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Impact of anthropogenic activities on biodiversity in Pakistan: A review

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The significance of biodiversity irrespective, how much is small has a keen importance in ecological studies. Biodiversity has remained to be an important topic among ecological researchers. The start of environmental degradation produces different impacts in quantitative but qualitative ways also. This review will help in understanding the environmental crisis causing a pronounced depletion of species. The technological expansion in the world to meet the expectation of humanity at the cost of natural resources is key factor in disturbing the ecosystem. The awareness about the complete status of wild life and flora in our country is still unknown. Random trapping and hunting of these endangered species is very common round the year. The most important concern is that, the reserves areas constructed for the conservation of nature are under stress resulting in increasing deteriorated conditions.

Keywords: Anthropogenic activities, Biodiversity, disturbances, environment, plant species, species diversity

INTRODUCTION

Biodiversity is the variability among living organisms from all sources. Biodiversity also can be considered at three levels (i) genetic diversity (variability within species), (ii) species diversity within an ecosystem and (iii) the variety of habitats on the planet (Bennett, 1990). The present review was carried out with the aim to review the factors affecting on the biodiversity due to human influence in Pakistan. The information gathered through the survey in this review may be helpful for researchers working for restoration of biodiversity and for the betterment of environment of the country and abroad. The review provides the knowledge about the impact of anthropogenic activities on biodiversity.

Pakistan has a rich and varied flora which is spread over an area of 882,000 Km^2, lying between 24º and 37º north and 61º and 75º east (Baig and Al-Subaiee, 2009). This great variation in elevation, temperature, precipitation, and other physical parameters has resulted in a diversity of biotic communities, and a relatively rich flora of at least 5,700 species of flowering plants (Ali, 1978). In a study, Nasir (1991) estimated that 580-650 plant species (c. 12% of the flora) are threatened or endangered, and suggested that this number would increase due to habitat destruction, over-exploitation of economic plants, introduction of alien species, and pollution as the major causes for this threat. Sulaiman et al*.,* (1991), suggested that awareness of the problems, additional knowledge are the need to be addressed for the solutions of the problem. Nature has decorated earth with deserts, mountains, greenery, rivers, lakes, seas, islands etc. and Pakistan is enriched with these resources (Ahmed and Rana, 1999) but the flora and fauna of the some region of the country are in state of danger due to various types of environmental and anthropogenic factors. A high number of plant and animal species are under threat and disappearing due to various

types of industrial and anthropogenic activities in Pakistan, likewise other developing countries. Pakistan has a number of the world's rarest animals and plants but these are now in danger from habitat loss and overuse. A high population growth rate, deforestation, overgrazing, soil erosion, salinity and waterlogging activities are major threats to the remaining biodiversity in Pakistan (GOP, 2000).

Every region has its own ecology and plays an important role in sustaining the natural environment and biodiversity. Whenever environment is being disturbed or polluted, three major fields such as air, water and soil are found highly affected. Air pollution is caused by the introduction of substantial quantities of toxic substances into the atmosphere by natural or human activities (Qureshi, 2000). Areas under the influence of anthropogenic activities undoubtedly represent an extreme ecological situation. Human's activities have also altered natural systems since hundreds of years. Such as, during the agricultural revolution, land was cleared in increasing amounts to grow specific crops valued by human society. As the agricultural revolution proceeded, natural systems became more fragmented. Since, than man has exploited about 40 percent of the earth's surface in agricultural activities to support ever increasing human population (Roquib, 1999). The constructions of canals and barrages in Pakistan have resulted in considerable expansion of agriculture involving the destruction of the natural vegetation and establishment of monoculture over vast areas. It is also well known that the expansion of canal system and establishment of barrages lead to the menace of water logging and salinity (Khattak, 1998).

Researchers all around the world have drawn their concern and published scientific reports on the significance of biodiversity. Studies on the context of biodiversity issues due to human activities in Pakistan are available. The efforts are continued on this aspect in the country by different governmental and non-governmental organization. Pakistan biodiversity action plan has been developed with the support from IUCN (International Union for Conservation of Nature). It has been estimated by the IUCN plant advisory group that as many as 60,000 plant species (Out of 250,000 species worldwide) become extinct by 2050 A.D., if the present trend continuous. Khan et al., (2016) have been reported that present biota is entering a "sixth" mass extinction, because of chronic exposure to anthropogenic activities. Various *ex situ* and *in situ* measures have been adopted for conservation of threatened and endangered plants and animal species.

The mangrove ecosystem within the Indus Delta in Pakistan is one of the largest areas of arid climate mangrove cover in the world and plays an important role in harboring fisheries (Hasan, 1999.). Azam and Hassan, (1999) studied that the Taunsa barrage, which is one of the most important wetland of the country due to its biodiversity and endangered species found in it. Versatile habitat of the wetland accommodates different types of aquatic fauna. The wetland has a large variety of fishes, amphibians, reptiles, birds and mammals. Its annual fish auction has risen up to Rs. 2.9 million while up to 2000 waterfowl had been found at the wetland in winter. A number of important and threatened species were found which includes *Axix porcinus, Platanista minor, Lutra perspicillata* and *Mamaronetta angustirostris.* Siltation, overfishing, eutrophication, uncontrolled harvesting of weeds and reeds, drought in winter, agriculture activities hunting and high disturbances were concluded major problems to the species and their habitat in the sanctuary area.

In another studies, a great risk of loss of genetic potential as indigenous trees and species such as Himalayan Ash and Himalayan Elm are nearly becoming extinct while alien invasion species such as Mesquite (*Prosopis juliflora*) and paper mulberry are taking over at great economic and social cost to society (Iqbal, 2002). Low species diversity around the industrial units of Pakistan in Karachi, city was associated with high industrial activities and several of pollutant discharge in the environment (Shafiq and Iqbal, 1988; Shafiq et al*.,* 1992). The decrease in species diversity around the industrial units can be due to low intensity of species interactions, minor role of inter specific competition and a large influence of a low number of, or even single, environmental restricting factors (Maqrurran, 1988).

The Western Himalayan Sub-Alpine Conifer Forests [IM0502] represent the frontline of the forested ecoregions in the western Himalayan region, standing against the treeless alpine meadows to the north. This ecoregion plays a critical ecological role as part of the Himalayan ecosystem, with interconnected processes that extend from the Terai and Duar grasslands along the foothills to the high alpine meadows and boulder-strewn scree that lie above the tree line. Several Himalayan birds and mammals exhibit seasonal migrations up and down the steep

mountain slopes and depend on contiguous habitat for these movements. If any of the habitat layers are lost or degraded, these movements can be disrupted. Therefore, conservation of this ecoregion is critical to maintain the biodiversity species and processes of this youngest and tallest mountain range on Earth (Rawat and Wikramanayake, 2017). It is clear that the environmental conditions of Pakistan are not good. In addition to health, its impact on plants growth is common. The primary mode of action in plant is the interference with stomatal function. The other common effects are alterations in metabolism, chlorophyll disintegration, photosynthesis, morphological and anatomical characters, foliar necrosis, leaf fall, seed quantity and quality, growth and yield reduction. Pollutant released from the various sources has brought changes in the nature, structure and composition of the biological communities and could involve in the extinction of some important species. Some existing industries discharge effluent without any treatment position. The type and effects of pollution depend on the amount of pollutant present and resistance of biota. The effects of environmental pollution on plant growth, stomatal clogging, phenology, periodicity, productivity and on Karachi, city environment reported earlier (Ahmed and Qadir, 1975; Ismail and Ahmed, 1984; Rizvi, 1986; Bhatti and Iqbal, 1988; Ghauri et al*.,* 1988; Iqbal, 1988; Mehmood and Iqbal, 1989; Beg, 1990; Abdullah, Iqbal, 1991; Qadir and Iqbal, 1991; Jehan and Iqbal, 1992; UNEP 1992; Iqbal et al*.*, 1994; Siddiqui and Iqbal, 1994; Ara, et al*.,* 1996; Iqbal et al*.,* 1999; Shafiq and Iqbal, 1999; Iqbal and Shafiq, 2000). The environmental disturbance and acute shortage of sweet water has resulted in a decline in the numbers of migratory birds visiting Pakistan via Central Asia (Shamsulhaq, 2002). The Himalayan regions possess variety of ethnomedicinal plants traditionally used to treat bronchitis and respiratory diseases (Amber, et al*.,* 2017).

Pothwar plateau parallels the outer Himalayas and lies between the rivers Jhelum and Indus. The climate of Pothwar comprises of semi-arid in the southwest to sub-humid in the northeast and the rainfall is erratic. The monsoon rains are usually accompanied by thunderstorms and occur as heavy downpours resulting in considerable surface run-off and soil erosion in the hilly areas and uplands. Most of the agricultural soils have developed from wind and water transported material comprising of loess, old alluvial deposits, mountain out-wash and recent stream valley deposits. About 60 percent of the land area has been highly eroded leaving the rest as a flat land which constitutes the main cultivated area. Of the total area of 1.8 million hectares, 0.77 million hectares is cultivated, the remaining is mostly grazing land. Intensive precipitation, steep slopes and erodible soils without adequate protection have led to extensive soil erosion and reduction in agricultural productivity in Pothwar uplands. The soil conservation technology is well established, but in spite of the efforts of various concerned government departments and projects costing billions of rupees during the last 54 years, soil erosion still continues to be serious menace (Khan, 2017).

The density and taxonomic diversity of understory vegetation in *Acacia modesta* Wall dominated forests in Malakand Division was found and it was concluded that the study sites were generally poor in species richness and were dominated by individuals of family Asteraceae and Poaceae. The results also suggested that species diversity was higher on east facing slopes with sandy soils and high conductivity values. *Dodonea viscosa* L. (Jacq) appeared to be the dominant shrub throughout the study sites with the highest density/ha, which may be due to its high ecological amplitude. From the results, also concluded that decrease in species richness was somehow linked with decreasing elevation, which may be due to the excessive exposure of vegetation to a number of anthropogenic activities in the study area. It was suggested that these threatened understory vegetation need special attention of the biologists, foresters and conservationists for sound conservation on scientific basis (Muhammad et al., 2016).

ENVIRONMENTAL POLLUTION

Pakistan has a coastline of about 990-Km, with an area of 240, 000 sq. Km of the Exclusive Economic Zone (EEZ). The continental shelf area within the EEZ of Pakistan constitutes about 50,000 sq. Km. The continental shelf about 30-100 Km wide along Sindh Coast and 10-20 Km wide along Makran coast. The out limit of the coastal waters is generally the edge of the continental shelf. The coastal water and associated shelf systems are both productive and vulnerable. These coastal areas are complex and dynamic ecosystems and are sensitive to development pressures and environmental degradation. The indiscriminate dumping of municipal and industrial wastes into coastal water has increased manifold the pollution load of the

sea either by reducing the potential for its development and economic support to the coastal population depends on the sea. The coast of Karachi is the most heavily polluted, being the dumping ground of untreated sewage from Karachi and its industries (Khattak, 1998). Another pollutant in Manora channel is oil waste discharges, which receives about 20, 000 tons/year. The Gizri Creek, receives about 2,000 tons/year of oil and oily wastes from two oil refineries, and through Malir River (Beg et al*.*, 1975). Lyari brings 120 mgd of municipal and industrial wastewater with an organic load of 2,000 tons of BOD/day. About 1200 tons i.e. 60% is contributed by the industries, textile having a major share of 90% followed by chemical industries of 8%. The Malir River discharges 42 mgd, into Gizri Creek bring 1500 tons BOD/day out of which industries contribute 1000 tons i.e. 66.6% and rest is the contribution of municipal wastewater (Beg et al*.,* 1984). The average dissolved oxygen level of the receiving water is less than 4 ml/l in contrast to that of unpolluted coastal water, which varied from 4 to 6 ml/l. There are considerable concentrations of hydrogen sulfides in the bottom layers. Dissolved oxygen in deeper layers of the shallow coastal water is less than 1.5 ml/l. The discharge of untreated municipal and industrial sewage further aggravates the lethal conditions of marine organism particularly fish shellfish (Rizvi et al*.,* 1987).

The ecological value of vegetation, which is based on specific beneficial functions also, damaged. Vegetation play an important part in agricultural and recreation areas, as necessary for water maintenance, for protection against wind and water erosion, and for reduction of stresses from atmospheric pollution. These ecological functions are disrupted over large areas around the industrial units such as stone quarries, cement and steel plants. Reduction in the ability for regeneration of species leads to a reduction in strength of plant communities as well as to unstable ecosystems. The ornamentals in gardens and parks are lessened primarily through foliar injury. The damage has been increased considerably as a result of extensive construction of industrial and residential areas. The pollutant released from these industrial units when combined with other pollutants can bring changes in the nature, structure and composition of the vegetation growing in the area. The effects of metals on vegetation are varied and could involve in the extinction of some species (Iqbal and Munir, 1988).

Water is used for drinking, bathing and irrigating purposes. It is also used as a recipient of much human toxic and solid wastes. The ability of surface water to receive wastewater has recently been highlighted. The most important sources of pollutants are industrial and domestic wastes as well as agricultural runoff (Sawidis et al*.,* 1995). Water pollution is clearly demonstrated by high concentrations of heavy metals in water, sediments, and aquatic organisms. Lyari, Malir, Indus, Ravi and Chenab River in Pakistan are used by local cities and wastes from upper country through the rivers that eject into the Arabian Sea. The concentration of pollutant in water is continuously producing toxic effects on the health of the citizens and biota of the region. The damage has been increased considerably since last the few years. Pollutant released from various sources has brought changes in the composition of biological communities. Some existing industries discharge effluent in drainage channel without any treatments. Karachi city had a natural harbor, and two seasonal rivers (Malir and Lyari). The neat and quiet port city in fifty years swelled to an unplanned mega city with all kinds of problems owing to over population, lack of civic amenities and exposure to various environmental hazards. These pollutant hazards are covering a wide range of effects on plants and animals both quantitatively and qualitatively. A press report emanating from Sahiwal (Pakistan) says that several thousand dead fish are floating on the water surface of river Ravi (T.P.T., 1987). The assessment of river water quality has been made by physico-chemical and biological analyses. The role of both plankton and fish as indicators of freshwater contamination by heavy metals, viz. Zinc, iron, magnesium, manganese, cadmium, lead, nickel and mercury. Significant variations in the concentration of heavy metals were observed in water due to changes in the volume of untreated industrial effluents and domestic sewage added continuously into the river system through various effluent discharging tributaries. The concentrations of all heavy metals, except cadmium and mercury, in water were concluded significantly higher than the safe limits as described by EPA (USA) for freshwater fisheries. Three freshwater fish, viz. *Catla catla, Labeo rohita* and *Cirrhina mrigala* are on the verge of extinction in the river system. Among phytoplankton, *Bumileria, Cladophora, Chlorella, Fragilaria, Synedra, Scendesmus, Tabellaria* and *Zygnema* indicated direct relationships with the

intensity of pollution at highly polluted sites. Among zooplankton, *Brachionus* and *Polyarthra* were almost absent at highly polluted sampling stations. However, the genra, viz. *Aphanizomenon, Bacillaria, Closterium, Cyclopedia, Cocconeis, Cosmarium, Chrococus, Denticulla, Euglena, Spirulina, Spirogyra* and *Volvox* showed considerable tolerance against heavy metals toxicity. *Keratella* and *Filinia* appeared to be the tolerant genera against heavy metals toxicity while Cyclops and *Philodena* were found as the sensitive forms. Metal ions in plankton have also shown direct relationships with the intensity of water pollution (Javed, 1999).

The unchecked production and use of fluoroquinolones (FQs) for the treatment of infections in human and livestock has increased in Pakistan, which resulted in large amount of antibiotics in water bodies. The average concentrations of ciprofloxacin (CIP), enrofloxacin (ENR) and levofloxacin (LEV) in the waste water samples were reported slightly higher in Kahuta than those in Hattar sites (Pakistan). The concentrations of CIP, ENR and LEV in the sludge samples were found significantly higher (i.e. 159; 153 and 164µgkg^{-1} respectively) in Hattar sites as compared to those in Kahuta sites (i.e. 129, 58 and 91µgkg^{-1} respectively). The individual risk associated with CIP was highest in Kahuta industrial sites for green algae ranging (2900-9100) followed by *M. aeruginosa* (5800-18200), cyanobacteria (580-18204) and invertebrates (24.2-75.8). These values were suggested that the prevalence of antibiotics in the waste disposal sites could be potential risk for the aquatic ecosystem, and harmful to biodiversity (Riaz, et al., 2017).

LAND POLLUTION

The concentration of pollutant in soil is at its highest in industrial cities and seriously contributing toxic effects on biota of the region. The damage has been increased considerably since the last few years. Pollutant released from various sources has brought changes in the nature, structure and composition of the biological communities and could involve in the extinction of some important species. The damage may occur at any stage of plant growth and on any parts of the plant. Various heavy metals ions, including Pb, Cd, Ni, Ti, Cu, Hg, Cr, Al and Zn may enter plants by their root system.

High levels of heavy metals were investigated in the soil samples from various polluted areas of Karachi city (Khalid et al., 1996). The vegetation of an area is governed by a complex of environmental factors including climate, soil, geology, topography and biota. Whereas, any change in the environment contributes its effects on vegetation. Iqbal et al., (1998a) carried out a survey of vegetation and trace metals (Cu, Zn and Pb) in soils along the Super highways near Karachi city. The stands dominated by *Prosopis juliflora* D.C. and *Senna holosericea* (Fresen.) Gretter, showed broad range of lead level. One of the stands in which *Blepharis sindica* Stocks ex T. Anders was dominant, 15 µg/g^{-1} of lead was recorded. Considerable higher values of Cu, Zn and Pb metals have been recorded in some of the stands where *Suaeda fruticosa* (L.) Forssk. and *Salsola baryosma* (R.B.S.) Dandy was associated with *P. juliflora*. The continuous increase in the concentrations of metals might change the soil pH from basic to acidic and can produce high uptake of these metals by plants and ultimately cause harmful effects to them. The vegetation close to sewage effluents channel around the Lyari river was adversely affected by sewage pollutants (1998b). The vegetation was found mostly dominated by monocotyledonous species viz. *Paspalidium geminatum*, *Chloris barbata* and *Aeluropus lagopoides*. Nineteen species were recorded on the heap area forming six plant communities, whereas, on the plain area seven species with five communities were observed. *P. geminatum* was the most dominant species on both areas, which indicated its tolerance to sewage pollutants. Edaphic characteristics of both areas (pH, calcium carbonate, organic matter, sodium, potassium, lead, zinc and copper) showed a significant correlation with the vegetation types. High soil pH, exchangeable sodium and potassium, zinc and copper with low calcium carbonate and organic matter were observed on the plain as compared to the heap area. However, a similar range of lead level (10-35 ppm) was found on both areas. The availability of copper concentration was found above the toxic permissible limit of 150 ppm, on both areas, which range from 200-640 ppm. The concentration of zinc fell under the permissible toxic level and did not exceed 300 ppm.

INDUSTRIAL POLLUTION

Industrial pollution has become a serious socio-economic problem in the heavily industrialized areas of the world and has become a global issue. Industrial pollution is caused by the discharge of a variety of pollutants in the form of gases, liquids and solids which affect the physical, chemical and

biological conditions of the environment and are detrimental to human health, fauna, flora and soil properties (Dueck and Endendijk, 1987). Different types of industries are discharging different types of compounds in the environment. These compounds are varying in nature and cover wide range of effects on plants and animals both quantitatively and qualitatively. Industrial waste effluents have a disrupting and deleterious impact on the ecosystem and could reduce the number of species in a particular ecosystem and may lead to instability within plant communities. Vegetation directly depends on the soil characteristics and conditions necessary for their successful growth and distribution. The distribution of species significantly associated with water holding capacity of soil, pH, organic matter, inorganic phosphorus, calcium carbonate, exchangeable sodium and potassium and increase or decrease in these soil characteristic produced a significant impact on the species distribution pattern. The vegetation of the wasteland of Valika chemical industries near Manghopir road, Karachi was found disturbed. The stands were dominated by the halophytic and succulent species such as *Tamarix indica*, which attained the highest importance value, followed by *Suaeda fruticosa, Salsola imbricata syn. S. baryosma, Cressa cretica, Aeluropus lagopoides, Atriplex griffithii* and *Chenopodium album*. In most of the plant communities, the soil texture was sandy loam with moderate water holding capacities. The pH was alkaline with sufficient quantities of calcium carbonate (17.70-30.33%) in the soil. Inorganic phosphorus (31-53 ppm) and organic matter was low (2.70-5.30%), sodium was fairly high (2233-3067 ppm) with an appropriate amount of potassium (1900-2167 ppm) (Mehmood and Iqbal, 1995). Iqbal and Munir (1988) studied the industrial waste effluents and their impact on different plant communities growing under diverse habitat conditions along the polluted disposal channels of the Karachi industrial area. The vegetation around the stone quarries and processing plants of Karachi and Thatta districts was found disturbed, xerophytic in nature, dominated by herbs and shrubs with few scattered large trees (Shafiq and Iqbal, 1987). The vast area, which was at one time green, is becoming dusty due to emission of enormous quantity of dust from cement factories. This has great concern not only for the residential area but also for vegetation.

The mushroom growth of furnaces which burn crude oil to melt insulated wires and other hazardous substances has added to the city environment of Gujranwala. Emissions from these furnaces are deadly dangerous. The people living nearby are suffering from different respiratory diseases. Over 1,000 furnaces are operating in thickly populated areas of Sheikupura Road, Muslim Road, Khilai Shahpur, Nowshera Sansi Road, Mian Sansi Road, Khurshid Alam Estate, Kutcha Khiali Road, Bypass Road and Kutchi Abadis. Population in these areas is stated to be around 500, 000. Some furnaces have been operating for the last two decades despite opposition from the residents. The furnaces usually operate at night because thick smoke generated will be seen by people in daylight (Malik, 2000).

Throughout the world, reserves have been established where regretted species can remain relatively free of human activities. Pakistan is under tremendous pressure in view of population explosion, unplanned urbanization leading to extensive pollution, deforestation and overexploitation of natural resources. It is estimated that at least ten ecosystems are threatened with habitat loss and degradation (Ali, 2000). There are many other challenges in the field of ecological restoration. We must take adequate corrective measures and conserve our natural resources. Vital role of the environment, which acts as a selective agent has to be clearly understood. The first step towards a sustainable future will be to quantify rates of ecological damage and repair. There is a need to boost our afforestation activity. We plant trees with figures of million every year but yet the country is still facing the shortage of wood. The reason is perhaps; we do not pay our full attention to the survival of seedling planted in a region. Awareness among people will only become possible if we involve them at grass root levels. We cannot afford to over look the consequences of environmental pollution and degradation of its resources. We must emphasize on these issues and take necessary steps to prevent them from further losses of our natural resources. It is suggested that detailed study is needed on similar lines to evaluate crops, which could tolerate metals toxicity, particularly Pb and Cd if grown on metals contaminated soil or if irrigated with such water which might consists of metals. There is a need to paid persistent attention for the improvement of the current states of environment, which has lead the country to a situation of highly depressing position. Plant acts as pollutant sink. More plantations are recommended for reduction of

stresses from atmospheric pollution. Growing the trees and other herbaceous plants in highly populated cities, particularly along the roadsides could further reduce the risk of lead exposure from the auto vehicular emission. Continuous air monitoring for one or more pollutant is an absolute necessity for completing a diagnosis of air pollutant level in the environment. More importantly, a network of monitoring stations throughout the country will helpful to describe the current pollutant level. Accumulation of air monitoring data will provide the criteria needed for establishing air quality standards. There is a need to take up drastic steps to save our valuable plant species.

There is also a need to update the name of the threatened plants of Pakistan from time to time to save from the extinction in the region. Government agencies and many human society are looking at ecosystems in terms of their possible uses, including uses that threaten their existence. However, proper legislation can provides reliable protection for threatened species in terms of endangered Species Act. The critical habitat for such species should be protected. No ecologically sound restoration or ecosystem management can be developed unless substantial changes are made in human society's thinking and practices (Franklin, 1989). Guidance from the skilled professionals is needed for policy and regulatory decisions. Recommendation from the researchers on such projects would be beneficial to human society. Clearly, the restoration of the affected area needs our support, commitment and interest in the project. There are a number of scientific measurements available from universities and research institutions around the world that can furnish very useful information. Ecological restoration projects are only examples of what can be done to restore and protect natural systems. However, one could provide many more examples of the damage to ecosystems that continue. The rate of ecosystem damage exceeded (Cairns Jr, 1995). This will also be a particular vigilance against recurrence of channelization and other assaults has caused a wide gap between biodiversity to deteriorate in the first place. However, in the years to come, new types of damage may occur. More plantation will help in establishment of clean environment. It is the plant that has the ability to meet its own nutritional requirement by reducing atmospheric CO_2 to sugar with the help of solar energy absorbed directly in its photosynthetic apparatus of the chloroplast. In this process oxygen is liberated equal in volumes to CO_2 reduced. It has been justly remarked, “were there no green plants to function as solar energy converters, practically all life on earth would cease” (Galston, 958). It is obvious from the foregoing discussion that the crisis in biological diversity is comprised of various distinct or interplaying factors and as such attracts sincere human rethinking while harnessing various natural resources (Agwan, 1999).

CONCLUSION

Therefore, our ecological capital (forests, grasslands, wetlands, soils, biodiversity, etc.) must be protected. Environmental issues required top priority as we found in the developed countries of the world. Research papers and review survey may be consulted to solve the problem. No doubt, national efforts to deal with this increasing problem are under way in many major cities, but such efforts must be strengthened. There is a need to bring about improvements in the environmental conditions by means of more plantations because plant acts as a pollutant sink. More plantations would be helpful in reducing the burden of pollutants from the immediate environment. There is also a need for enforcement of regulations to control environmental pollution. Public participation, non-governmental organization and civic agencies of the government require a collective approach towards this solution. Continuous air monitoring for one or more pollutant is an absolute necessity for completing a diagnosis of pollutant level in the air, water and soil environment. More importantly, a network of monitoring stations throughout the country will be helpful to measure the current pollutant level. Accumulation of air monitoring data will provide the criteria needed for establishing air quality standards. The vary nature of automobile pollutant (especially heavy metals) must be analyzed and nature of harmful effect be clearly understood. There is a need to examine the toxic pollutants present in air, water and soil, which would be helpful in formulating the strategy to control or at least minimize the pollution. Considerable recovery in the environment quality is possible if the heavy reliance on the auto vehicle discouraged. In Pakistan, the state of the environment in major urban cities center is not good due to air, water and soil pollution. The damage to the environment has been increased considerably since last couple of decades very rapidly. The numbers of species are reducing and majority of native plants are disappearing for the use of food, fiber or medicine, pharmaceutical and

industrial raw materials. The awareness about the complete status of wild life and flora in our country is still unknown. Random trapping and hunting of these endangered species is very common round the year. The most important concern is that, the reserves areas constructed for the conservation of nature are under stress resulting in increasing deteriorated conditions.

CONFLICT OF INTEREST

There is no conflict of interest among all authors.

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AUTHOR CONTRIBUTIONS

MZI designed the article. MS surveyed the literature, gathered information from the scientific papers, search engines and draft the review. MK and ZRF critically reviewed the article.

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