Proceedings of the Pakistan Academy of Sciences:
B. Life and Environmental Sciences 57 (3): 27-34 (2020)

ISSN: 2518-4261 (print), ISSN 2518-427X (online)

Pakistan Academy of Sciences

Review Article

Deforestation Dynamics in Pakistan: A Critical Review

Fatima Khalid[1], Muhammad Babar Taj[2,3,6*], Asma Jamil[1], Huda Kamal[1], Tahira Afzal[1], Muhammad Jamshed Iqbal[4], Tahseenullah Khan[1], Muhammad Ashiq[5], Ahmad Raheel[2], Muhammad Sharif[6], and Syed Ahmad Tirmizi[2]

[1]Department of Earth & Environmental Sciences, Bahria University, Islamabad, 44000, Pakistan
[2]Department of Chemistry, Quaid-e-Azam University, Islamabad, 44000, Pakistan
[3]Department of Chemistry, University of Malaya, Kuala Lumpur, 50566, Malaysia.
[4]WWF Pakistan Firozpur road Lahore, 54600, Pakistan
[5]Agricultural Research Council, Islamabad, 44000, Pakistan
[6]Department of Chemistry, Islamia University Bahawalpur, 63100, Pakistan

Abstract: Deforestation dynamics in Pakistan can be attributed to various factors and reasons. This review explores the comparison of green cover for ten years in the capital territory of Pakistan. There is a sever between local interferences and global pledges to achieve forest outcomes. The estimated data of illegal wood harvesting in Pakistan have also been discussed and it is strongly recommended that future forest governance needs to recognize the divergence of performers in the policy growth and the intricacy of local forest contexts. In short, there is a need for policy grit and problem fixate policy-learning routes.

Keywords: Deforestation, illegal logging, factors, NGO campaigns

1. INTRODUCTION

Pakistan had magnificent Coniferous forests on its west, massive Timber forests in its north, and dense Mangrove forests on its southern boundary [1]. As the population of Pakistan grew from 37 Million in 1947 at the time of partition from India, it has now reached 180 Million citizens as a result of which forests were greatly reduced [2]. When Afghanistan was breached by the Soviet Union in 1979 more than 1 Million Afghans left Afghanistan to save their lives, they took refuge in Pakistan and often move into throw-away camps chiseled out of previously forested areas [3].

The key factor of deforestation is illegal logging. The amount of wood consumed, and the total amount of wood harvested from State forests in Pakistan is used as basic information to estimate the level of illegal wood harvested. It was documented that the illegally harvested wood was four times more than the legal wood harvested. Illegal logging is considered an important part of the underground market [4]. Forests in the areas of Kashmir and Khyber Pakhtunkhwa are vulnerable to illegal harvesting of timber by militant groups. Illegal timber is being smuggled between Pakistan and Afghanistan. Timber that is smuggled from Pakistan is then sent back to Pakistan as mentioning it is duty-free Afghan timber. After the wood being smuggled in Pakistan, it is transported to Karachi and further to the Gulf States [5].

Pakistan has strived to overcome the "Timber Mafia" which means groups or individuals who illegally cut trees and sell them for their benefit without a warrant. At the time of independence, Pakistan had 7% green cover but after Bangladesh's separation in 1971, it was reduced to less than 5%. The forest cover (% of land cover) calculated by the World Bank in Pakistan was 1.91 as of 2015 [6]. The percentage of forest cover in Pakistan was 3.28 in 1990 and 1.91 in 2015 over the past 25 years. Pakistan is now left with only 2-5% of its forest cover and so is at a critical point [6]. Islamabad because of the presence of Margalla Hills National

Received: February 2020; Accepted: September 2020
*Corresponding Author: Muhammad Babar Taj <drbabartaj@gmail.com; dr.taj@iub.edu.pk>

Park is one of the lush green capitals which is facing deforestation. Bare lots and arboreous areas are being chopped off leaving behind only twisted yellow ankle-high sapwood [7]. Game models are one of the helping tools to find the amount of illegal wood and used to make policy decisions to control illegal forest activities. The illegal logging economy is a part of the underground market economy.

Fig. 1 shows the amount of economy used in the underground market economy at the global level is $ 1.81 trillion includes $ 7 billion for illegal logging. Pakistan contributes about $ 6.53 billion to the underground market economy including $ 782 million for illegal logging. These values are based on annual illegal wood harvesting [8]. The present study deals with the dynamics of deforestation in Pakistan as the country has faced a great deal of decline in the green cover area over the past years. The objective was to determine the variation in the green cover area of the MHNP particularly and to study the environmental, socio-economic, and governance impacts of deforestation. The literature has been summarized and reported for other areas of Pakistan as well.

1.2. Status of Deforestation in Pakistan

In Pakistan forest belongs to the government mostly. Forests are classified into two categories of public forest (state-owned) and private forest (not state own). Public forests are divided into reserve forest and protected the forest, and in a private forest, its main component is Guzara forest. The forest is divided into these classes to indicate the people's rights and the types of forests. The percentage of production and protection forests is 27 % and 72 % respectively [9].

1.3. Concerns of Deforestation in Past & Present

Between the rate of consumption and supply, there exists a fearsome gap. Here's a report of past and present wood consumption as in 1993 wood supply was 18 % insubstantial and in 2013, this rise to a quarter of average consumption [10]. Due to illegal logging timber has been taken away in a massive ratio from the public forest in different areas. According to the Theory of Himalayan Environmental Degradation (THED), which explained that in the Himalayan region due to overpopulation, the pressure gets building up on the mountain ecology. Another factor is urbanization, which is raising more lowland areas being converted into cities and so the demand is incompatible with the supply of wood [11].

The decrease in forest cover area has been observed as the government didn't succeed in the formation of a relevant institutional system for

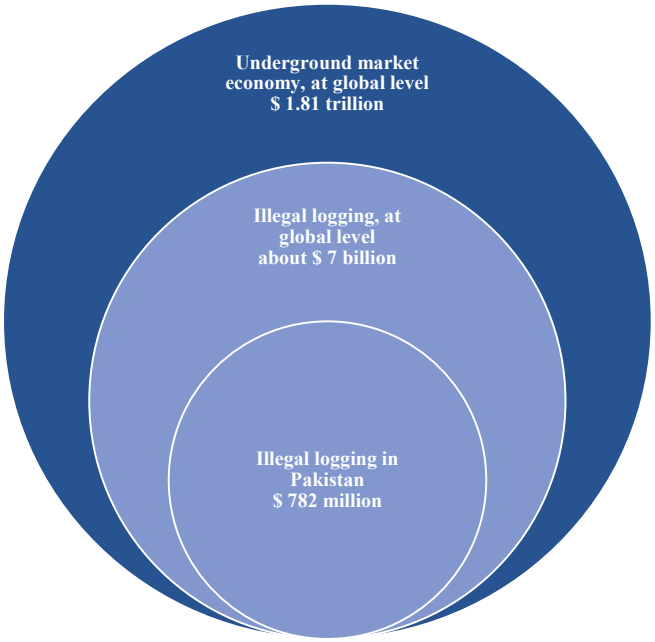

Fig. 1. Underground market economy [8]

forest management. Another main reason for the decrease in the number of the forest is due to the intimacy of private forest contractors and forest officials which contributed towards illegal logging activities [12]

1.4. Understanding Forest Failure Management in Pakistan

This study addresses the government activities which proceed in substandard net gain from the forest and, the consequences of forest failure in the forest management of Pakistan. The highlighted assumption is the incompetent system of the federation that would secure utilization of forest resources is the initial cause of deforestation in Pakistan. A few of the points are as follows:

1. The government had dismissed the prevailing proceeding arrangements that governed resource use understanding and hence create a severe dispute between federation and forest communities.
2. The contradicting system of property rights is prevailing due to the uneven authority of government over forest resources.
3. Forest management becomes an unachievable task as the government was marked against the social identification of state land was unavailable.

2. MATERIALS AND METHODS

2.1. Monitoring Forest Cover of Margalla Hills

Deforestation is one of the major environmental issues around the world so as in Pakistan as it already has a scarce amount of forest present. This study involves the monitoring of forest cover over the past two decades by using Remote Sensing. This climate change and its impacts have been determined on Margalla Hills National Park which is responsible for the change in forest cover. For spatial and temporal analysis monitoring two different software including; ArcGIS 10.2 and ERDAS imagine 9.1 were used. The results indicated the rise in land build in various forms. The Forest class which is being observed comprises of conifer forest. At the end of the study, it has been concluded that conservation practices are immediately needed to be followed.

GIS software has proven to help indicate the forest cover of conifers trees over the past years in Pakistan. In a previous study, a decline of conifers pine and the deciduous forest was observed from 1992 to 2011 using the hybrid classification algorithm. It also acted as a baseline data of climate change impacts that can be helpful for future impacts[13].

2.2. Fuelwood Storage Houses in Islamabad

This study gives information about the types and amount of wood stock present at the Wood Taals. The study areas were various locations of Rawalpindi and Islamabad including; Said our village, Golara sharif, Pind Singrial, Meharabadi, G-8, G-9, G-10, I-8, I-9, I-10 sectors, Bhara Kahu, Bari Imam, and Khanna pul. It focused on the household survey, forest guard interviews for forest cover data of MHNP. Fifteen households were randomly selected from each village.

3. RESULTS AND DISCUSSION

The study indicated that in Islamabad, about 20 Wood Taals were surveyed. The wood found at those Wood Taals were Sheesham, Phulai, Ber, Kikar, Safeda, Toot, Poplar, Neem, Soru, Amaltas, and Jaman. The majority of the wood found on the Wood Taals were Kikar, Ber, Phulai, Sheesham, Neem, and Toot. The average price of fuelwood was found to be PKR 500-550 Mann and the maximum were PKR 800/Mann in G-8 and the minimum price was PKR 350/Mann in Golara sharif. Customers of those Wood Taals were households, tandoors, daig houses, hotels, and marriage halls. An owner of a Wood Taal at Bari Imam said that his permanent customers were Saudi Embassy, Marriott hotel, and Prime Minster House.

It was reported that the peak season for the sale of fuelwood was the winter season from January to February. But one owner said that he had set customers who buy fuelwood from him throughout the year so one season does not matter. The kind of wood available at the wood Taals was inspected and it concluded that Phulai from the parking area (MHNP) was found mixed with the set of woods at 7 Wood Taals. An owner of a Wood Taal stated that local people get fuelwood from Margalla Hills National Park and sell them on their camels at the

price of PKR 100/Mann only.

It was found through this study that "Daig Houses" near the shrines of Bari Imam and Golara Sharif were the prime fuelwood consumption places. The report focused on the fact that the Daig Houses of Bari Imam are the greatest threat to Margalla Hills National Park.

A report submitted by the Capital Development Authority (CDA) to the Supreme Court has highlighted 264 events where the forest has been mutilated. The Authority has so far collected Rs1.113 million in the form of fines from 2015-2017 by the people who were found illegally cutting trees [14].

3.1. Realities of Deforestation in Northwest Pakistan

A study by Ali et al. [15] focused on the myths and realities relating to deforestation taking place in North-West Frontier Province Khyber Pakhtunkhwa (KPK) Pakistan. It told the viewpoint of the people of the province who are dependent upon the forest like about the conditions of the forest, the forest use patterns, the factors which result in forest depletion and increase in illegal logging, and the changes in forest cover.

About 39 hectares of forests are disappearing on yearly basis according to an estimate. By using Remote sensing techniques, it has been estimated that within 30 years there will be the complete disappearance of the forest from most of the areas of KPK due to the decreasing number of forest cover there. The local people of the area are mostly blamed for the declining forests. Lack of awareness, poverty, population explosion, overgrazing, extensive cutting of trees by the local people, a rapid increase in urbanization, cutting of trees for construction, huge dependence of the people of rural area on the wood for fuel and their daily needs and timber mafia are some of the causes of decreasing forests of NWFP. The Forest department has focused more on the forest's economic utility rather than its environmental utility.

It was estimated during a present study that about 90% of the local people were found to use wood from the forests for their daily needs like for heating purposes or cooking food. Fuelwood was extensively used as the local people don't have excess gas etc. Electricity was also present in some of the villages, but it was very expensive for poor people to afford it. Forest wood was also being used for the construction of houses.

A huge amount of grazing activities was being carried out in the forest all of which has led to forest degradation. The results showed that the illegal cutting of trees has increased over the past five years. The majority of them were being carried out by the forest department as they take a huge amount of money and let the timber mafia cut trees illegally. Few of the local people were also involved in their illegal cutting. According to the information from a local person, the forest department is quite weak and the timber mafia here is very powerful. Most of the people here are poor and the only option left for them is to cut trees and sell them for their living [15].

3.2. Forest Management in Swat Pakistan

The present study pays close attention to how corruption is adding to deforestation in Swat, Pakistan. The strategy of the "Crime and Punishment" approach was highlighted in the study; this approach is not implemented due to an imbalance in an institutional environment. There should be a systematic institutional system to put a halt to corruption.

Corruption is common in many of the developing countries, Pakistan is one of them. The people involved in such activities and real culprits belong to the law enforcing agencies. During this study, information was collected from witnesses who informed that the forest department and forest officials are deeply involved in corruption in the forestry sector. The study included individual interviews and household surveys from some randomly selected villages in Swat. From household surveys, many people reported that police officials were involved in corruption and after taking bribes allowed the vehicles full of illegally cut wood to pass. Forest officials as they have low salaries to support their families find such situations as an opportunity or they are forced to get involved in such situations just to support their families. We need a set of policies that aim at both environmental

and social objectives. There should be a systematic reform system and the reforms should focus specifically on the forest sector [16].

3.3. Fighting Deforestation in Swat

Swat possesses a distinct amount of biophysical and socioeconomic characteristics with the high mountain Hindu Kush Himalayan region of Pakistan. There are different types of frangible and fragmented ecosystems in the region, but land cover changes have escalated process irreparable effects on the ecosystem. This study recommends realigning of property rights, education, and community participation, its main purpose is to present evidence of deforestation with the setting of diverse accounts regarding forest resources of Pakistan. A serious change in the forest cover has been noted from 1968 till 2007 in the temporal analysis of forest cover.

In high elevation areas, 69% change has been noted and in lowland areas change has been decreased to 36%. In the Swat district, we noted annual deforestation rate in (pine forest zone) 0.80%, 1.28% (agro-forest zone), 1.86% (scrub forest zone) due to deforestation ecosystem and connected livelihood [16]. By conduction this study, the main point that was found in Swat was health and forest ecosystem was getting affected in the area and our methodology was adopted by doing household surveys and expert interviews. It was found out that lack of awareness is one of the main reasons and it arises due to lack of education, lack of substituted earnings. Some other issues found out where the problems in corresponding to property rights in forest area and lack of implementation of statutory.

As for a solution to this issue we need to build some other ways of generating income, along with agricultural production need to increase, there is a demand for forcible enforcement of state, laws, and rules that are corresponding with the safeguard of forest and also environmental awareness needs to be spread. In Pakistan, forests are decreasing at the amount of 39 hectares from the year 1981 to 1990 the rate of forest depletion was 0.6% annually, and from 1990 to 2000 the rate of forest depletion recorded was 1.5% annually. According to a survey from the year, 2000 to 2005, a 33 percent decline of forest cover was found in Swat District [17].

Satellite images are used with the help of remote sensing from GIS. Along household survey was conducted with a sample size of twenty from each Village for knowing the socio-economic problems. There were two different periods in the study from 1970 to 2005. Regarding the holdings of property rights Quantitative analysis was taken place our questionnaire was open-ended. In the Swat district, major deforestation has been noticed in the region of Kalam, Malambjaba, and Barikot areas. The decline in the forest has occurred from 30.5% to 49.7% and 32.7% to 9.5% change in forest cover has been noticed from 1968 to 2007 [17]. The local community has not been given the right to cut down timber, from surveys regarding household and local community revealed that illegal logging was occurring due to which tree count is declining.

3.4. NGO Campaigns and Government Works in Pakistan

3.4.1. WWF Tree Campaign with Islamabad United

On 13 February 2018, WWF and Islamabad United cricket team organized an event in Fatima Jinnah Park Islamabad. The main theme of the event was to make Pakistan cleaner and greener due to the rise in Global Warming and the overall shift in climate. Both institutions contributors planted trees of Orange and Amaltas. WWF was dedicated to Islamabad United to plant around 1,400 indigenous trees in 2018. Director-General WWF Pakistan, Hammad Naqvi Khan communicated the message of NASA and the National Oceanic and Atmospheric Administration that according to their recordings 2017 was marked as the three warmest years. So, it is the current necessity to make a bond between people with nature and also bring sustainability as a liability to perform. Another important point which he denoted that Pakistan has the highest deforestation rate in Asia and the forest cover is less than 2.5 %.

In a metropolitan city like Islamabad, the plantation is needed to diminish the impacts of climate change. Executive Director General Capital Development Authority (CDA) briefed about the advantages of trees as they supply shade, along

with medicine, water, timber, clean air, etc., and help in sustaining a healthy ecosystem. He also communicated that forest needs to be conserved and valued as not only it helps in reducing carbon emissions and the associate livelihood of the community and we need to denote this with the rise in climate change respective to the global environmental agenda.

Mr. Ali Naqvi, owner of Islamabad United communicated that environment is important for reshaping our future that is what the team believes too. He further denoted how enthusiastic he is feeling that both bunches of ambassadors and cricketers are encouraging this work for conserving nature. Further, he mentioned that he is in commitment to plant a tree for every run that his team has taken and 10 trees for a wicket that is taken by Islamabad United in PSL. The captain of Islamabad United 'Misbah ul Haq' added that climate-related impacts and global warming are combinable impacting many sectors of our economy.

3.4.2. The Billion Tree Tsunami

"The Billion Tree Tsunami" project looked forward towards the better protection and the growth of the forests of KPK as the government is fully motivated to increase the cover of the forest.

The goal of this project was that by 2018 the forest cover in KPK province was to enhance from 20% to 22%. This included protecting the existing forest and including more area under the forest. Under this project massive afforestation would take place, about 30,000 hectares of additional forests will be planted. By 2018 the existing forests would increase from 20-30%. These targets would ensure the protection and conservation of trees and ensure 27,000 hectares of plantation each year. These targets were to be achieved in four years billion tree tsunami project. On small scale, ecopreneurs are being established in the province. "Youth Nurseries" is a program which is started by the provincial government which is motivating the villagers to establish small nurseries which contain about 20,000-25,000 plants which will be back-up by the forest department that will monthly generate an income of Rs 12000 to 18000 for the youth of the area [17].

The traditional custodians who are the local people (communities) have been given the responsibility of protection and enrichment of the forest. They will be allowed to hire, and train locals based on an agreement with the government these trained locals will be known as "Forest Nighabans". In this way, better protection of forests is ensured and more jobs for the youth are created. The government is also looking forward to establishing the rules and the provincial government has aimed to finish these activities, cut down all their sources in government, strictly enforce punishments, the zero-tolerance policy will be adopted, and satellite real-time monitoring will be improved to overcome these mafias.

The benefits of this project for Pakistan include as it will reduce soil erosion, improve water availability, and increase flexibility against floods due to climate changes. The benefits of this project for the world include it will contribute towards global climate mitigation and sequester carbon.

3.4.3. G8 Action Programme on Forests

G8 action program on forests came into being in 1998 and emphasized five issues related to the world's forests and to accomplish sustainable forest management (SFM). Other countries including Pakistan are going to be affected by these action programs as they may contribute to lessening the impacts of climate change globally.

3.4.4. Monitoring and Assessment

The G8 members put effort to strengthen the activities from fire prevention to the detection of illegal logging. G8 members established the guideline for the auditing system and financial support for the improvement of the capacity of producer countries. Support and participation of G8 members for the World Fire Web initiatives and the global network were established for the mapping of active fires and burned areas. They participated in the Global Fire Monitoring Centre which presents the global data on fire.

3.4.5. National Forest Programs

The national forest programs (NFPs) are the more important and will support the developing countries

in working towards the SFM. G8 members believe that public participation is vital for SFM. For the creation of NFPs the help of government, indigenous people, forest owners, environmental groups, researchers, and other interested groups to balance the environmental, economic, social, and cultural demands placed on forests.

3.4.6. Protected Areas

Technology enables the countries to keep informed about neighboring countries around the globe, raising the awareness of shared resources. It is crystal clear that clean water, pure air, and healthy forests as a birthright for every child rather than children of a specific country. That is why the world's forest protection is the main concern of the G8 action program on Forests.

3.4.7. Private Sector

Working with private groups will have the best possible decisions for all residents of all sectors in society. Conservation groups, forestry firms, academics, and labor representatives from around the world work together to reduce conflict and identify a common vision on forest values.
G8 members are leading to prevent or reduce illegal logging problems over the globe. Research on wood DNA analysis by the G8 partners will prove to be useful for catching and preventing forest crimes. Methods are being developed to determine the authorization of harvested logs [18].

4. CONCLUSIONS

The present study was designed to determine the effects of drivers of deforestation and to determine the information lapse to develop the hypothesis to control deforestation in Pakistan. By developing scenario visioning the problem of deforestation can be solved. There is a need for a forest growth policy by keeping an eye on the rate of illegal harvesting. Other options should also be taken into consideration, for example, afforestation and demarcation of forest boundaries especially forest close to local residential areas. It is the dire need of the day to prepare the deforestation control policy.

5. REFERENCES

1. B. Shahbaz., T. Ali, and A.Q. Suleri. A critical analysis of forest policies of Pakistan: implications for sustainable livelihoods. *Mitigation and Adaptation Strategies for Global Change* 12: 441-453 (2007).
2. W. Stanton. *The Rapid Growth of Human Populations, 1750-2000: Histories, Consequences, Issues, Nation by Nation.* Multi-science publishing (2003).
3. E.B. Turk. F*rench Theatre Today: The View from New York, Paris, and Avignon.* University of Iowa Press (2011).
4. D. Humphreys. Forest crimes and international trade in illegally-logged timber. H*andbook of Transnational Environmental Crime. Edward Elgar,* Cheltenham 168-189 (2016).
5. A. Nizami. *Forest fights in Haripur, Northwest Pakistan* (2013).
6. T. Kurosaki. Land-use changes and agricultural growth in India, Pakistan, and Bangladesh, 1901-2004. In: *New and Enduring Themes in Development Economics* 303-330 (2009).
7. I.H. Adil, and A. Dehlavi. Valuing the Recreational Uses of Pakistan's Wetlands: An Application of the Travel Cost Method. *The South Asian Network for Development and Environmental Economics* (2011).
8. N. Nazir, and L.S. Olabisi. Illegal Logging and Wood Consumption: Estimation and Projection of Illegal Wood Harvesting in Pakistan through System Dynamics. *Pakistan Journal of Commerce & Social Sciences* 11: 406-427 (2017).
9. M.A.K. Sahide, and L. Giessen. The fragmented land-use administration in Indonesia–Analysing bureaucratic responsibilities influencing tropical rainforest transformation systems. *Land Use Policy* 43: 96-110 (2015).
10. S.P. Wood. *A gap in time: Thoughts on the implications of electronically inflated psychological acceleration.* Pacifica Graduate Institute (2013).
11. P. Blaikie. Actors and their narratives in participatory forest management. In: *Forests People and Power,* pp. 114-137. Routledge(2013).
12. C. Barnes. Sustainable collective action in Joint Forest Management, Maharashtra, India (2010).
13. R. Cochard, and M. Dar. Mountain farmers′ livelihoods and perceptions of forest resource degradation at Machiara National Park, Pakistan-administered Kashmir. *Environmental Development* 10: 84-103 (2014).
14. M.J.I. Chaudhry. An assessment of Fuelwood storage houses (Wood Taals) in Islamabad Capital Territory. A research report submitted to WWF-Pakistan and IWMB, Islamabad 19 (2017).
15. T. Ali., B. Shahbaz, and A. Suleri. Analysis of Myths and Realities of Deforestation in Northwest

Pakistan: Implications for Forestry Extension. *International Journal of Agriculture and Biology* 8: 107–110 (2006).

16. M. Qasim., S. Khalid., D.F. Shams, and W. Khan. Fighting deforestation in Swat Pakistan through realigning property rights, Education and Community Participation. *Journal of Applied Environmental and Biological sciences* 4: 24-27 (2014).
17. M.A.A. Khan. The Billion tree Tsunami. The Express Tribune (2015).
18. G8 Action programme on forests-Backgrounders (2002).