

Impact of Climate Change in Pakistan on Peasants and Women

Overview

The impact of climate change is a survival issue for Pakistan as it threatens to reduce one third of the total river water in the Indus River system which is the backbone of the country's agriculture. In the words of the Task Force on Climate Change, set up by the Planning Commission of Pakistan (Feb 2010), "{Climate change} is particularly a concern for Pakistan because climate change is posing a direct threat to its water security, food security and energy security."

Pakistan is among the lowest contributors to the global warming but the most vulnerable to its adverse effects because of the country's dependence on rivers that originate in the Himalayan glaciers. The climate change threatens the country's economy and social life because it is leading to the melting of glaciers and changes in the pattern of monsoon rainfall. Because of the glacial melt, the country is at risk of losing one third of the existing river water in next 15 years while the heavy rains, causing extreme events like super floods, as they occurred in the summer of 2010, can have devastating impact on a large portion of the country.

Peasants and women are two marginalised sections of the Pakistani society. More than 80 percent of the country's population lives in poverty or below the poverty line. A majority of the farmers live on a subsistence agricultural economy. The poor farmers are among the disadvantaged sections of the rural economy which is dominated by the powerful feudal class that takes a lion's share of the available resources including the irrigation water, agricultural loans and subsidised agricultural inputs.

The declining water availability in the wake of the global warming and calamities like high floods bode ill for the peasants because in the event of drought they stand to further lose their already meagre share in the irrigation water and in the case of super floods they stand to lose their small stocks of cattle, on which their subsistence economy is largely dependent upon. Peasants are largely illiterate and ignorant of what lies in store for them in terms of climatic changes. They could be the worst victims of the global warming's effects on Pakistan as they are least prepared for adaptability to such changes. There is need to wage awareness campaigns among peasants about this phenomenon and make them prepared in techniques of adaptability to the looming threat.

Definitions

Climate is the average weather of a region or statistical description of mean weather conditions over a period of two to three decades.

Climate change, aka global warming, takes place because of natural climate variability as well as human activity. The human factors include use of fossil fuel in industry and transport,

industrialization, increase in human population, deforestation and urbanization. The major agent of the global warming is the emissions of greenhouse gases (GHG), mainly carbon dioxide, methane and nitrous oxide.

The global climate change

According to the Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC), the average global temperature, which increased by 0.6 degree Celsius over the past century, is projected to go up further by 1.1 to 6.4 degree Celsius by the end of the current century.

The global warming will bring in large increases and decreases of temperature and rainfall (precipitation) in different world regions besides large scale shrinking of Arctic sea ice and recession of mountain glaciers and rise in average sea level by up to 0.6 meter etc.

Climate change affects all societies and ecosystems most profoundly through the medium of water. Other effects of climate change include extreme events such as flash floods, heavy rainfall (precipitation in weather jargon), droughts, cyclones, hail storms, dust storms, etc. According to IPCC (2007), the frequency and intensity of these extreme events is likely to increase in future. Such events destroy the plants and animals themselves, their habitats and their food as the unprecedented monsoon floods in Pakistan did in 2010.

Another major impact of climate change is that it exacerbates land degradation, the wind erosion due to low rainfall and high winds, and water erosion as a result of high torrential rains. Heavy rainfall also causes increased water-logging and rise in water table height which in turn leads to salinity due to greater evaporation from land surface resulting in accumulation of dissolved salts on the salt surface.

Pakistan contribution to climate change

Pakistan is a small GHG emitter. It contributes only about 0.8 percent of the total global GHG emissions. On per capita basis, Pakistan with 1.9 tonnes per capita GHG emissions, putting it at 135th place in the world ranking of countries on the basis of their per capita GHG emissions.

Pakistan's total GHG emissions in 2008 amounted to 309 million tonnes (mt) of Carbon dioxide equivalent, comprising about 54 percent CO₂, 36 percent Methane, 9 percent Nitrous Oxide and 1percent other gases. The biggest contributor is the energy sector with 50 percent share, followed by the agriculture sector (39 percent), industrial processes (6 percent) and other activities (5 percent).

Signs of climate change in Pakistan

Pakistan is highly vulnerable to negative effects of global climate change. The signs of adverse effects of climate change or global warming have been noticed in the recent years. According to the report of Pakistan's Task Force on Climate Change, summer temperatures shot up in all parts of Pakistan during 1951-2000. The rainfall (precipitation) trends show 10-15 per cent fall in the coastal belt and the arid plains over the last 40 years and an increase in summer and

winter precipitation in Northern Pakistan. **(Ref: Climate Task Report by the Planning Division, 2010)**

Pakistan's meteorological department has recorded a temperature rise of 0.6 to 1.0 degrees Celsius over historical levels. Moreover, humid areas of the country have recorded an 18 to 32 percent increase in monsoon rainfall, which covers three months of the summer, from July to September. **(Ref: "Like it or Not" by Reema Murad, The News, March 20, 2011)**

Impact of climate change on Pakistan

According to an estimate, Pakistan ranks in the top 20 category in terms of impact and vulnerability of climate changes. **(Ref: Address by Husnain Ahmed, President Engineering Congress at World Environment Day, June 5, 2010)** Pakistan faces the issues like monsoon variability, melting of glaciers in the high mountains and the Arabian sea level rise in the coastal areas of Sindh and Balochistan provinces.

The Planning Commission of Pakistan Task Force on Climate change describes the impact of climate change on Pakistan in these words:

"Pakistan is particularly vulnerable to climate change because it has generally a warm climate; it lies in a world region where the temperature increases are expected to be higher than the global averages; its land area is mostly arid and semi-arid (about 60 per cent of the area receives less than 250 mm of rainfall per year and 24 per cent receives between 250-500 mm); its rivers are predominantly fed by the Hindu Kush-Karakoram-Himalayan glaciers which are reported to be receding rapidly due to global warming; its economy is largely agrarian and hence highly climate sensitive; and because the country faces increasingly larger risks of variability in monsoon rains, large floods and extended droughts. Under the influence of all these factors the Water Security, the Food Security and the Energy Security of the country are under serious threat. Compounding these problems are the expected increased risks to the coastal areas (these include Karachi, Pakistan's largest city and the hub of its industrial activity and international trade) and the Indus deltaic region due to sea level rise and increasing cyclonic activity; to the mountainous regions due to glacier lake outburst floods (GLOFs) and landslides; to the country's scanty forests (less than 5 percent of the land area is under forest cover) due to forest fires as well as reduced regeneration under rapidly changing climatic conditions; to human health due to heat strokes, diarrhoea, cholera, vector borne diseases, etc.; and to human settlements due to floods and cyclones."

The year 2010 was as a year of climatic catastrophe for the country with the outburst of glacier in Hunza leading to landslides and the creation of an artificial lake and the heavy rainfall in summers causing unprecedented flooding across the country. The sudden abnormal floods in Pakistan in 2010 are considered another negative effect of climate changes.

The expert opinion exists that unusual rains were caused by changes in the global climate and more such calamities may hit the country in the coming years. Oxfam, a UK-based NGO, said around 40 per cent of Pakistan's population has become highly vulnerable and victim of multiple natural disasters like cyclones, floods, drought, intense rainfall and earthquakes.

Possible future impacts of climate change in Pakistan include: changes in sowing season (time of soil moisture and temperature); increase in locust and insects due to high temperatures; increased mortality and morbidity from heat waves, floods and droughts, etc. This forecast has grave implications for the marginalised sections of the society including the poor, women and children, as they are least prepared for these events and have no capacity to cope with the adverse effects of these changes.

The official report projects increased frequency and intensity of extreme events in Pakistan such as heat waves, heavy precipitation, droughts and tropical cyclones.

Melting glaciers

Pakistan has more area under glaciers than any other country – 13,680 km, that is, about 13 percent of the mountain area of the Upper Indus basin. In addition, there are more than 25 significant high altitude lakes in Pakistan often fed by glaciers, lying at altitudes between 2,000 metres and over 4,000 metres, supporting unique flora and fauna. **(Ref: Wetlands in Pakistan – What is happening to them? By Abdul Aleem Chaudhry, Director General Wildlife and Parks, Punjab)**

A report by the UN Environment Programme in Cancun states that the fourth fastest rate of glaciers melt is in the high mountains of Asia, including Hindu Kush and Himalayas. The major concern is that glacial melt on Himalayas may reduce the water availability in the Indus River system by 33 per cent in the next 15 years. **(Ref: Address by Husnain Ahmed, President Engineering Congress at World Environment Day, June 5, 2010)**

Reports suggest Himalayan glaciers are experiencing retreat by 15 metres each year owing to the intensifying global warming. A rapid warming has been recorded at Himalayan climate stations - about one degree Celsius since the 1970s. Winter stream flow for the Baspa glacier basin has increased 75 percent since 1966 and local winter temperatures have warmed, indicating increased glacier melting in winters. The Khumbu Glacier has retreated over five kilometres since 1953.

Impact on Indus River system and Indus basin

The crucially important Indus basin, the backbone of the country's agricultural economy, is severely affected by the impacts of changing climate. The country is facing abnormal weather patterns in the form of late winter and spring rains that has negative effects on the agriculture sector and also on the overall environment. **(Ref: A statement by Ishfaq Ahmed, Advisor Science and Technology, Government of Pakistan, Chairman Task Force on Climate Change, The News, Rawalpindi, 25 April 2010)**

The Indus River, originating into the glaciers of Himalayas, flows into the plains of Punjab and Sindh. Pakistan has 17 million hectares of irrigated farmland that can be categorized as seasonal wetlands dependent on the Indus River system. Nearly 77 percent of the Pakistan population survives on water from the Indus River system and there are no alternative water resources available. **(Ref: 'Like it or not' by Reema Murad, The News, March 20, 2011)**

Declining water availability

In the medium-to-long run, climate changes threaten to drastically decrease water availability in a country whose 70 percent of the land is arid and which depends on the river water flows from the Himalayan glaciers for its largely agriculture economy.

Pakistan has world's largest irrigation network, providing for 60 percent of the water utilized for irrigation. The inflow of river water used for irrigation has declined from an average of 140maf (million acre feet) in the 1980s to an average of 100maf in 2005. It is estimated that by 2025, the water availability for the agriculture will be reduced by 33 percent. **(Ref: A paper titled 'Promoting Better Management Practices – an initiative by WWF' by Muhammad Naqi Khan etc)**

During 1999-2002, the prolonged three year drought, especially in Sindh and Balochistan, was caused by erratic rainfall. This affected 2.2 million people and 16 million livestock all over the country. The drought occurred again in 2008 and ended with the devastating monsoon floods in 2010.

While the year 2010 saw a devastating deluge, submerging more than one-third of the country under water, at the same time, the country was faced with an acute shortage of irrigation water during the same year owing to dry conditions during the rest of the year. Just before the flooding and soon after it, the provinces of Sindh and Punjab were at each other's neck for the distribution of irrigation water. Even at the time when the parts of the Khyber-Pakhtunkhwa province were submerged in flooding water, the Sindh was experiencing extreme shortage of irrigation water. This drought was attributed to El-Nino conditions in the Pacific Oceans.

In view of the climatic changes, growing population, urbanization and increased industrialization, Pakistan was moving fast from a water stressed country to a water scarce country. In 1947, the availability of water was 5600 cubic metres per person per year, which declined to 1200 cubic metres in 2005 and 1038 cubic metres in 2010. (Ref: statistics by WAPDA) If the present trend persisted, the water availability could be halved in the next one decade or so. The areas outside the Indus Basin are already categorized as water-scarce. **(Ref: River Ravi potentials, pollution and solutions – an overview by Abdullah Yasar, Fawad Ali etc).**

Effects on agriculture

Agriculture economy contributes around 24 percent of Pakistan's gross domestic product. Major crops include wheat, sugarcane, cotton and maize. Sugarcane and cotton crops are mainstay of the economy. Nearly 68 percent of the country's population, directly or indirectly, relies on agriculture for its livelihood. Cotton contributes 10 per cent of the GDP and 55 percent of the foreign exchange earnings.

The climate changes threaten to have a major impact on Pakistan's agriculture as changes in temperature and rainfall patterns (precipitation) will alter crop yields and growing seasons with a predicted increase in more extreme storms, rainfall and drought. New pests and diseases will emerge and could have a negative impact on food security. **(Ref: Reports by UN Environmental**

Programme) There are reports that fruit farmers in the northern areas of the country have harvested summer stream water into 3,000 litres gravity-fed storage tanks.

In the face of declining river water availability, one major issue is the cropping patterns which are not sustainable because of water intensive crops like sugarcane, rice and cotton. These crops and bovine meat, with its high consumption in the country, are known to have high water footprints.

Recent calamities in Pakistan caused by global warming

Hunza landslide and monsoon flooding are two recent calamities related to climate change.

Hunza landslide disaster

The landslide in Hunza early 2010 is one example of how melting glaciers have started affecting the lives of the people, especially the poor sections of the society. Most people in Gilgit-Baltistan believe that this landslide was the biggest ever calamity to have hit the region.

A massive landslide struck Hunza Valley's Attabad village on January 4, 2010. At least 20 people died in the landslide. The debris from the landslide filled up three kilometres of the Hunza River and blocked it. This led the creation of a lake that gradually expanded over a 23-kilometre-long lake. Four other villages, namely Ainabad, Shishkat, Gulmit and Gulkin, were submerged in the lake. The Karakoram Highway also came under water disconnecting 26,000 people living in the Upper Hunza Valley, aka Gojal, with the rest of the country. In summer the Gojal people crossed the lake by boats but in winter they had to leave the area. The government also evacuated 20,000 people from 36 villages downstream the Attabad Lake as there was a fear that bursting of the lake might submerge them.

The 2010 monsoon flooding

Extreme events like super floods are another effect of global warming and people who are already vulnerable are likely to be even at greater risk. Pakistan's unprecedented flooding in 2010, caused by heavy rains, was on such instance.

According to a report released in Cancun by the World Meteorological Organization (WMO), global warming caused the extreme Asian summer monsoon which resulted in heavy rainfall in 2010. The report says: "Pakistan experienced the worst flooding in its history as a result of exceptionally heavy monsoon rains. The event principally responsible for the floods occurred from July 26-29, when four -day rainfall totals exceeded 300 millimetres over a large area of northern Pakistan centered on Peshawar. There were additional heavy rains further south from August 2-8 which reinforced the flooding. The total monsoon season rainfall for Pakistan was the fourth-highest on record." This information was based on climate data from networks of land-based weather and climate stations, ships, and buoys, as well as satellites.

According to Oxfam, 2010 was one of the hottest years recorded with Pakistan logging 53.7 degree Centigrade, the highest ever in Asia. **(Oxfam report titled "More than ever climate talks that work for those that need them most," by Tim Gore as reported in The News, November**

11) On the other hand, Michel Gabaudan, president of Refugees International, has been quoted as saying: “the massive flooding in Pakistan is a wake-up call that starkly highlights the real threats we face from climate-related disasters.”

The monsoon floods in July-August 2010, sweeping from the northern parts of Pakistan down to southern most areas of Sindh, submerged one-fifth of the country, uprooting more than 20.3 million people, claiming 2,000 lives and causing \$9.7bn in damages. According to the official estimates, 2,433 miles of roads and 3,508 miles of railway lines, 45 bridges, and nearly 10,000 schools, 10,000 rural health centres and 1.7 million houses were destroyed. According to UNICEF, the impact of the floods will be felt for years to come. **(Ref: A report in Daily Times, December 8, 2010, Oxfam report, The News, November 11)**

How the 2010 flooding affected the rural poor could be gauged from a report of the World Food Programme in March 2011, according to which the food prices were pushed too high for an impoverished population, as malnutrition levels rise despite the recovery of crops after the devastating floods. According to WFP, malnutrition levels in Sindh reached 21 to 23 percent in early 2011, which was well above African standards. The emergency standard is 15 percent. A survey by WFP in March found that in some flood-hit areas 70 percent of people were taking out loans and even using them to pay for food. **(Ref: Pakistan food prices too high: A statement by Wolfgang Herbinger, director for the World Food Programme (WFP) in Pakistan, March 24, 2011)**

A story of starvation

The stories of impoverishment and starvation of the poor people in villages in the aftermath of the flooding abound. In one incident in Dera Ghaz Khan in October 2010, soon after the floods, a farmer Niaz Shah, belonging to Mauza Nooria Korla Gharbi, presented his nine children and grand children for sale in front of Commissioner Office of the divisional headquarter. **(Ref: Daily Khabrain, October 9, 2010)**

Pir Sabak – a village inundated by swollen Swat River

An unprecedented flooding of the Swat River that started on July 28 2010 is one major phenomenon of the 2010 monsoon floods in Pakistan and is considered the biggest flooding in people’s memory. The Met department too had no previous record of such a high flooding in this river.

Only one of 51 bridges in the Swat valley survived the ferocious flooding of the Swat River. Hundreds of homes and businesses in the Valley were swept away in hours. Electricity plants were destroyed, along with hotels for the tourists.

Pir Sabak is a small village of Nowshera district in the Khyber Pakhtunkhwa located at the junction of Kabul River and Swat River. The farmers of the village grow vegetables, wheat and sugarcane as major crops. The village was submerged in 15-feet deep flood water from the Swat River and stood inundated. In March, the scribe visited the village and interviewed the local farmers about this calamity.

A farmer of the village, Rooh-ul-Amin, 45, said he had just harvested the sunflower crop from his fields on the bank of Swat River that rains started and he hurriedly returned home around for o'clock in the afternoon. "The rains were so heavy that within one and half hours, all the crops were under water and after 10-12 hours water had entered our houses." At night when the water started entering the village, people started evacuating their homes. Amin says: "Neither I nor my parents had ever seen such a flooding."

The villagers said there was high flood in Kabul River and when Swat River also overflowed, the water did not find way into Kabul and the tiding waves turned towards the Pir Sabak village. Another farmer, Nur Majid Khan, said each year, the Swat River gets flooded but the water stands up to two to three feet on the river banks. Majid Khan said the biggest loss was in terms of the death of the cattle. He said when the waters receded the municipal workers picked at least 100 bodies of buffaloes. "My brother owned 10 goats, but he could save only one; all others were swept away in the flooding waters" The 500 acres of cultivable land on the bank of the Swat River became uncultivable as the floods piled sands on it.

However, the villagers said one good effect of the floods was that it brought some fertile soil with it which resulted in the bumper crops of wheat in 2011. The villagers showed the scribe a piece of land that never produced any crop became green and fertile.

Deforestation

Deforestation is considered to contribute 20 percent of the global warming. **(Ref: A 2010 paper titled "Climate change threats to biodiversity in Pakistan' by Dr Mohsin Iqbal and Arshad Ahmed Khan, Quaid-e-Azam University Lahore)** Forests play an important role in the climate of a region as they control soil erosion, provide clean water and create corridor for wild life and plants to move to favourable cordons. Forests influence climate change mainly by absorbing atmospheric carbon dioxide. When forests grow, wood, leaves and soil absorb carbon from the atmosphere. Because of the forests' ability to absorb and store carbon, they are considered 'carbon sinks.'

When a tree is cut, it ceases to be a carbon sink and when an area is deforested, it becomes a source of greenhouse gases and eventually causes ecology disturbance. Deforestation strangulates all life support systems on earth and leads to destruction of corals, degraded watersheds, denuded uplands, landslides, flooding, silting of rivers and dams, extinction of thousands of species, heavy soil erosion and the greenhouse effect. Thus, deforestation hinders the efforts to reduce global warming.

Pakistan ranks at 6th number in population (around 180 million in 2010) and 110 numbers in terms of the forest cover with 2.28 percent of the land area under forests. **(Ref: Address by Husnain Ahmed, President Engineering Congress at World Environment Day, June 5, 2010)** However, officials assessment conducted in 2004 put the forest cover at 5 percent of the total area, including natural forests over 3.44 million hectares, trees on farmlands over 0.78 million hectares and others over 0.17 million hectares. **(Ref: 'Massive deforestation ruining environment,' The Nation, Feb 12, 2011)**

Pakistan's already meagre forest cover, mostly located in the mountains of Khyber Pakhtunkhwa and Gilgit-Baltistan, is being depleted at a fast clip, considered to be the highest annual deforestation rate in Asia. Unsustainable exploitation of forest resources in Pakistan has resulted in degradation of forest to the tune of 0.2 to 0.4 percent per year during the past two decades. According to the Ministry of Environment, deforestation of natural forests is 27,000 hectares per year. **(Ref: 'Massive deforestation ruining environment,' The Nation, Feb 12, 2011; A 2010 paper titled "Climate change threats to biodiversity in Pakistan' by Dr Mohsin Iqbal and Arshad Ahmed Khan, Quaid-e-Azam University Lahore)**

In Balochistan province, over-grazing is a main factor responsible for deforestation as it decreases the forage production in range land to one-third of the potential, a loss of nearly 50 million tons per year. In the province, Juniper and Chilghoza pine forests are declining. Some of the juniper trees are stated to be 1500 years old.

The forests bordering the Arabian Sea and the forests of mountain tops of Himalayas, Hindukush and Karakoram ranges have been plundered and needs to be reforested to upkeep the ecosystem of the areas.

(Ref: A Trample on the Mangroves," by Engr. Usman-eGhani, Deforestation and "Biodiversity – A stable Ecosystem" by Dr Zaheer-ud-Din Khan)

Land degradation

Land degradation means the land becomes less suitable or unsuitable for optimum crop cultivation or fertile soil loss is lost owing to certain processes including water-logging, salinity and soil erosion. Climate change aggravates these processes.

In Pakistan, 5 percent of the land is affected by water-logging to various degrees; 8 percent of the land, mostly in Punjab and Sindh provinces, is affected by salinity and sodicity (the presence of excessive sodium on the soil); 17 percent of the land is affected by water erosion and 8 percent of the land by wind erosion and 96 percent of the land falls under the category of having low (less than one percent) organic matter.

A reduction in forest cover results in soil erosion by wind and water. The outcome of extensive deforestation and grazing are barren surface, soil erosion and porous soil. During the monsoons and cloud bursts, the porous soil soaks in water and gets loosened. This causes the whole mountain slides down taking with them trees, farmlands and finally damming the rivers – leaving behind barrens cars on the mountains which further cause erosion. The landslide in Hunza in 2010 could be attributed to this phenomenon.

Some two million hectares of land, mostly in Potohar, Thal and Cholistan regions in Punjab and sandy deserts of Thar in Sindh and Chaghai-Kharan in Balochistan, are facing wind erosion.

Soil erosion caused by water is a particular problem in Khyber Pukhtunkhwa and Gilgit-Baltistan regions and agro-ecosystems of barani lands (lands irrigated by rain water.) Nearly 11 million hectares of land are affected by the washing away of soil owing to water. This has also led to increasing sedimentation of wetlands and habitat degradation.

Biodiversity under threat

Because of climate change, a large portion of biodiversity is under threat. According to UNDP, poverty and biodiversity are interlinked. The poor in rural areas depend on biodiversity for food, fuel, shelter, medicines and livelihoods. Biodiversity loss exacerbates poverty, and likewise poverty is a major threat to biodiversity.

Climate change is a major threat to biodiversity because it increases the incidents such as floods, fires and insect plagues. Higher concentration of dissolved atmospheric carbon dioxide leads to rise in sea temperatures and increased acid levels in oceans, which badly affects marine life.

The loss of wetlands

Wetlands - including coastal wetlands, lagoons, coastal peeps, deltas, mangroves, swanks and wetlands associated with streams, lakes – provide habitat for mammals, birds, fish and serve as source of fuel, wood, rice paddies. They need to be protected.

In spite of Pakistan's arid climate, the country supports more than 780,000 of wetlands covering 9.7 percent of the total land area, with 225 nationally significant wetlands of which 19 have been recognised as Ramsar sites of global significance.

The Indus Delta and mangroves

Mangrove forests spread over about 600,000 hectares make up an important ecosystem in the coastal deltaic region formed by the Indus River. They are wholly dependent on the discharges from the Indus River and a small quantity of water from domestic and industrial effluents of Karachi. These forests are life supporting ecosystems providing habitat, shelter and breeding ground for a number of flora and fauna, They also act s a barrier for the protection of coastal regions and ports against the disastrous natural phenomenon such as cyclones, wind storms, flooding and soil erosion. **(Ref: A paper titled "State of Forests in Sindh as well as the economic benefits flowing out of it" by Muhammad sadiq Mughal)**

There is concern about the depletion of the country's mangrove along the sea coast, disturbing the livelihood of the traditional fishing communities in the area. Out of a total 1050 square kilometre of Pakistan's delta, Indus or Sindh delta comprises 350 square kilometre. It is the world's fifth biggest delta. **(Ref: 'Steps for revival of Indus delta urged,' Dawn 4 April 2010)**

The excessive use of irrigation water upstream through a series of dams, barrages and link canals has significantly reduced freshwater flow downstream Kotri Barrage badly affecting the Indus Delta region. At present, freshwater flow in an average year is estimated to be far lower than 10 Million Acre Feet (MAF) per year, the minimum level of environmental flow stipulated in the 1990 Water Appointment Accord. The lack of fresh water has had major effects on the Indus deltaic ecosystem and livelihoods. The sea water has crept into inland up to 1.2 million acres, turning what was once fertile agricultural land into extremely saline. This has also led to the salinity of the seawater, which has harmed the growth of mangroves.

The fish farmers in the deltaic region are already showing signs of being affected by climate changes with coastal stability affected owing to lack of sediments flow. Quality of surface water aquifers has suffered and certain species of fish, which were dependant on mangroves and fresh water, have become almost extinct. Commercialization of the fishing sector and shortage of alternative livelihood options have forced many fish folk into fishing in prohibited seasons. This has put a further strain on marine resources and led to unsustainable fishing.

Rangelands

The arid lands of Balochistan province, Kohistan district in Khyber Pakhtunkhwa province and Karachi, Dadu, Thatta and Larkana in Sindh province and deserts of Thar, Mirpurkhas, Sanghar, Khairpur and Sukkur in Sindh and Thal in Punjab province are the country's Rangelands which are a major source of forage for livestock particularly sheep and goats. They also provide habitat for wildlife and are a source of biodiversity. They also work as a pollution buffer. These rangelands support millions of people and their livestock as a source of fodder, forage and fuel wood.

The rangelands in Himalayan regions are considered fragile and sensitive to climate changes. An official document of the Pakistan Ministry of Environment states the climate change and other biotic factors are causing desertification of the range resources at an alarming rate especially in the arid and semi-arid zones of the country which constitute 43.3 million hectares or 83 per cent of the total area of rangelands. **(Ref: Rangeland biodiversity to be increased. Dawn, 4 March 2010)**

On the direction of the prime minister's task force on food security a rangeland baseline study was conducted in 2010. Results of the study show there is an obvious downward trend in the overall productivity of the rangelands besides significant reduction in the overall functions and services. The baseline analysis shows the current productivity of the majority rangelands varies from 25 to 50 per cent of their potential. In addition, due to overgrazing, the species composition of a given ecosystem has changed in the favour of non-palatable weed species to the extent of more than 40 per cent.

In March 2010, the federal government drafted a national policy focusing on rehabilitation of degraded rangelands and pastures close to their potential for increased productivity. The objective was to help increase and conserve rangeland biodiversity besides mitigating the negative impacts of global climate change through collaborative and holistic rangeland resources to contribute to the livelihood improvement of the rangelands dependent communities as well as to the national economy.

Fossil fuel consumption

Although the carbon emissions of Pakistan are much lower as compared to the high emitters in the region like China or India, but the consumption of fossil fuels is increasing with the phenomenal rise in the number of cars in big cities like Karachi, Lahore and Islamabad, that is causing air pollution with consequent health issues related to respiratory diseases. Fossil fuels already make up over 60 per cent of total commercial energy consumption in Pakistan with

hydro, solar, wind and geothermal energy making up just 3.5 per cent. If the current trend persists, it would lead to disastrous consequences of environmental degradation and climatic changes.

-Prepared by Adnan Adil

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Ends