacity for transition, are barely taking steps to reduce emissions. According to the World Meteorological Organization Secretary-General Petteri Taalas, "Despite all the commitments at the Paris Agreement for climate change, there is no sign of slowdown or reduction in greenhouse gases." (Sky News, 2019). Developed economies with stable financial systems, liquid markets and bigger banks are better suited to mitigate these effects and rectify the damages caused by natural disasters.

5.1. Climate change: causes, outcomes in Pakistan and a way forward

Climate change can generally be defined as a change in global or regional climate patterns. In particular, it is the change apparent from the mid-to-late 20th century onwards, and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels. The Framework Convention on Climate Change (UNFCCC), in its Article 1, defines climate change as: "A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".

Climate change has caused drastic effects in the world climate, such as the rise of carbon dioxide level, global temperature, melting of ice sheets, rise of sea levels, and ocean acidification. For this change, a range of human activities is responsible. As per NASA, 97 percent of climate scientists agree that climate-warming trends over the past century are very likely due to human activities, for instance, the rapid emission of carbon dioxide that has resulted in global warming. We, therefore, need a broad-based consensus at international level and a firm commitment at the national level to fight to diminish the aftermath of climate change.

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Human activities are the major cause of climate change. The foremost cause is global warming. Burning fossil fuels, such as coal and oil, has increased the concentration of carbon dioxide. Due to expansion of the greenhouse effect, global warming has risen. As per this phenomenon, gases such as water vapors, carbon dioxide, methane, nitrous oxide, and chlorofluorocarbons in the our atmosphere prevents the heat to leave the earth’s atmosphere; resultantly, the ozone layer depletes and the temperature rises.

In its Fifth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) concluded that there is a more than 95 percent probability that human activities over the past 50 years have warmed our planet. Industrial activities that our modern civilization depends upon have raised atmospheric carbon dioxide levels from 280 parts per million to 400 parts per million in the last 150 years. The panel also concluded there is a better than 95 percent probability that human-produced greenhouse gases such as carbon dioxide, methane and nitrous oxide have caused much of the observed increase in earth’s temperatures over the past 50 years. About half of the CO₂ emissions, between 1750 and 2010, have occurred in the last 40 years.

Deforestation and increase in the use of chemicals in domestic and agriculture life is another reason of climate change. Deforestation is the second leading cause of global warming and produces about 24 percent of global greenhouse gas emissions. Scientists say that deforestation in tropical rainforests adds more carbon dioxide to the atmosphere than the sum total of all the cars and trucks on the world’s roads.

The surge in the uses of chemicals in domestic as well as in agriculture, in the shape of fertilizers, also plays its role in climate change. The high rate of application of nitrogen-rich fertilizers has effects on the heat storage of cropland (nitrogen oxides have 300 times more heat-trapping capacity per unit of volume than carbon dioxide) and the run-off of excess fertilizers creates ‘dead zones’ in our oceans. In addition to these effects, high nitrate levels in groundwater due to over fertilization are cause for concern for human health.

These causes resulted in climate change and have a perilous aftermath. In this regard, the Intergovernmental Panel on Climate Change (IPCC) was created by the United Nations Environment Program (UN Environment) and the World Meteorological Organisation (WMO) in 1988. It now engages with 195 member countries, which provides policymakers with regular scientific assessments on climate change, its implications and potential future risks, as well as to put forward adaptation and mitigation options.

The foremost hazardous evidence is the rise of carbon dioxide in our atmosphere. As per NASA’s scientific evidence, for a millennium, the level of carbon dioxide (parts per million) was below 300, which started to rise since 1950, and is now above 400. Secondly, as per NASA’s evidence, the planet’s average surface temperature has risen about 1.62 degrees Fahrenheit (0.9 degrees Celsius) since the late 19th century, a change driven largely by increased carbon dioxide and other human-made emissions into the atmosphere. Most of the warming occurred in the past 35 years, with the five warmest years on record taking place since 2010. This is also established by the United Nations’ report, prepared by

the World Meteorological Organisation, on September 22, 2019. It states that the period “is currently estimated to be 1.1 degrees Celsius above pre-industrial era of 1850-1900, and 0.2 degrees Celsius warmer than 2011-2015”.

Thirdly, the oceans are getting warmer, and ice sheets are shrinking. As per NASA, the oceans have absorbed much of this increased heat, with the top 700 meters (about 2,300 feet) of ocean showing warming of more than 0.4 degrees Fahrenheit since 1969. The Greenland and Antarctic ice sheets have decreased and have lost an average of 286 billion tons of ice per year between 1993 and 2016, while Antarctica lost about 127 billion tons of ice per year during the same time period. The rate of Antarctica ice mass loss has tripled in the last decade.

Fourthly, the glaciers are melting and sea level is rising. Around the globe, the glaciers are retreating including in the Alps, Himalayas, Andes, Rockies, Alaska and Africa. The global sea level rose about eight inches in the last century. The rate in the last two decades, however, is nearly double that of the last century and is accelerating slightly every year.

There are other drastic evidences of climate change. Arctic sea ice is declining rapidly. Disturbed rainfalls and extreme weather events have increased. Also, the ocean acidification, which has increased by about 30 percent since the Industrial Revolution, is another evidence of climate change. It also has a negative impact on crop yield productions. The direct impact on the lives of humans is on the vulnerable and the marginalised segment of society.

As per NASA, 97 percent of climate scientists agree that climate-warming trends over the past century are very likely due to human activities. As per IPCC Fifth Assessment Report, numerous risks are involved that raise concern. These include risk of death, injuries, health or disturbed livelihoods due to storms, flooding and sea-level rise. The risk in water supply, supply of electricity and emergency situations are also there. The foremost risk is food insecurity due to droughts, flooding, and precipitation variability. There is the risk to lose marine and coastal ecosystems and biodiversity as well.

Pakistan has also suffered economically due to climate change. According to experts, Pakistan has faced around 150 freak weather incidents as a result of climate change in the past 20 years: flash floods, smog in winter, forest fires in summer, melting glaciers, freaky heatwaves, landslides, displaced population. During the floods in 2010-11, almost 10 percent of Pakistan’s population was displaced in two provinces, one in the north and another in the south. Last year, the cost of extreme weather as a consequence of climate change was listed at \$384 million; in the past 20 years, there has been a cost of almost two billion dollars to the national economy because of the ravages of climate change.

The UN has shown its commitment to fight in this noble cause. There are various agreements and protocols for climate change. The United Nations Framework Convention on Climate Change (UNFCCC) is the main international agreement on climate action. It was one of the three conventions adopted at the Rio Earth Summit in 1992. To date, it has been ratified by 195 countries. It started as a way for countries to work together to limit global temperature increases and climate change, and to cope with their impacts.

In the mid-1990s, the UNFCCC signatories realized that stronger provisions were needed to reduce emissions. In this regard, they agreed to the Kyoto Protocol in 1997, which introduced legally binding emission reduction targets for developed countries. Next comes the Paris Agreement; the Paris climate conference took place from November 30 to December 11, 2015. On December 12, the parties reached a new global agreement on climate change. The agreement presents a balanced outcome with an action plan to limit global warming ‘well below’ two degree Celsius. There is also the Montreal Protocol 1987, which is a global agreement to protect the stratospheric ozone layer by phasing out the production and consumption of ozone-depleting substances. There is also the United Nations Convention to Combat Desertification (UNCCD) 1994 to combat desertification and mitigate the effects of drought in countries experiencing serious drought/ desertification. What requires is that we must change course by 2020, as the UN Secretary General Antonio Guterres has said; we risk missing the point where we can avoid the “disastrous consequences for people and all the natural systems that sustain us.”

In this regard, there are the following suggestions to tackle global warming. Dramatically reducing our use of fossil fuels, especially carbon-intensive coal, is essential to tackle climate change. There are many ways to begin this process. Key action steps include: not building any new coal-burning power plants, initiating a phased shutdown of coal plants starting with the oldest and dirtiest, and capturing and storing carbon emissions from power plants. While it may sound like science fiction, the technology exists to store carbon emissions underground.

Using alternative sources of energy is more efficient and meets the problem of global warming. Energy producing from solar, wind, tidal, and biomass are more clean and renewable. There are least effects if we produce electricity from the alternative sources of energy. Nuclear power results in a few global warming emissions; an increased share of nuclear

power in the energy mix could help reduce global warming. A successful global compact on climate change must include financial assistance from richer countries to poorer countries to help make the transition to low-carbon development pathways and to help adapt to the impacts of climate change. The energy used to power, heat, and cool our homes, businesses, and industries are the single largest contributor to global warming. Energy efficiency technologies are the dire need of the hour.

Transportation sector's emissions have increased at a faster rate than any other energy-using sector over the past decade. For this, efficient fuel consumption modes of transport, and switching to low-carbon fuels are the requirement of time. In a nutshell, we must develop a two-pronged approach: firstly, we must reduce emissions and stabilize the levels of greenhouse gasses in our atmosphere; secondly, we must adapt climate-friendly lifestyles and pursue the principles of sustainable economic growth.

5.2. Climate change and Pakistan

Pakistan ranks 31st in terms of global emitters while it is the seventh most affected by climate change fallout. Pakistan, like much of the world, is vulnerable to climate change. Over the past few years, we have witnessed extreme weather conditions that include floods, heavy monsoons and heat waves even while the country has contributed less to the overall environmental damage than other climate offenders.

According to a new report submitted to the Economic and Social Council of the United Nations, Pakistan ranks 31st in terms of global emitters while it is the seventh most affected by climate change fallout. The increased frequency and intensity of heat waves which claimed more than 1,200 lives in Pakistan in the year 2015 is a warning sign that the country is a victim of global climate change. Floods and hydro-disasters have also increased in frequency over the past few decades. Small communities near the riverbanks are routinely washed away. And if by any chance, floods spare these communities, they are hit by droughts that cause misery in areas like Tharparkar in Sindh, as well as in Baluchistan. To address the growing threat from the climate change phenomenon, the federal government has already launched 'Billion Tree' plantation drive across the country. And this project has now been up scaled with plans to plant '10 Billion Trees' countrywide over a period of five years. The mammoth project is meant to restore depleted forests and perhaps even reduce the impact of climate change.

With low emission levels and environment-friendly policies, Pakistan may be able to reduce the impact of climate change, but it will not be able to stop the process entirely. Faced with a host of issues that have been hampering a robust industrial activity for years, Pakistan is nowhere close to the big climate offenders, who have been involved in strong economic and industrial activity. The world's biggest polluters — in both absolute as well as per capita terms — must now take action over their increasing emissions rates to prevent further damage to the global environment. For Pakistan the challenge is to create national environment-friendly policies that can further lower our emission levels in the future without hurting our economic and industrial growth.

6. Climate change deaths

The sluggish approach by Pakistani authorities on climate change points to a grave failure on their part. Around 128,000 people die due to climate change every year in Pakistan, an official of the ministry of climate change informed a Senate panel recently. Officials also made some other disturbing disclosures at a meeting with members of the Senate Functional Committee on Human Rights. Some of these are that average lifespan in the country could be reduced by two to five years because of environmental pollution; 43 per cent of the pollution is being caused by the imported low-grade oil used by the transport and energy sectors; and Pakistan cannot use environmentally-friendly fuel till 2021; that the country's last oil sector policy came, in 1997, 22 years ago. Since then, much technological advancement has taken place. Furthermore, climate change is also affecting children's immune system. The committee, headed by Senator Mustafa Nawaz Khokhar, took up the issue of climate change after the recent smog in Lahore. The panel invited the ministry of climate change, Punjab government representatives, and the ministry of petroleum, Ogra, and representatives of oil refineries to the meeting.

The panel was informed that the five oil refineries in the country are still primitive and our oil has high magnesium and Sulphur contents. This is harmful to health. In Pakistan, Euro-2 standard is applied while the world has gone to Euro-6 technology. Experts say going to Euro-4 or Euro-5 will be counter-productive if vehicles are not upgraded with regular inspections. Tail-end emissions and fuel quality need to be considered simultaneously.

Considering all this in the backdrop of the fact that Pakistan is the fifth-most vulnerable country to climate change, the sluggish approach by the authorities' points to a grave failure on their part. We should not uncritically get carried away

by all that writers on climate change say. One should sift chaff from the grain. However, science is not an alternative fact. It cannot be denied that ice melts when exposed to heat.

7. Climate change triggers widespread migration in Pakistan

Extreme weather patterns, shrinking agriculture, sea erosion, and lingering dry spells have caused widespread migration within Pakistan in the past decade, according to officials and local experts. More than two million people were displaced by floods that inundated one-fifth of the country in 2010, triggering mass migration from rural to cities.

Of that figure, almost 70% did not go back to their hometowns and permanently settled in big cities to make a living because of the destruction to their homes and farmlands, Ministry of Climate Change spokesman Muhammad Saleem told Anadolu Agency. He said seasonal, long-term and permanent migrations mainly due to drought and floods, had taken place in southern, southwestern, and northeastern Pakistan in the last 10 years. About 700,000 people migrate to big cities from rural Pakistan annually on long-term, and permanent basis, he said, citing international surveys.

Climate change: 'Pakistan 5th most affected country from 1999 to 2018' Pakistan recently has been placed fifth on the list of countries vulnerable to climate change by the Global Climate Risk Index for 2020. Pakistan lost 9,989 lives, suffered economic losses worth \$3.8 billion and witnessed 152 extreme weather events from 1999 to 2018, according to the Global Climate Risk Index. The data also indicates the government, as well as the world, is not taking enough measures to cope with challenges and risks climate change poses to Pakistan.

7.1. Increasingly Vulnerable

Pakistan is annually losing more than \$4 billion due to climate change disasters. According to a report from the Climate Change Ministry, the country lost \$80 billion from 1996 to 2016 because of climate change calamities. The alarming fact is that climate migration is taking place in all four provinces - Sindh, Punjab, Khyber Pakhtunkhwa (KP), and Balochistan - and the northern Gilgit-Baltistan region.\

7.2. Climate change extends dengue season

"Almost 50% of Pakistan's population is increasingly becoming vulnerable to climate change, which may trigger another wave of mass migration", Saleem, who has specialization in climate change communications, observed. The ministry has no official statistics, but Saleem believed 15% to 20% of the country's total 210 million population had moved to big cities from rural areas from the four provinces since 2010 floods. "[The] last nine years have been the worst period for Pakistan in terms of natural disasters like floods, drought, a decline in rains and heat wave. Over the years, these disasters have destroyed or damaged hospitals, schools, roads, sources of livelihoods in different parts of the country speeding up influx from rural to urban centres," Saleem said. "A few years back, the rural-urban population ratio was 40-60. Now it is fast becoming otherwise." In Islamabad alone, he added, the city's population increased to more than 2.2 million from around 500,000 in 2010. Amar Guriro, a Karachi-based analyst who regularly writes on climate change and environment, supported the view putting the numbers of climate migrants at 30 million in the last 10 years.

7.3. Climate change increased global burden of diseases: UN

A lingering dry spell, he said, had gradually shrunk the agriculture and herding in southern Thar Desert and several districts of southern Punjab and southwestern Balochistan provinces, propelling a mass migration to the big cities in recent years. "The three regions are more vulnerable because they totally depend on agriculture and herding, which depend on the weather, and the weather is marred by climate change," Guriro told Anadolu Agency. "Prolonged summers, drought, a decline in rainfall, extreme weather patterns and frequent heat waves, have become a new normal in several parts of the country damaging the local economy and demography", he opined.

7.4. Sea Erosion

A combination of sea erosion and intrusion has submerged several Indus river delta islands, mainly in the Thatta, Badin and Sajawal districts of the southern Sindh province in the last few decades compelling local communities to migrate to the nearby districts or the port city of Karachi, the country's commercial capital. Ketu Bandar, once a port city on the Arabian Sea near Thatta district, is one of the glaring examples of how climate change has affected the local communities.

7.5. Concerned citizens seek climate emergency

The city, which had had its own municipal corporation until 1921, has been relocated four times in the last 40 years due to rising sea levels. "A consistent sea erosion has engulfed nearly three million acres of land, apart from submerging

scores of villages in Thatta, Badin and Sajawal in the past 40 years,” Mohammad Alsi Shah, who heads Pakistan Fisherfolk Forum, a non-government organization that works for the advancement of the fishermen community, told Anadolu Agency. “And the phenomenon is accelerating day by day due to rising sea levels,” he added. According to Shah, more than one million people from the coastal areas of the three districts moved to Karachi and other cities because of sea intrusion and erosion in the past four decades. Construction of dams and diversion of river water, he said, had further added to growing sea intrusion already sprawling more than 124 miles (200 kilometers).

8. Pakistan remains victim of climate change

8.1. Unseasonal Rains

Normally, rains mitigate impacts of dry spells, however, instead of giving relief, unseasonal rains have prolonged the drought-like situation in several areas. Already shaken by six years of consecutive drought, Thar received heavy but unseasonal rains this year destroying cluster bean crops and fodder for livestock. “The unseasonal rains [in November] - a direct result of climate change -- instead of bringing some relief to Thar, have further added to their miseries not only in terms of destroying the standing crops but also their investments,” Guriro said. “Now, it’s not only drought but also unseasonal rains, which may force many Tharis to move to adjoining districts,” he observed. Thar Desert, which forms a natural boundary with neighbouring India, spans a region of 124,000 miles (200,000 kilometers), has a population of 1.5 million and is ranked by the World Food Program as the most food-insecure region in the country.

9. Government working on climate-smart agriculture

9.1. GLOF

In the northern scenic Gilgit-Baltistan region, which borders China, landslides and glacier lake outburst floods (GLOF), which are the outcome of global warming, have submerged scores of villages and destroyed infrastructure, forcing local communities to move to other areas. Thousands of people were displaced after a massive landslide blocked the River Hunza creating a natural lake, Atta bad, in 2010. The rising water immersed scores of villages, farmhouses and a 12-mile stretch of Karakorum Highway, which connects Pakistan with China. “Melting glaciers and landslides have posed a serious threat to the local population, and infrastructures in several parts of Gilgit-Baltistan region,” Zahid Hussain, a Gilgit-based environmentalist told Anadolu Agency.

The melting of glacial ice, in particular, he said, had already created artificial lakes in different parts of the region displacing thousands from their ancestral places. “On a safe side, I am quoting the figures [of displaced people in the region] in thousands because the government authorities have no official statistics in this regard. Northern Gilgit-Baltistan region is home to the six peaks of more than 26,200-foot (8,000-meter) altitude, including the world’s second tallest peak, K-2. In addition to that, the region has over 5,000 large and small glaciers and more than 100 lakes, which jointly make up the world’s largest freshwater reservoir.

10. The link between Pakistan’s locust crisis and climate change

Crawling across thousands of kilometers (km) and flying through the air, millions of locusts have swarmed large swathes of agricultural land in Pakistan and India, devouring any vegetation in their path. The United Nations’ Food and Agriculture Organisation (FAO) says that Pakistan will lose more than USD four billion worth of rabi and kharif crops. According to the FAO, 38% of the land area of Pakistan (60% in Baluchistan, 25% in Sindh and 15% in Punjab) is a breeding ground for desert locusts. They move in swarms of up to 50 million locusts, and each swarm can travel up to 150 km a day, eating as much food as consumed by 35,000 people, and laying 1000 eggs per square metre. The situation can easily turn dire if these swarms are not contained, and if they migrate to other areas of Pakistan.

The daily lives of farmers have changed dramatically with locust attacks affecting more than 60 districts across Pakistan. Farmers resort to traditional remedies such as banging utensils and watching crops from dusk till dawn, in a vain attempt to dispel desert locusts from their farms. To their dismay, locusts by the millions are paving their way towards Pakistan from the Horn of Africa.

While locust plagues are not new, scientists say climate change is making them worse. It is argued this infestation is driven by unusually warm weather and heavy rains in the Arabian Peninsula, creating the ideal breeding ground. From mid-2018 to early 2019, the Empty Quarter along the borders of Oman, Yemen and Saudi Arabia witnessed two large cyclones that brought heavy rains, resulting in an 8000-fold increase in locust numbers in remote areas, where survey

and control activities could not be conducted. By January of 2019 a new generation of swarms had bred, which then migrated to the Horn of Africa and the Indo-Pakistan border during the summer of 2019.

In normal conditions, desert locusts usually undergo quiet periods in semi-arid and arid desert regions of South-West Asia, Near East and Africa, which receive less than 200 millimetres of rain annually. These locusts either migrate from these regions or die of natural mortality. But the last five years have been hotter than any other since the industrial revolution. Research links hotter climate to more intense and damaging locust swarms, leaving Africa and South-West Asia disproportionately affected. Keith Cressman, a senior locust forecasting officer with the FAO, says that locust breeding is directly linked to soil moisture and food availability. Therefore, rain patterns have a strong influence on locust populations.

Climate change also led to wet weather (ideal for locust breeding) in the Horn of Africa caused due to 400% above-average rainfall from October-December 2019. These abnormal amounts of rainfall were a result of the Indian Ocean Dipole (IOD), a phenomena accentuated by climate change. Scientists have warned that the IOD can become a regular occurring phenomenon in more extreme forms, as sea temperature rises. For these reasons, the locust attacks in Pakistan cannot be viewed in isolation. Rather, they are a part of the wider global climate changes aggravated by global warming.

According to the FAO locust watch (May 27, 2020), adults are forming groups and small swarms in spring breeding areas in the southwest (Baluchistan) and the Indus Valley (Punjab). These infestations will move to the summer breeding areas along the Indo-Pak border, from Cholistan to Tharparkar. In response to the locust plague, Pakistan has declared a national locust emergency with a comprehensive National Action Plan for Surveillance and Control of Desert Locust in Pakistan, 2020-2, consisting of three phases. The effort to coordinate and support large-scale locust control operations is being spearheaded by the Federal Ministry of Food Security and Research in collaboration with National Disaster Management Authority (NDMA), provincial agriculture departments, and the armed forces.

Among the initiatives to safeguard national food security are efficient coordination with key stakeholders (public and private sector institutions), timely resource mobilization, effective surveillance, control operations, and mass awareness activities as per the Standard Operating Procedures (SOPs) endorsed by the FAO to combat serious threats to agriculture from desert locusts. For a timely and effective response, Pakistan is collaborating with Iran and India under the FAO Commission for Controlling the Desert Locust in South-West Asia (SWAC). It has also sought help from China and the United Kingdom, with the Department for International Development (DFID) of the United Kingdom pledging £6 million for locust control in Pakistan. However, these measures are slow and delayed, with many farmers left to fend for themselves in trying times amidst Covid-19.

While the government mulls over the various possibilities to address the locust crisis, it is imperative to include the factor of climate change. To save Pakistan, and the region, from repeated episodes of locust invasions it is the need of the hour that a joint regional climate strategy be devised. Perhaps, the SWAC can be expanded to promote climate change dialogue between Pakistan, India, Iran and Afghanistan. Without further delay, concrete action is required because the storm is brewing.

11. Climate change: time to panic?

The question posed above is about climate change; the age of climate panic is here wrote The New York Times in a special report on the subject of what mankind faced if it did not urgently address the issue of global warming. The heat wave in 2018 that produced the fourth hottest year in the history of the United States killed dozens from Quebec in Canada to Japan. There were the most destructive wildfires in the Californian history that turned more than a million acres to ash. Pacific hurricanes forced three million in China to flee and wiped away almost all of Hawaii's East Island.

There are many other climate-related stories from around the world. We are experiencing a world that has already warmed one degree Celsius since the late 1800s when records began to be kept. Scientists have determined that we are adding Earth-warming carbon dioxide to the atmosphere at a rate faster than any other point in history since the beginning of industrialization. Scientists no longer quarrel about their findings. In October 2018, the United Nations Panel on Climate Change issued what has come to be called the 'Doomsday' report — a deafening, piercing smoke alarm going off in the kitchen, as one United Nations official described the document — outlining climate consequences at 1.5 and two degrees Celsius of warming.

They have also begun to examine the consequences of temperatures moving beyond three to four degrees Celsius. In the latter case, the world as we know today would cease to exist. There is no one in the already crowded Democratic

field for the presidential poll of 2020 in America who does not endorse an agenda concerning climate change. Panic has hit the Democrats in the United States. Panic has also hit the American youth. An initiative taken by Alexandria Villasenor, a 13-year-old girl from New York has grown into a global movement. She is one of a group of young, mostly female, activists behind the 'School Strike 4 Climate' campaign. On March 15, with the support of some of the world's biggest environmental organizations, tens of thousands of kids in at least two dozen countries and possibly 30 states in the United States plan to skip school, come out in the streets and march, and demand action. "Their demands are uncompromising: Nations must commit to cutting fossil fuel emissions in half in the next 10 years to avoid catastrophic global warming," wrote The Washington Post in a front-page coverage of the movement. "And their message is firm: Kids are done waiting for adults to save their world." Said Villasenor: "My generation is really upset.

Government action will only come if there is willingness on the part of policymakers. That may have begun to happen in the United States, the country that under Donald Trump has retreated a great distance. There was a dramatic change in the United States' political climate as a result of the mid-term elections of November 2018. In early February 2019 Congress woman Alexandria Ocasio-Cortez sponsored the Green New Deal that has the support of four leading Democratic contenders for the presidency. The ideas they laid out aspired to power the US economy with 100 per cent renewable energy within 12 years and called for "a job guarantee programme to assure a living wage to every person who wants one," "basic incomes programmes" and "universal healthcare," financed, at least in part, by higher taxes on the wealthy. But some on the left of the political spectrum were not supportive of the Green New Deal agenda. Nancy Pelosi, the Democratic Speaker of the House, waved off the initiative as impractical. But those who supported the effort were of the view that it had not been fully explained by its sponsors.

For instance, Jedediah Britton-Purdy, the author of *After Nature: A Politics for the Anthropocene*, made a case for the Green New Deal's approach. "In the 21st century environmental policy is economic policy. Keeping the two separate isn't a feat of intellectual discipline. It is an anachronism," he wrote in a newspaper article. He argued that carbon emissions are basically about infrastructure. For every human being, there are about 1,000 tonnes of built environment: roads, office buildings, power plants, cars, trains and trucks. Human beings have created an artificial world which cannot survive unless far-reaching policies are adopted.

What role should Pakistan play in the renewed effort to address the problem posed by climate change? The government headed by Imran Khan should operate at three different levels — local, regional and international. At the local level there is an urgent need to improve the quality of air in the country's large cities. This will require the removal of brick kilns that burn soft coal; the banning of burning of crop residue after harvests; and strict regulation of motor vehicles, including rickshaws, pertaining to the fuels they use. At the regional level, Prime Minister Imran Khan should seriously consider convening a conference involving all the countries that receive river waters from the Himalayas. This would mean inviting Bangladesh, Bhutan, China, India and Nepal to a well-prepared regional policy document to discuss and take action on. This effort would contribute to Pakistan playing a major role at the international level. Imran Khan has the name recognition and charisma to pull off such an initiative.

12. Climate change - a very real problem

United States President Donald Trump is known to toss around the term 'fake news' in relation to many things, especially climate change. To challenge this, speakers at the Karachi International Water Conference explored, at a rather sensationally titled session "Trumping the Devil - Is Climate Change Fake News?" various aspects of climate change and the impact it will and already has had on Pakistan.

Chairing the session, Rudolph Cleveringa, executive secretary of the Global Water Partnership, spoke about the link between water stress and migration, explaining that there were 184 peer-reviewed research articles proving this. Climate change and water stress lead to migration and many countries want to curb this and the influx of refugees, he said, Speaking about climate change in the Pakistani context, he said the country has allocated only 8% of its public expenditure for water. Environmentalist and author Zulfiqar Halepoto was the only speaker to touch upon the topic of the session and discussed the global and US reaction to Trump's strong stance against the phenomenon of climate change. Illustrating his point with screenshots of tweets and video clips, Halepoto said many citizens and government officials in the US did not support their president's view that climate change was fake. Since his election, he has refrained from openly disparaging the existence of climate change, according to the environmentalist's presentation.

"The [effects of] climate may vary but it is very real," said Dr Zaigham Habib, a consultant hydrologist. She discussed the confusion between natural climate variabilities and climate change, explaining that droughts and floods are natural occurrences but the frequency with which they have been occurring is alarming. "Scientists need to separate what's part of natural climate change and what is not," she told participants of the session. Dr Habib cautioned that carbon dioxide

levels have peaked in the last 60 years, illustrating her point with a graph tracing the carbon dioxide levels in the world for the past 400,000 years.

Pakistan is among 10 countries most vulnerable to climate change, she warned. Dr Habib also cautioned that the formation of large lakes was troubling. All these occurrences are cause to worry, she said. She pinpointed the impacts of climate change such as uncertainty in water availability, decrease in crop yields, loss of biodiversity and increase in health risks. She linked climate change to the agriculture sector and the recent failed potato crop. "Some climate change impacts, like melting glaciers, cannot be reversed," she said, urging people to forget Trump and instead accept that Asia has it worse in terms of climate change impacts. Sindh governor bursts the bubble at 3rd Karachi International Water Conference. Dr Lubna Ghazal, an assistant professor at Karachi University's geography department, said the increasing population is leading to an increased demand for water. Pakistan is a country that suffers both floods and droughts.

"By 2025 one-third of the human population will be living in areas lacking fresh water and Pakistan will be among those areas," she said, adding that water will become the new oil in the not-so-distant future. According to the United Nations, the demand for water increases by 10% every year, she said. Dr Ghazal added that Pakistan claims to be an agro-based economy but most of its population is highly undernourished. What we need is monitoring, management and financial support, she urged.

Daanika Kamal, from The Asia Foundation, put a human rights spin on climate change, arguing that the issue was about protecting future generations. "Human rights are 'human' because humans both suffer and impose the [changes]," she said. "The blame game doesn't work," said Kamal, explaining that the situation worsens while countries try to pass the buck. By putting a human rights spin on the issue, she said that countries would be liable to impose limitations on non-state actors, and assist other countries reduce the effects of climate change in their territories. By doing so we would be taking care of all humans, she said, adding that another right to protect is the right to culture and heritage, which will be endangered by climate change-related migration.

12.1. Global Heating & Climate Change

In the early 1900s, climate change was nothing more than a faraway concept. But this decade, we are already starting to see the very real effects of climate change. Earlier this year, Australia suffered their most destructive bushfires on record. Over a period of several months, more than 11 million hectares (110,000 sq km or 27.2 million acres) of bush, forest and parks across Australia were burned. Nearly 50 threatened species are believed to have had more than 80% of their area affected, including seven critically endangered plants.

Due to its dry desert-like climate, bushfires occur regularly in Australia. But this year was far worse than normal, and scientists warn it's an indication of climate change. Over the past year, Australia set two new temperature records, with an average maximum of 41.9C recorded on 18 December. Natural weather patterns are regarded as the main cause behind the increased fires, but many researchers say human activity has also played a part.

During the months of burning in Australia, East Africa also suffered extreme weather conditions. According to the Famine Early Warning Systems Network, the Horn of Africa saw up to 300% above average rainfall between October and mid-November. As a result, over 1 million people have been affected by flooding in Kenya, Somalia and Ethiopia.

Whilst scientists say this extreme weather is caused by a natural climate phenomenon known as the Indian Ocean Dipole, they have warned extreme climate and weather events caused by the dipole are likely to happen more frequently, if greenhouse gas emissions continue to increase.

- **The air quality** across the globe has been steadily worsening for the past 50 years, and recent reports reveal that the quality of the air we breathe is now reaching toxic levels in many parts of the world. Latest figures from the UN reveal that in low and middle-income countries, 98 per cent of cities with more than 100,000 inhabitants fall below the World Health Organization's air quality guidelines.
- This is having detrimental impacts on human health, with WHO estimating there are around 7 million premature deaths a year as a result of poor air quality.
- One of the main contributors to poor air quality is the fossil fuel industry, which is responsible for 80% of all energy production worldwide. According to UN statistics, only 82 out of 193 countries have incentives promoting investment in renewable energy production, cleaner production, energy efficiency and pollution control.

- We also rely heavily on fossil fuel for transport, which accounts for almost one-quarter of energy-related carbon dioxide emissions. Open waste burning is another large contributor to air pollution, releasing harmful dioxins, furans, methane, and black carbon. Globally, it's estimated that around 40 percent of waste is openly burned, and is practised in 166 out of 193 countries.
- Plastic waste has been found floating in all corners of our oceans and has even been discovered on the ocean floor of one of the deepest places in the ocean – the Pacific Mariana Trench. The American explorer, Victor Vescovo descended nearly 11km in a submersible, breaking the world record for the deepest ever sub-dive.
- However, amidst his search for sea creatures, he reported finding a plastic bag and plastic sweet wrappers at the very bottom of the ocean floor, revealing the true extent to which plastic pollution has infiltrated our oceans.
- Deforestation is a major contributor to global heating and climate change. Rain forests act as the earth's lungs, absorbing greenhouse gases such as CO₂, from the atmosphere. They also provide a habitat for approximately 80% of the world's documented species.

The World Air Quality Report 2019, has ranked Pakistan as the second-most polluted country in the world, accounting for one of the highest concentrations of fine particulate matter (PM_{2.5}) in the air.

The report stated that the poor air quality accounts for some 113,500 deaths in Pakistan annually, or around nine per cent of all deaths recorded in the country annually.

Pollution is also quite costly for the poor country as it inflicts damage worth a whopping \$12.51 billion every year.

Due to the depleting air quality, the report pointed out that it has contributed to reducing the average age of Pakistani citizens by around 2.5 years.

Meanwhile, it noted that the Ministry of Climate Change (MoCC) has formulated a draft for the new.

12.2. Pakistan Clean Air Program 2020

As per the report, available with The Express Tribune, the air quality guidelines set by the World Health Organization (WHO) say that the reduction of annual average PM_{2.5} concentrations from 35 µg/m³, to around 10 µg/m³, could help reduce deaths related to air pollution by about 15 per cent.

However, it noted that PM_{2.5} concentrations in Pakistan have been recorded to be at least 100 per cent above this threshold with levels at 65 µg/m³. This level is the second-highest recorded in the world.

The draft further stated that big, industrial cities such as Karachi, Lahore, Peshawar, and Faisalabad have been included in the list of the most polluted cities in the world.

The document termed emissions from traffic congestion due to disorganized transportation, industrial and power plants running on fossil fuels, and improper burning of solid waste as the major causes of environmental degradation in the country.

It added that as much as 71,000 tons of solid waste is generated daily from the larger metropolitan cities of Pakistan but there is no proper system to dispose of it efficiently.

The report further said that the government has initiated several program to cover up environmental damages in the country with the introduction of the electric vehicle policy. Apart from this, the government has started importing the relatively environmentally-friendly Euro-V compliant fuel. It further highlighted that the government has shut down industrial units in 12 of the most polluted districts for two months during the summer season to mitigate environmental pollution while brick kilns across the country were being shifted to the environmentally-friendly Zig-Zag technology.

What does it mean for Pakistan? As the government mulls over a slew of stimulus packages to revive the economy, while ensuring that easing the lockdown is safe, the authorities would do well to review its investments in coal energy. More than 95 per cent of Pakistan's installed coal-based electricity generation capacity (5,090 megawatts) was commissioned during the past three years and the plants are at various stages of development. All this is happening at a time when around the world the same are being scrapped — not only because of the high levels of air pollution they generate but also because they are economically unviable.

Take the example of the nine proposed coal power plants with a total capacity of 3,700 MW in Tharparkar, which has the worst human development indicators in Sindh. A recent study titled Air quality, health and toxic impacts of the proposed coal mining and power cluster in Thar, Pakistan, carried out by the Centre for Research on Energy and Clean Air (CREA), paints a horrific picture.

It projects 29,000 deaths related to air pollution over an operating life of 30 years, 19,900 new cases of asthma among children and 32,000 preterm births. With quality of life compromised due to breathing polluted air, most Tharis would be living with chronic obstructive pulmonary disease and diabetes, and be at risk of stroke.

Terming Tharparkar one of South Asia's largest "hotspots for mercury and carbon dioxide", the study calculated that of the 1,400 kilograms of mercury emitted annually, one-fifth will settle in water or on land. The independent research centre could only review three environmental impact assessments that were available publicly and found "errors and omissions" thereby "misleading public through data manoeuvring" noted lead author Lauri Myllyvirta, with concern. There was one EIA report that had calculated mercury content in coal but its calculations about emissions were inaccurate. The study also held those carrying out these assessments to be "misreporting". At the same time, it questioned the role of the Sindh Environmental Protection Agency (Sepa) and the "level of regulatory oversight". Had the EIAs been reviewed seriously, the "elementary" errors caught by CREA could certainly have been caught by the regulator.

According to CREA spokesperson, while there are affordable techniques whereby mercury emissions can be reduced by more than two-thirds, there were no emission limits in Pakistan that would require any mercury controls. With the result, plant developers can continue to completely neglect the issue. And so, it must be emphasised to Sepa how crucial it is to carry out studies to evaluate the health risks of mercury emissions since lignite coal plants are very large sources of the element.

However, for the sake of public health, perhaps the best decision — one requiring courage — would be to cancel those coal-based plants that are still in the early stages of development and not follow the route of China and the US, which is slowly pivoting towards fossil fuels. As they come up with economic recovery packages, there are reports that China wants to set up new coal plants and the US wants to use the pandemic as an excuse to relax environmental rules and impact reviews.

The pandemic has made it crystal clear that our future economic plans must be climate-smart. The 10 billion tree tsunami project has earned the government much applause. At present, it provides jobs to nearly 65,000 people and plans are underway to provide three times more employment by the end of this year. But instead of resting on its reforestation laurels, perhaps the government can direct some of its attention towards renewable energy projects that are much cheaper than mammoth toxic-spewing coal plants.

Civil society movements and environmental activists must come together and put pressure on the government to tread a greener, more sustainable path towards economic recovery, and use the opportunity provided by the pandemic to course-correct with even more stringent environmental laws and regulations, and rectify past mistakes. Pakistan's second-largest city is choking on smog, driven in part by smoke from bricks kiln and steel mills, burning of rice stubble and garbage, growing numbers of vehicles on the road and large-scale losses of trees as the expanding city makes way for new roads and buildings, residents say. The Government of Pakistan commission also ordered the planting of trees in urban areas and efforts to spread environmental awareness in schools.

"Climate change is no longer some far-off problem; it is happening here, it is happening now"

Barack Obama

13. Conclusion

Although Pakistan is facing environmental challenges, which include climate change impacts, loss of biological diversity, deforestation and degradation of air and water quality, Pakistan is trying to respond well. Because of the deteriorating economy, the country could not do much. But still, the present government has launched the Ten Billion Trees Tsunami Program to lead the country towards aiming at revival of forestry and control air, weather, wildlife, forestation, watershed management and soil conservation to combat the negative impacts of climate change. Pakistan is amongst the pioneers who have established a climate ministry. The country has also launched the Climate Change Policy 2012. The National Climate Change Policy comprehensively addresses all possible challenges of climate change and provides a foundational framework to tackle the problem. But Pakistan alone cannot do it. It is a global issue. The whole of the

world's future is at stake. It is time that the United Nations, along with all 195 countries, do not let the grass grow under its feet and act now to save the mother earth.

Compliance with ethical standards

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