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Sindh Forestry Resources: Causes of Deforestation and Policy Guideline for Its Conservation (A Case Study of Lower Indus Valley Sindh-Pakistan)

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Abstract:

The Agro ecosystems of Sindh, the second largest province of Pakistan are contained within larger landscapes that include uncultivated land, drainage networks, rural and coastal communities, wildlife, fisheries and forest sector. In Pakistan and particularly its lower Indus valley called Sindh province at present is facing a serious environmental degradation problem due to population explosion, mismanagement in wetlands, construction of dams in the upper areas and industrial waste of the country.

The major issues under this subject have been summed up after the in-depth analysis and examination of four types of forests: riverian forest, irrigated forest, mangroves forest and rangeland forest. Using quantitative and qualitative data from secondary sources, the study contributes significantly in the existing body of knowledge on this subject. It concludes that mismanagements in wetlands, scarcity of water resources, rapid population explosion, ill planned speedy urbanization and industrialization are the main causes of deforestation in Sindh. It also suggests a dynamic policy guideline, keeping in view the international environmental standards for overall improvements in these resources in the region.

Keywords: Agro ecosystem, forest, fisheries, policy, growth, development, MAF

1. Introduction

Forests are the important components of the eco-system of nature. They are closely connected with soil resources, water management, wildlife conservation and livestock population. Forests are beneficial for the economic progress and environmental balance. They are utilized economically by the population and provide protection cover to the earth. Forests provide timber, firewood, and habitat for wild life and flora and fauna, honey and herbs, grazing field, silkworm production, raw material for paper, board and matches industry.

The forest resources also offer defense in war, stop salinity and water logging, provide direct and indirect employment, natural way of reduction in pollution and other environmental hazards, balance of forests protect the crops from cyclone and natural disasters, manure to the crops, maintenance of fertility of the crops. Forests also play a very important role in the leather industry such as tanning; contributes to clean and healthy environment. Forests are a primary source of livelihood for thousands of indigenous communities across Sindh but multiple threats and factors are accelerating their rate of depletion. Recent studies of WWF/IUCN said that about 1.6 billion people around the world are directly dependent on forests for their livelihoods. Forests are also the biggest sinks of carbon dioxide and play a major role in decreasing air pollution. However, an alarming at least 3 percent annual decrease in the forest cover has been observed worldwide as estimated by the environmental experts.

The renowned economists highlighted the economic repercussions of environmental degradation, stating that it is causing losses of around one billion rupees per day. Forests cover about one-third of our planet and are home to about 80 percent of all living species, while also being essential sources of fuel and wood. On the average, a single tree is home to about one hundred organisms and one acre of forest absorbs the amount of carbon dioxide equivalent to the emissions by a vehicle covering a distance of 41,842 kilometers. Mangroves (an important plant in its kind) is also a significant type as one hectare of mangrove forests produce 100 kg of fish, 25 kg of shrimps, 15 kg of crab meat and 40 kg of sea cucumbers annually.

The major threats to forests in Sindh, according to specific studies on the subject are illegal reclamation, non-availability of river water, reduced rainfall and drastic climatic changes. Building new dams and barrages will further exacerbate the situation. Pakistan's total

forest cover is about 1,902,000 hectares and Sindh forest cover is 1125866 hectares but a rapid rate of deforestation sees us lose 41,100 hectares annually. Keeping in view of the above this study is an attempt to discuss in details all the obstacles with particulars type of forest in Sindh province of Pakistan and suggest policy implication for conservation of available resources in the region.

2. Methodology

The quantitative and qualitative approaches of research has been used in this section, mainly depending on personal observations, interviews of specific groups and some kind of available primary and; secondary data to make the study a unique policy document in all respects. The above mentioned objective can not be achieved until and unless we evaluate all elements mentioned in studies of WWF/IUCN Pakistan annual reports and specific group study officials of Sindh forest department (SFD).

3. Discussion and Results

When we analyze Sindh forests in detail, we find following four types of forests; two are productive forests and other two are protective forests. These are bifurcated in detail according to area in acres / hectares and also in percentage share in the region as it is mentioned in table 1.

Type Of Forest	Area In Acres	Area In Hectors	% Share In Region
Productive Forests:			
Riverian Forests	596000	241198	1.72%
Irrigated Plantations	203306	82277	0.58%
Protective Forests:			
Coastal Mangrove	852112	344845	2.45%
Rangelands	1130596	457546	3.25%
Total	2782014	1125866	8.00%

Table 1

Source: "Sindh Forestry Resources" Office of the Chief Conservator of Forests Sindh, Government of Sindh Hyderabad.2013.

3.1. Riverian Forests

The riverian forests constitute 596000 acres along the river Indus as it is mentioned in table 1 above. These types of forests exist along both banks of the Indus River. They rely on inundation by the River for irrigation and therefore their existence is heavily dependent on the intensity, duration and frequency of river water flow. The heavy flooding by the Indus River in the moon soon seasons causes huge amounts of land to be eroded and consequently deposited in adjoining areas. These new lands that are created as a result of soil deposition are known as wet land 'Kachos' in local Sindhi language. The new land supports the growth of species like Tamarix dioica (Lai), Saccharum munja (Kanh) Populus euphratica (Bahan) and Babul (Kikr). Babul is the dominant tree of Riverian forest of Katcha area. The growth of these species is a source of livelihood for thousands of people and also provides fuel wood, timber, fodder, honey, tannin etc. Moreover, they serve as carbon sinks and also protect the surrounding areas from the severity of floods.

It has been analyzed that before the construction of Sukkur barrage in (1930) the Indus River flow was free, causing large forest areas in the whole Sindh. The construction of two more barrages in Sindh after partition namely Guddu and Kotri barrage and dams in the upper areas of Pakistan in 1960 reduced water flow of Indus River and this reduction of water worked as a great obstacle in the growth of forest. The historical analysis of Sindh forest lends credence to this very fact that in 1940s Pir Syed Sabgatullah Shah Rashdi waged a freedom movement in Sindh. His followers were declared by British government as terrorists and traitors.

The British government in retaliation set on fire the Mukhi forest of Sanghar district to purge it of gangs of dacoits living there. The said forest area consequently was allocated to the non-civilians of other provinces. The same practices have continued unabated in different governments in different periods. But the period of 1980-2000 about two decades dealt a severe blow to forests in Sindh. Thousands of acres of the area of forests have been cut down and burnt in the name of law and order. This heinous practice is still said to be in vogue. The large tracts of land locally known as (keties) have also been occupied by the feudal / influential persons of the area who have converted these areas into their mini states and hunting grounds.

3.2. Irrigated Forests

This is also called agro forestry and it is most economical, sustainable and stable alternative for ensuring ecological security of the area. The farmers have adopted this practice as an income generation activity. There is no proper emphasis has been given to farm forestry by the forest department resulted a less tree cover of the province and major cause of increase in temperature for the last two decades.

The planting of canal banks and roadsides would be necessary for amenity purposes besides environmental protection and also for international environmental standards. These kind forests are also planted by the forest department for commercial use estimated at 203306 acres according to table 1 above. The main species grown in the upper Sindh region include Dalbergia sisoo (shisham), and in the lower part Acacia nilotica (Babul). Due to its fast growing nature, Eucalyptus camaldulens is also being planted in these areas for industrial use. The higher fluctuations have been observed in the growth of irrigated forests in Sindh. According to data in table 2 in the last two decades, there has been no increase in the growth of irrigated forests in Sindh. In the initial year of 1989, the area under

irrigated forests was measured at 3.5 million hectares. During 2002, 2003 and 2007 highest growth was recorded up to 5.6, 6.0 and 8.0 thousands hectares. But in conclusion after about two decades, the area has been measured with decreased up to 1.5 thousands hectares and last year data of 2008 is only 2.0 thousands hectares. The main obstacle is inefficiency / corruption of the Sindh forest officials, backwardness of communities and problems in irrigational system that lead to fresh water scarcity.

S. No	YEAR	FIGURE IN '000' HECTARES
1	1989	3.5
2	1990	3.7
3	1991	3.9
4	1992	1.6
5	1993	0.7
6	1994	1.6
7	1995	1.9
8	1996	2.9
9	1997	2.8
10	1998	0.3
11	1999	0.2
12	2000	1.1
13	2001	1.1
14	2002	6.0
15	2003	5.4
16	2004	3.4
17	2005	2.4
18	2006	2.0
19	2007	8.0
20	2008	2.0

Table 2: Area under Irrigated Forest

Source: Agricultural Statistics of Pakistan 2001-02, & 2010-11 pp.207&197

3.3. Mangroves / Coastal Forests

The *Avicenna* is the biological name of mangroves. Indus delta mangroves are among the largest mangroves of the world and also have important place in eco-system of the globe. These are located in the southern delta of Sindh along the sea side stretching from Balouchistan coast in the west and to Indian border area in the east covering about 200 kilometers. According to the data of table 1, Sindh mangroves cover 852112 acres, making up 2.45% area of total forests in the Sindh province. The growth of these mangroves is highly dependent on the fresh water of river Indus and monsoon rains. The mangroves have an important contribution towards Sindh economy in terms of employment opportunity. According to a conservative estimate about 5 million people directly and indirectly are engaged in mangroves production/growth. They (mangroves) also provide fuel, wood, habitats and breeding grounds for fish and shrimp. These mangroves protect Bin Qasim and Karachi ports and harbors from silt and other environmental hazards. They provide a natural cover for the people of Karachi, Thatta, Badin and other coastal towns from cyclones and pollution. The mangroves also reduce the rate of water logging and salinity in the area of southern Sindh.

The following findings constitute the major obstacles to the development of mangroves forests in Sindh. These findings are based on specific group study of coastal communities and empirical study of WWF (Pamela 1995).

It has been concluded that over the past 65 years, three large storage dams and twenty barrages have been built on Indus which divert river water for agricultural use. The construction of dams in upper areas of the country and diversionary barrages affect bed load and transport of suspended sediments during the flood season. This reduction in the flow of fresh water to Indus Delta from 150 to 50 million acres feet (MAF) over the last 60 years has created two problems; first, the salinity of the sea water has increased, which is detrimental to mangroves growth second, the flow of alluvium, the fine gained nutrient rich soil, brought by the river during its course through the fertile plains has declined by over 50%. At the institutional level, in the water accord of 1991 irrigation department of province and federal ministry of water and power has decided that 10 MAF water flow down is necessary for Delta region. It is regrettable that this decision is yet to be implemented in letter and spirit due to a tussle between Punjab and Sindh province about their water share and this inordinate delay in implementation has severely affected mangroves and Indus delta population.

The forest department of government of Sindh is principally responsible for these forests, but lack of funds, lack of professional negligence of other line departments, i.e. Sindh revenue department, provincial and federal Government environment protection agencies, lack of concerned communities and committed NGOs have led to the shrinking of mangroves growth. The port and fish harbor authorities also shift their responsibilities and blame to each other for the degradation of mangroves forests. As a result, marine pollution is increasing at an alarming rate and damaging the growth of the forests. Illiteracy, lack of awareness and indifference of political leadership of coastal areas also render existing law of environmental control and rehabilitation in the region ineffective. The

mismangement of port authorities also leads to marine pollution in the area that is harmful for the growth of above forests. The ever increasing population of Karachi and the chemical/untreated waste of industries from Karachi to Thatta represent serious environmental hazards that affect mangroves growth. The lack of coordination among all institutions makes it difficult for them to work on sustainable policies and guidelines for implementation of laws and betterment of marine environment for mangroves growth in the region. The role of local population to this effect is very important either to protect or affect forests. The local population of coastal areas is living below poverty line. Fish catching and selling mangroves wood for the fuel purpose is their main profession due to lack of other income/employment/livelihood alternatives. Over-fishing and cutting of mangroves forest is order of the day in the areas that affect the growth of mangroves. To sum up, fresh water scarcity due to upstream diversion of river flows for agricultural crop, water pollution, overgrazing, mangroves cutting for fuel wood and timber, unsustainable fishing levels are seen as the main factors associated with biodiversity loss in the mangroves forests on the coasts of Sindh. Dr Pamela mentioned with reference of Thompson and Tirmzi (1995), that "The rate of degradation of mangroves forests in the Indus Delta has been estimated at 6 % between 1980 and 1995. At present only 15 % of mangroves here are considered healthy." Source :(Dr. Pamela Stedman Edwards, 1995, pp.3)

3.4. Rangeland Forests

These forests are located in the hilly areas of the Mahal Kohistan and sandy areas of Thar Desert. These are also located in some parts of Thatta, Badin, Larkana and Karachi and eastern parts of Sanghar, area of Khairpur, Sukkur and Ghotki and cover 1130596 acres of land as shown in table 1. The above rangeland forests solely depend on rainfall water in particular of moon soon season. Various kinds of grasses and shrubs are their main production and suitable for livestock fodder and low priced wood for fire and fuel purpose. Sindh receives low, inadequate and irregular rains except in moon soon season. This meager source of rainy water is completely wasted due to lack of water collection in rangeland areas. Institutionally, rain water development projects have been neglected to date due to two main reasons. First, weak/minimal representation of politicians and bureaucrats from the above areas and second, majority of schedule castes and minority communities just like Hindus, Manghwar, Cooli, Bheel and other weaker and marginalized communities. The dismal role of public institutions at provincial and federal level, closure of Sindh Arid Zone Development Authority (SAZDA), negligence of policies planner in public sector development programs especially in annual development program and five year plan and perspective plans towards infrastructural development in the region have taken their toll on the rangeland forests. For the research and further development of rangeland forests, Arid Zone Research Center Umarnot was established with co-operation of Pakistan Agricultural Research Council (PARC) affiliated with Arid Zone Research Institute of Quetta. But due to its operation at small scale and lack of funds and professionals, this institute could not provide desired results. Decertification of plants, loss of biodiversity, lack of fencing of bushes and ranges, wastage of rainy water, lack of grass reseeding, scarcity of small dams and wells in the region, negligence toward use of wind energy, lack of water resources management and development, inappropriate management of range eco-system, complete ignorance of Sindh forest and agricultural department towards rangeland constitute major obstacles to the development of rangeland forests. The poverty and illiteracy of local communities and their weak representation at national level have also led to shrinking of rangeland forests. On further rainfall analysis, we find that last decade (1990-2000) of severe drought in the rangeland area and country at large severely affected the growth of rangeland forests. Over the years, inadequate and irregular supply of rainfall, lack of co-ordination among government departments, poverty, overgrazing and high population growth rate have all impacted negatively on the rangelands.

4. Conclusions and Conservation Policy

The study of Sindh forests lends credence to this very fact that Sindh has four important kinds of forests, i.e. mangroves forests, riverian forests, irrigated forests and rangeland forests. Mangroves forests are 2.45%, riverian are 1.72%, irrigated are 0.58% and rangeland are 3.25% in the province. The growth of mangroves, riverian and irrigated forests depends on Indus water, except of rangeland forest which depends on rainy water. Since 1940, cutting and setting forests on fire in the name of law and order continues unabated. Misappropriation and mismanagement in public sector funds provided for the development of forests sector and scarcity of professionals also affect and hamper their growth. The construction of dams in upper areas reduced Indus water flow and dealt a death blow to growth of forests. The irrigated forests growth is stagnant for the last two decades. The mismanagement of ports authorities, forests department, environmental protection agencies, ignorance of local communities, over fishing, untreated industrial water of Karachi, increasing marine pollution, minimal representation of coastal areas in power corridors at provincial and national level, negligence of public sector policies and reduction in Indus water flow affect the growth of mangroves negatively. It is due to this fact that we are left with only 15% healthy mangroves.

The rate of degradation of mangroves forests in the Indus delta has been estimated at 6% from 1980 to 1995. The rangeland forests cover 68000 square kilometers of sandy area of Thar and hilly area of Kohistan. Low, inadequate, irregular rains, lack of collection of rainy water specially scarcity of small dams, negligence of policy planners, and poverty of local communities affect the growth of rangeland forests. The institutional mismanagement of agricultural and forest departments, just like decertification of plants, loss of biodiversity, lack of fencing of bushes and ranges, lack of grass reseeding, increasing population rate in above areas and their fuel needs, over grassing, drought situation after every five years, wastage of rainy water has been considered as obstacles in the development of forest sector. The growth of forests is totally dependent on fresh water of River Indus. According to the estimation of forest experts flow of one cusec (28 liters) for each 100 acres of forests is necessary for the growth of forests especially mangroves forests located in coastal areas. The water accord of 1991 is implemented, that provides 10 Million acres foot of water at Kotri down

stream. At national policy level, it must be remembered that large dams and barrages construction in the upper northern areas may cause further reduction in the flow of Indus water and slow down growth of forests. So above schemes should be revised according to the needs of Sindh forests system. At the institutional level in the province, environment protection agencies, forests departments, agricultural departments with the co-operation of Non governmental organizations (NGOs) and Community based Organizations (CBOs) should raise awareness to protect remaining forests resources. Provision of gas will reduce the cutting of forests for fuel needs. Much attention should be given to rangeland forests in arid zone of Sindh. The artificial plantation of trees and various kinds of grasses should be started with the help of conservation of rainy water through constructions of small dams and lining of natural ponds. The development projects should be started with the joint supervision and cooperation and mutual understanding of provincial agriculture forest, environment and livestock departments. The Sindh province of Pakistan has less than 1% available forest resources, but according to world standard requirements is 25% of total geographical area for a healthy environment/ climate. The climate change will play an important role in setting new trends in agrarian economies around the world, including Sindh and country's economy with particular reference of global warming. The major impacts on agriculture, particularly in Sindh/Pakistan will be more droughts, more soil erosion and agrarian economies will be affected the most. The policy planners of the country need to work closely with forest sector specialists in order to be better prepared for future environmental conditions and challenges in 21st century, an age of globalization and rapid industrialization and their impact on nature and biodiversity in the region. The sustainable environment betterment and development policies are needed to protect our available forest /natural resources at any cost and also needs to grow more for coming generations. The land analysis provides sufficient evidences that Sindh is naturally divided in the following zones and every one has separate potentials. The coastal and hilly areas are suitable for forest tourism and fishing, arid zone has great potential for livestock breeding with range land forest, and central cropping zone for cultivation, including agricultural forests with banks of Indus River and crops/ horticultural farms. The policy makers should follow the zone wise natural advantages during analysis and policy making according to the absolute advantages of the zone.

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