FOREST MANAGEMENT'S FUTURE STRATEGY FOR GREEN RESPONSE TO THE ENVIRONMENT

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Abstract

Deforestation is the one of the accelerating factors of climate change in least developed countries. It is the cause of about 10% of global warming. Deforestation is a wrong act from different point of view. Trees absorb and store carbon dioxide, so loss of trees can cause climate problems around the globe. In Pakistan, it is because of illegal exploitation and poor implementation of forest legislation. Impact of deforestation is being faced every year such as floods, soil erosion, increasing risk of landslides, desertification, land degradation, heat-wave in urban areas, air pollution, several bacterial and viral diseases. Deforestation minimizes the food stuff for different animals and the production of fruits and vegetables for human in the country. It also affects the climate in terms of less rain in the areas where there are a smaller number of forests. In other words, there is a direct relationship among forests and rain. It means more forests; more expected rain in the specific area on the earth. This study deals with problems related to deforestation in Pakistan and highlights its impact on forest biodiversity. It also demonstrates environmental changes and health issues due to deforestation. Recommendations have been given to current forest management to provide green response to the environment.

Keywords: Deforestation, Green Emergency, Climate Change, Environmental Impact, Global Warming, Environmental Sustainability.

INTRODUCTION

Land-use change renovates natural ecosystems, threatening species persistence around the globe. Deforestation is one of the purposeful clearing of forested land (Galán-Acedo et al., 2021). Deforestation is major cause for environmental problems i.e climate change and global warming because it contributes up to 10% of the carbon dioxide emissions caused by human activity (Lawrence et al., 2022; Ripple et al., 2020). As of 2019, deforestation is accountable for approximately 11% of worldwide greenhouse gas emissions because tropical deforestation is accelerating carbon emissions (Alves de Oliveira et al., 2021; Wolff et al., 2021). The worldwide percentage of dry regions has been greater than before more than 1.74% per decade from 1950 to 2008 (Feng et al., 2020). It is reported that it is among the most damaging natural disasters. Every year, it damages and affect millions of people and damage of tens of billions of dollars in the world (Song et al., 2020). In these years, struggles by governments, companies and civil society to control deforestation have gradually amplified (Dos Reis et al., 2021). Earth planet is comprised on several billion acres of forests, around more than 10 billion acres, which is over 30% of its entirety (Chu et al., 2022). Now, forests are being cut down at a wide range (approximately 15 million acres/year), it is deforestation in order to make space for urban-rural developments, i.e infrastructure, roads, railways, buildings and other man-made arrangements (Baehr et al., 2021; Rahman and Islam, 2021; Viana et al., 2008). If we see the history and new Era, forests always have been targeted for making space for agricultural purpose or animal grazing. Other side, businessmen doing this to get wood for fuel, manufacturing, and construction, some other causes of deforestation are given in Fig.1 (Leijten et al.,

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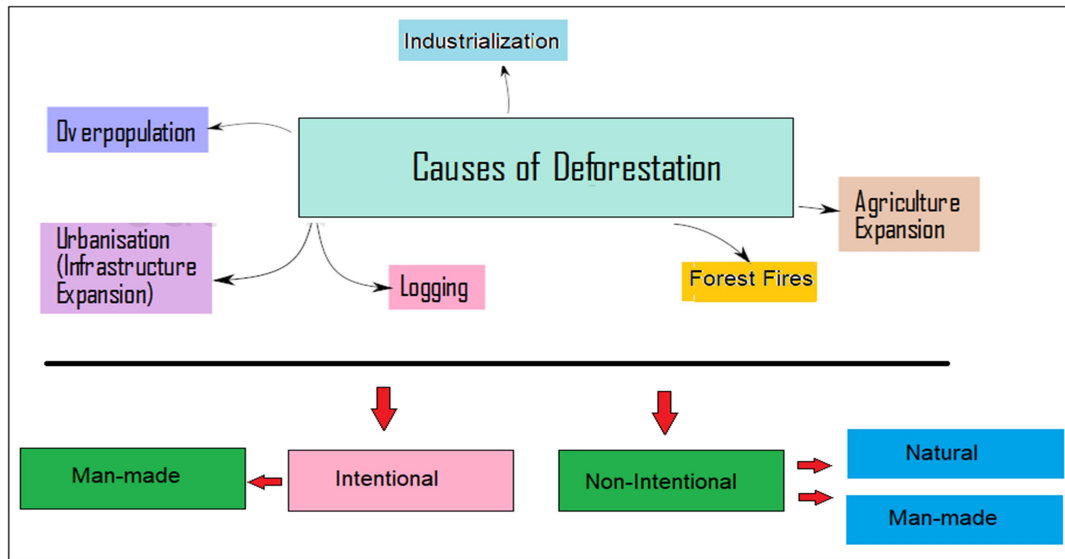
2021).

Figure 1 : Causes of Deforestation

Direct reasons of deforestation are growth in agriculture, wood extraction (i.e., wood for domestic fuel or charcoal), and infrastructure development such as road, railways and urban growth (Lyons-White et al., 2020). As mentioned earlier in the overview that agricultural growth is one of the noteworthy causes disturbing forest land but several other things which are related to this issue such as live-stock ranching, prohibited logging, urban growth, desertification of terrestrial areas, forest fires, mining, and paper production (Sasaki et al., 2021). Deforestation can be the main reason for wildfires that blowout of control because of people burn vegetation. In addition, these fires bring smoke and it also cooperates with clouds and the Sun to decrease further rainfall, which crafts dry and fire-prone situations (Bera et al., 2020). The exclusion of trees without enough reforestation has caused in habitat damage, loss of biodiversity, and aridity (Da Silva et al., 2021). The top layer of soil can be dislodged due to deforestation and soil erosion takes place. Instability of soil top layer resulting in increased surface run-off. This thing increases the risk of flooding (Vajda et al., 2020).

Pakistan is facing big problems related to deforestation. Pakistan has lost 14.7% of its forest habitat between 1990 and 2005 interval (Tahir et al., 2010). A number of investigations have been conducted on ongoing climate change and speed up forest degradation around the globe but very few studies have been conducted for Pakistan deforestation and its related problems. The previous climatic archives are not available even serious climate events are barely documented (De Oliveira et al., 2020). In 1993, a logging ban was done but it seems that it could not stop deforestation. Forest loss was with same magnitude, of course it was illegal cutting but no action was taken against such mafia. It was reported that deforestation was increased after the ban especially near human habitation (Zeb et al., 2019). Natural resources of Pakistan are under some regulation authorities, they ought to be restructured to maintain sustainable and transformative management (Ullah et al., 2022). Due to deforestation, local carbon emission is life-threatening, there should be progress in strategies and national action plans for forest carbon management. It can be sustained because of good strategies for due deforestation, wood harvest and forest degradation (Ahmed et al., 2015).

Another study reported that forest loss leads to loss of 206 kMg C (9 kMg C yr^{-1}) and emissions

associated to degradation also wood harvest are caused for loss of 1757 kMg C (80 kMg C yr^{-1}) and 221 kMg C (10 kMg C yr^{-1}), respectively (Ahmad et al., 2018). These findings recommend that during the years 1994 to 2016, major drivers of deforestation and degradation are growth in population, protection policy of forests with weak law enforcement and cultural attitudes of the local people towards forests. Another considerable thing is their integrated carbon emissions which is totally being ignored (Ullah et al., 2022). According to survey from eighteen provincial divisions of country conducted on consumption of wood from forest by the brick kilns, yearly emission contributions of three main GHGs i.e., CO_2, CH_4 and N_2O crossing limits. The combined CO_2-equivalent is estimated to be 533019 t y^{-1} (Tahir et al., 2010). Economy of Pakistan largely based on agriculture and it is an arid and semi-arid country. In the northern hemisphere of Pakistan, forests are caused to natural calamities due to forest fires, insect outbreak, flooding, and soil erosions. No doubt, the Pakistan's northern forest is also known as a good hotspot for biodiversity but unluckily, this forest has been more prone to windstorms, droughts, floods, and forest fires (Rehman et al., 2019). After flooding in 1992 and 2010 in Pakistan, prevention of forest loss is a high priority because these flood events have been linked to deforestation (Zeb et al., 2019). There are many things which need to be implemented to support forest protection. This review paper highlights the deforestation issues in Pakistan and its impact on forest living things. It also demonstrates health issues and environmental changes due to deforestation. It also deals with current forest management policies in Pakistan and what changes should be done in policies in future.

Impact of Deforestation

Deforestation causes extinction, loss of habitat, changes to climatic conditions, desertification, increased greenhouse gases, soil erosion and flooding, water in the atmosphere, destruction of homelands and shifting of populations, as witnessed by current circumstances and in the past through the fossil record (Ghazoul, 2013). Deforestation causes loss of mineral in soil because farmers burn everything after setting the deforested land for farming. In this case, soil will be unstable for crops, see Fig. 2 for all impacts. Another issue is highlighted that if the land is then reserved for cattle pasture, forest cannot be restored easily (Gomiero, 2016; Santín and Doerr, 2016). In addition, deforestation make land in such condition that it needs higher levels of water for rising livestock and crops (Byerlee et al., 2014). Impact of deforestation is dangerous because it brings death of animal and plant species due to their loss of habitat (Barros et al., 2020; Runyan and Stehm, 2019). Biodiversity is important, animals and plants in the rainforest may grip the cures for diseases. The ways are given to expand the food we produce and make them fresh. Biological experts say that many of these animals and plants may not have even been discovered yet (Fugère et al., 2016; Mora et al.,2011). Rainfall and temperature are affected by deforestation. The rain that falls in tropical forests, one-third water is recycled into the atmosphere. A cycle is always there, evaporation of water, condensation into clouds and falls again in the shape of rain (Zhao et al., 2022). In addition, if forests are there, then tropical rainfall increases and it leads to cooling of Earth's surface because of evaporation. Drier and hotter climate in the tropics is the result of forest loss. Tropical deforestation may also disturb rainfall series far outside the tropics (Desbureaux and Damania, 2018).
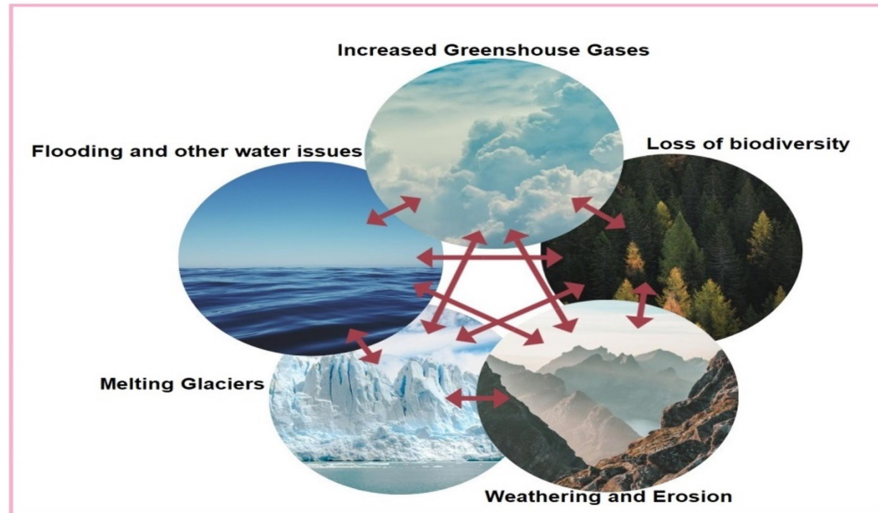
Figure 2 : Consequences of Deforestation

Most important matter is that, forests have capacity to pull greenhouse gases from the atmosphere (Timothi et al., 2017). The forests have different kinds of trees and plants containing a lot of carbon. They utilize carbon dioxide and store carbon in their stems and leaves by photosynthesis process. Due to forest loss, carbon dioxide is discharged back into the atmosphere. Deforestation adds approximately 15-20% of all annual greenhouse gas emissions (Angelsen, 2001). Forest loss can also turn the tropics into a superior source of carbon emissions, which rises the global warming and greenhouse effect (Ullah et al., 2022). Unfavorable consequences is then brought by global warming such as heat-wave, drought etc, which impact many areas of the globe (Veldkamp et al., 2020). Deforestation affect greatly on living things, environment and climate change. Every country has to take steps for reforestation. It is time to give green response to the earth.

Health Threat Due to Deforestation
Deforestation is having another worrisome effect about health on living things. Experts have voiced concern about the people health that are living at the frontiers of deforestation as extensive burning remains today in tropical forests in the Amazon, and some parts of Africa and Southeast Asia (Guégan et al., 2020; Morris et al., 2016). Next severe pandemic could begin from our world's forests, said the experts (Zimmer, 2019). Deadly infections such as malaria and dengue fever have been increased. Malaria is declared dangerous disease killing approximately a million people every year due to infection by Plasmodium parasites spread by mosquitoes. Deforestation has been suspected as main cause (Wilson, 2008). If forest loss is increased 10% yearly, then 3% rise in malaria cases, it was noticed during 2003 to 2015 (Reiter, 2001). This effect can be found in the interior of the forest (Hahn et al., 2014). Another related disease from dengue is endemic throughout the tropics and subtropics in more than 100 countries (Brady et al., 2012). Yearly 390 million become infected of which 96 million manifests symptomatically, with this; 3.83 billion people are at risk. There is an ecological reason, the forest loss can play a role as an incubator for worm-borne diseases that upset humans (Kalbus et al., 2021). Deforestation facilitates the spread of particular infectious diseases through disturbing the vector ecology and it has been proved with evidence; see Fig. 3 (Morris et al., 2016).
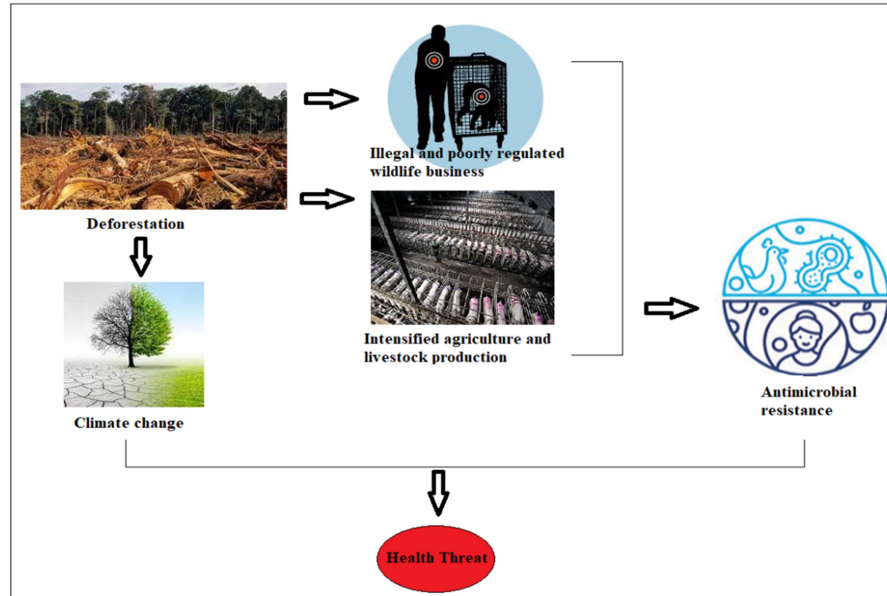
Figure 3 : Health threat due to deforestation

Remarkably, in Pakistan, deforestation has been connected to vector-borne malaria, yellow fever and Lyme disease. Temperature has a non-linear influence on the transmission of mosquito-borne diseases (Karuppusamy et al.,2021). Nevertheless, the influence of deforestation has variation for different diseases such as dengue. It totally depends on transmission cycles and disease ecology. Only few studies investigated the connection between deforestation and dengue fever (Kalbus et al., 2021). Mosquitoes aren't the only for transmitting deadly scourges to people, they bring disturbance in animals too. Indeed, 60% of new transmittable diseases that appear in human beings such as Ebola, HIV, and Nipah are initiated in forest-dwelling living things then they were transmitted through other animals specially wildlife (Machalaba et al., 2015).

In addition, the decrease of a habitat is frequently the foundation for the loss of a several species (Plowright et al., 2021). Forests loss does not lead to only the trees cutting down, but also destruction of several forest species, such as birds, mammals, insects, amphibians etc. As they are forest species, they cannot be alive into other areas (Casey et al., 2014; Johnson, 2014). If there is no forest, some animals which suck human blood, they transmit a number of diseases (Confalonieri et al., 2014). Some diseases are well-known and a number of deadly un-known diseases have been diagnosed which are linked with deforestation (Baylis and Risley, 2012). Diseases can be brought by a new disease-carrying habitats living in the forest after deforestation (Fong, 2017). From above previously published literature, it has been concluded that deforestation bring health threat to living-things.

Deforestation in Pakistan and Environmental Changes
In Pakistan, every year, 27,000 to 31000 hectares of deforestation has been recorded (Mannan et al., 2019). The Himalayan forests and the subtropical forests of Pakistan are decreasing day by day due to illegal urbanization and agricultural expansion. 14% deforestation has occurred of the total forest area between 1990 and 2017 (Ahmad et al., 2018), due to land-use and land cover (LULC) change resulted from urbanization and population pressure (Mannan et al., 2019). It will have negative impact in coming years because regeneration of natural or artificial forests takes long time (Lu et al., 2018). Forest loss does not mean destruction of biomass and carbon stock but it distract water cycles, disturbs the dynamics of

climate system (Qamer et al., 2016). It also changes forest structure, forest composition, forest ecosystem, then it leads to biodiversity loss in the area and also effects can be seen at global scales (Ahmad et al., 2018; Mannan et al., 2019; Ullah et al., 2022). Forest loss in Pakistan also affects negatively rural population that relies on forests for their livelihoods. Tourism and agriculture are also affected specially in northern areas of Pakistan because those big and beautiful trees are the main attraction for tourists. However, tourism is not directly impacted by forest loss; its operation in part relies on the profits of Pakistan's forestry.

All kinds of plants play a dynamic role in keeping the earth habitable. Plants have photosynthesis; this natural process filters the air. This process helps to separate carbon dioxide gases and releases oxygen (Puhlick et al., 2017). In this way, cutting massive amounts of plants may have an adverse impact on the environment e.g building up greenhouse gases and global warming (Ahmad et al., 2018; Mannan et al., 2019; Nambiar, 2021; Ullah et al., 2022). Global warming bring drought incidents encouraging tree death, stunted tree growth, and increasing the possibilities of forest fire and windstorms (Lu et al., 2018). Forest loss and degradation is main cause for climate change (Nambiar, 2021). In addition, there are changes in the ecosystem due to forest loss, extremely vulnerable to the further degradation of forests because in this region, several households and workers lose their vocation, skillset and habitat (Klock et al., 2022; Morgan et al., 2022). Deforestation may cause plant and animal species destruction. Forest is the oldest ecosystem and after destruction, it may take years for reforestation (Abas et al., 2017). Green Emergency is urgently required in Pakistan for stopping forest loss.

Forest Management in Pakistan

Forest management around the globe follows to the principles of sustainable forest management (SFM) (Putz and Thompson, 2020). Forests provide water, buffer climate change, and provide home for many pollinators, all of which are necessary for food production to be sustainable (MacDicken et al., 2015). Forest management is both sustainable and beneficial to people and the environment. It supports local livelihoods while also providing environmental benefits such as carbon sequestration and water, soil, and biodiversity conservation (Tadesse et al., 2022). Therefore, Sustainable Forest management (SFM) is defined as a "dynamic and evolving concept, which aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations (Morgan et al., 2022; Sharma and Cho, 2021)." Based on this concept "sustainable" means to the ability to preserve, continue, or keep something, whereas "forestry" means to the science and art of forest management. As a result, sustainable forestry is concerned with caring for and managing forests to provide the natural resources we use now and, in the future, such as wood and clean water (Paudel et al., 2021; Ye et al., 2021).

There are several benefits of forest for Pakistan. Pakistan enjoys the following benefits from the forests: (i) Forests provide quality timber for furniture, Marri, Jarrah, Tasmanian Oak, and Blackwood furniture are well-known for being durable, dependable hardwoods that last for years while still exuding a distinct charm bred of diverse wood tones, grain patterns, and stain hues. (ii) Forests Cause Extra Rain Fall, because forests are symbolized to as the source of rain. This is because forests emit water vapors from their leaves during transpiration, which condenses into a cloud, which then precipitates and falls as rain on the ground. (iii) Forests fulfill the need of wood because Forests are essential to a country's socioeconomic development, such as Pakistan. They serve a major portion of the rural population with energy, housing, fuel, timber, and fodder, as well as jobs. With the country's rapid economic expansion, industrialization, and population rise, demand for forest goods and services is rising. (iv) Forests fulfill

the needs of animals' food because Forests provide nourishment for animals. Forests give water for animals to drink. Plants consume carbon dioxide and release oxygen into the atmosphere for animal respiration. Plant-eating animals (herbivores) rely on plants and trees, while flesh-eating creatures (carnivores) prey on herbivores. (v) Forests may be the Source of fruits because to supplement their own and their livestock's diets, millions of households in the poor globe rely on forest food and fodder. Forest foods do not always constitute a balanced diet, but they are an important part of the food supply. Forest foods improve the nutritional content of rural diets, augment other food sources (especially agricultural products that are only available seasonally), and provide as emergency food during drought, famine, and disaster. Regarding Pakistan forest management, lacking of proper management, no action against rule breaking people have increased forest loss. There should be proper forest management for different types such as (i) Forest Wilderness, (ii) Managed Forests, (iii) Urban Forests, (iv) Wildland-Urban, (v) Wildland–Urban Interface (WUI), and (vi) Plantation Forests.

In Pakistan, there is no proper system of forest management. There should be organized plan and management for different types of forests. Wildernesses are natural habitats on earth that have not been greatly influenced by human activity, or any non-urbanized terrain that has not been extensively cultivated. Managed forests that have been purposely designated and manipulated to generate desired items such as wood products and/or services are known as managed forests. Urban forests found in, and around metropolitan areas are known as urban forests. They might appear spontaneously or be induced through certain procedures. The wildland–urban interface (WUI) is a transition zone between wilderness (undeveloped land) and land developed by human activity - a place where the built and natural worlds collide. The wildland–urban interface (WUI) is a transition zone between wilderness (undeveloped land) and land developed by human activity - a place where the built and natural worlds collide. In the WUI, human communities are at a higher danger of catastrophic wildfire. Plantation forests are a type of managed forest in which trees are planted (rather than spontaneously regenerated), of the same age, and often of the same species, with the goal of increasing wood fiber production.

Many areas of the country have covered with forests. Famous examples are the forest of Changa Manga; Kaghan Valley, Gilgit Baltistan, Kashmir Valley, Sawat, Kohistan, Mansehra, Abbottabad, Swat Valley, and Chitral Valley have beautiful parts of forests. There should be transformative change in forest management and green response.

Need of Green Response in Pakistan
Green response in Pakistan is highly required because rapid forest loss is creating problem for survival. It will create problem in air we breathe. The importance of forests should not be underestimated (Ahmed et al., 2015; Mannan et al., 2019; Siddiqui et al., 1999; Tahir et al., 2010). Forest does not only provide habitats for animals and livelihoods for humans but also offers watershed protection, prevent soil erosion and mitigate climate change (Mannan et al., 2019; Siddiqui et al., 1999). Green response is a best tool for improving the environmental outcomes of humanitarian assistance because it does not only decrease harm caused to the indigenous environment but also help in reducing the global carbon emissions. Pakistan had a good project namely 'Billion Tree Tsunami' which is also part of green response.

Green response can be adopted by individually. All citizens living in Pakistan should plant a tree where they can. As paper industries are responsible for forest loss, so paper usage should be decreased in the offices and at home. Certified wood products should be used. Recycling or reusing is also best practice, recycled products should be used and then recycle them again and again. Those companies should be supported by people and government that are committed to reducing deforestation. Awareness

should be raised in communities to avoid tree cutting and support should be given who plant trees.

CONCLUSION

In conclusion, deforestation, while it may be necessary, will have an extremely negative effect on the environment. Although there are many benefits that can be enjoyed through it, its risks cannot be ignored. Many deforestation efforts focus only on short-term gains and think nothing of the long-term risks and consequences. The cure for a significant number of devastating illnesses could be found in forest areas right now, and deforestation may remove permanently the ability to discover something that could benefit humanity for the coming years. Deforestation should have its place and should never be overdone. Study shows that an area the size of 20 football fields is lost every 20 minutes. Considering this threat, we can help through research about what we can do help for this destructive process. In a 2015 study, researchers at Eco-health Alliance, a New York-based non-profit organization finds infectious diseases globally, and others found that "nearly one in three outbreaks of new and emerging diseases are linked to land-use change like deforestation."

Recommendations

- Designating protected areas in threatened forests is a direct way that governments can curtail deforestation by making special "Laws, Regulations & Policies for Pakistan" as other countries have implemented such as National Environmental Policy Act (NEPA) - a Forest Service site with information about "The National Environmental Policy Act of 1969 (NEPA)". National Forest Management Act (NFMA) - a Forest Service site with information about "The National Forest Management Act of 1976 (NFMA)".
- The residents of the closed and associated areas to the forests must be bound for not cutting the forest just for their domestic needs. They must make other arrangements for cooking purposes.
- Government should provide on easy installment and interest-free loans to such people who are totally depending upon the forests of the areas, so that they can fulfill their domestic needs from other sources.
- Government should also introduce some encouraging policies so that people may take interest in growing and developing the new forests in the area.
- The beneficial sprays must be done on the existing forests for their better growth and results.

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