

Impact of Flood on Environment, Ecology and Population Change

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ABSTRACT The impact of natural calamities on population and environment has thrown out many implications for consideration with regard to protection of environment and human life. In the present study, an attempt has been made to explore the basic ecological problems posed by floods on human habitation in terms of its environmental effects on the density, distribution and movements of populations and its socio-economic consequences on population change.

INTRODUCTION

The natural calamities like flood and draught have been the worst foes of man since time immemorial. Flood and draught have annihilated human populations on the earth often, thereby controlling the population growth to a larger extent. However, in recent times the draughts have been predictably contained to a certain extent by countries through concerted actions. Floods still ravages the human habitations and vegetations, especially in developing countries. The demographic history of Bangladesh illustrates the havoc played by floods on the lives periodically. In India also the unprecedented rain and squall in the costal states of Gujarat, Andhra, Kerala, Orissa and Tamil Nadu had weathered havoc to human habitations on recent times. Floods have killed many people and driven away many to other places. It has also brought in degradation to environment, land and cultivation, as well as to household properties. The hurricane havoc in the 1980's in Andhra Pradesh and later one in Tamil Nadu have been the fore runners to one in Kerala during October-November 1992, which occurred twice threatening life and property and

environment. Not only the flood had taken away many human lives, but also weathered havoc to the economy in terms of agricultural, industrial and infrastructural destructions in different districts in the state.

OBJECTIVES

The objectives of the present study are, (i) to explore the basic ecological problems posed by floods on the human habitations in terms of its environmental effects on the density, distribution and movements of population. (ii) its socio-economic consequences on population change. These objectives are examined through a case study of flood in October-November, 1992. The data and materials are drawn from News Paper reports and other documents and also observational data collected from, on the spot study.

THE BASIC ENVIRONMENTAL FACTORS INFLUENCING POPULATION HABITATS

The basic determining factors of environmental impact on population are the distribution and growth pattern of population. The environmental impact on population is not an oneway traffic. On the otherhand, the pattern of population distribution like density affect the environment. If the environment is not made conducive to the problem of population growth and distribution, it would affect the human habitations. Similarly, if the population growth and distribution are not conducive to the environmental factors, it will have to pay for its destructions.

Mostly, in India, it can be seen that the unplanned growth of towns and cities create

environmental degradation, in terms of industrial pollutions and growth of slums. Floods can easily wipe them away and can only damage the environment.

The rural areas are also at the vagaries of nature, as about 80 per cent of the population are still living in the rural areas; and they wholly rely on agriculture which is at the mercy of monsoon. So it can be easily understood that a flash flood during monsoon rain can destroy agriculture if not properly maintained by land and water management systems. To a larger extent these techniques are beyond the reach of most of the Indian farmers.

Rural dwellings, mainly thatched houses cannot withstand a good monsoon rain. The recent havoc played by monsoon in Kerala illustrate this evidently. Not only the house but also the household effects and other properties, including the cattle and poultry have been destroyed. It pays on the rural economy of the poor farmers, who lose all earnings of a life time because of flood. So, the economic problems created by the flood on affected areas are manifold. In these contexts, people migrate to safer places temporarily, either to their relatives or to the neighbouring areas or relief camps. But there are groups of people in the rural areas, who are tenants who migrate to urban areas permanently, as they have lost all their belongings, back at home. To retain their lands and dwellings, as it was before the flood, is a stupendous task for them. Land less among them migrate to cities or to towns which add up to the slums.

Damages done to environment also heavily impinges upon the state's economy. Infrastructure like roads, bridges railways and hydro-electric projects suffer much in the floods. Similarly, environmental destructions

due to sea erosion, soil erosion and inundation of forests are followed by floods. In hilly regions and valleys or low-lying areas, these damages are bound to occur and Kerala's topography is one of such. The people residing in the hilly areas, mostly tribal population are always at the mercy of heavy rain and landslides. Reaching them with immediate rehabilitation measures are also remote. So, the regional distribution of population is important in determining the environmental hazards created by floods. In terms of the above factors the recent flood and environmental hazards on population in Kerala are analysed below.

FLOOD AND ECOLOGICAL DAMAGES : THE CASE OF FLOOD IN 1992

Mainly 5 southern districts of the state have been worst affected by the flood due to the south-West monsoon. These districts are : Thiruvananthapuram, Kollam, Alleppey, Pathanamthitta and Idukki districts. Except Pathanamthitta and Idukki all others are coastal districts of the south. Data for population, density, growth rate (1981-91) land area, average rain fall of these districts are given in table 1. The population growth is moderate with respect to the state average. The districts, Idukki and Pathanamthitta are below the state average. The average rainfall of these districts are above the state average.

The infrastructural build-up of these districts vary.

The number of roads are less in the Idukki and pathanamthitta districts. The average availability of vehicle per 1000 persons is 1.48 in Thiruvananthapuram and less than 1 per cent in other districts (Table 1).

Table 1 : District-wise data on area, population and infrastructure (for 4 districts only)

District	Area sq. km	Population (in lakhs)	Density population sq. km	Growth rate of population 1981-91	Average monthly rainfall (mm) 1991	No. of vehicles per 1000 population
Thiruvananthapuram	2192	29.39	1184	13.19	2137	1.48
Kollam	2491	23.98	873	10.25	3036	0.74
Pathanamthitta	2642	11.86	426	5.45	3374	—
Alapuzha	1414	19.91	1319	6.71	2680	0.73

Pathanamthitta and Idukki districts are surrounded by hilly regions and valleys. A large proportion of tribal population is residing in these districts in the reserved forests in the hills. The area under forest form about 27 per cent of the total area in the state. Similarly, the state has a coastline of 50 km, which form about 10 per cent of India's coastline. The flood has caused environmental and ecological problems in the four districts under study. An account of its causes and consequences are given below.

RAINFALL

The rainfall, basic to the flash flood, in the districts studied has been excess over the normal fall. The figures of rainfall recorded during the period is given in table 2.

Table 2 : Rainfall in different districts during Nov. 1992 Flood

District	Actual (mm)	Normal (mm)	Excess Percentage
Thiruvananthapuram	231.2	40.9	465
Kollam	331.6	55.1	502
Pathanamthitta	207.8	60.5	243
Allappuzha	208.6	54.7	281

The figures on rainfall show that the highest rate of excess rain i.e. 502% experienced in Kollam District. Whereas the district Allappuzha recorded an excess of 281% rainfall. There was considerable environmental damage in the Kollam district, as it has most of the lagoons and backwaters in the state. The rainfall in the other districts was also very high. This excess rainfall has caused flash flood in many areas, which has affected the habitations, there.

LOSS OF HOUSES

The effects of flood on housing depend on the nature of its construction as well as its environs, particularly when houses are built along the banks of rivers. For this reason, the

distructions to housing colonies of Thiruvananthapuram district have been considerable, particularly of those situated nearby the banks of rivers, Killiar and Karamana river. It is estimated that more than 3000 houses have been destroyed in the district due to flood. The district-wise data on the houses damaged and the families affected are given in table 3.

Table 3 : District-wise data on the No. houses damaged, No. of families affected and the No. of relief camps conducted

District	No. of Relief camps conducted	No. of families affected	No. of Houses Damaged
Thiruvananthapuram	101	3798	4915
kollam	278	11171	3829
Pathanamthitta	91	2564	1397
Allappuzha	20	560	4

Source : Memorandum on Flood, Govt. of Kerala 1992.

It is observed that the number of families affected and the number of houses destroyed are more in the Thiruvananthapuram and Kollam districts (Table 3). The number of relief camps conducted are also more in these districts. The district, Thiruvananthapuram had the highest damages to houses, mainly because these are situated along the banks of rivers.

Similarly, the damages done by flood water to the housing colonies nerarby the coastal areas are also high. Mostly, the fishing folks have been affected by this. This fishermen's house have been built mainly by cudgeon leaves, wooden planks and mud-walls. Mud-walled "kutchu" houses are easily destroyed by flash floods and mounting sea waves. Therefore the fishermen's houses are easy pery to the cyclonic storm and heavy rains.

The landslides have also affected the housing colonies of people living in valleys particularly in Pathanamthitta and Kollam districts. The flood has also affected the colonies of coir workers, scheduled castes and

tribes and other poorer sections of the society. That is, the destruction of the houses are mainly due to the environmental changes like sea erosion, landslides, and flash floods. The inadequate construction of bunds, and water-ways have added to the flood - situations instead of preventing them. It points out to the poor environmental planning to the human habitations.

DESTRUCTION OF RIVER BANKS AND CANALS

Kerala had a total number of 46 rivers. The population density is 747 persons per sq. km, as on 1991. The flooding rivers during rainy seasons are a continuing environmental problem for the state. The flow of excess water had damaged the river banks considerably in the 4 districts, studied. Neyyar, Karamanariver, Killiar, Vamanapuram river, Ithikkara river, Moovathupuzha river, and periyar rivers were overflowing during flood. Irrigation and navigation canals were also affected. The Kuttand paddy fields, known as the rice bowl of Kerala submerged in flood water mainly because of the damages to bunds, culverts and roads, causing immense destructions to cultivation and environment.

Similarly, severe damages to the existing sea-walls have occurred in the coastal districts of Thiruvananthapuram, Kollam, Alappuzha and Ernakulam districts. Sea erosion had not only affected the people residing nearby the seacosts, but also the ecology of their habitats.

FISHERIES

In the fisheries sector, apart from the environmental and ecological damages, there had been considerable economic loss also. The implements and fishing equipments of fishermen had been washed away, and also heavy losses to mechanized boats, canoes, country crafts, nets etc have been reported. In the inland fisheries also, substantial damages had been done by the flash floods, like destruction to fish farm etc. This has created hardships to fisherfolks and to their livelihood.

The diary farm sector also has been affected by flood causing considerable damages to livestock and the grazing fields. Keraia has the highest percentage of cross-bred cows in the country. Rain and flood have affected badly the diary farms in these districts.

CROP LOSS

The cyclonic storm and the whirlwind have destroyed the standing perennial crops widely in the districts. The Western Ghat was hit by a series of landslides and landslips causing ecological damages to cash crops like cardamom, pepper etc. The paddy fields in the districts have been under water for days causing environmental problems to the land and the plants. The area-wise crop-loss due to flood in 4 districts is given in table 4.

The major crops in the state such as paddy, banana, tapioca and coconut suffered huge loss in the flood (see Table 4). Almost

Table 4 : District-wise and crop-wise loss of standing crops (area in ha)

District	Paddy		Banana		Tapioca		Coconut	
	Total area	Area lost	Total area	Area lost	Total area	Area lost	Total area	Area lost
Thiruvananthapuram	10420	4000	5505	2900	15864	2200	86091	1100
Kollam	16415	5500	4494	2600	25094	6000	26752	1700
Pathanamthitta	5607	2500	3678	2200	9520	1500	28752	600
Alappuzha	21274	3000	2422	1800	6011	1100	61088	900

Source : Memorandum, on floods, Govt. of Kerala, Nov. 1992

half the area cultivated by these crops had been flooded with cyclonic storm and whirlwind. Considerable damage to the bunds across paddy fields have been reported, which had added environmental hazard to rural folks by flooding the residential areas.

DESTRUCTION TO FORESTS AND TRIBAL HABITATS

The flood had affected the forest areas, destroying the trees and agriculture of tribal folks. It has also damaged the infrastructural build up of forests, particularly the bridges, rivers, culverts etc. to a considerable extent. These have obstructed the communication and transportation services, especially in areas like Aryankav, Achankovil and Idukki forest belts. Nurseries and plantations raised under social forestry have been damaged.

The tribal habitations have been severally hit by the landslides. It has affected mostly the houses built by bamboos, leaves and twigs, which are easily destroyable in the storm and heavy rains. Landslides have also become dangerous to the existence of such houses. Cyclonic storm and rain also damaged these hutments. The flood and landslides also have affected their source of drinking water, which are mainly the 'springs' originating uphill. Landslides have destroyed these 'springs' in many forest dwelling areas of the tribals. This points out the fact that there need special forest conservation techniques for environmental protection. Broadly, the eco-development of forests require environmental protection of forests, particularly, during floods and heavy rains.

DESTRUCTION OF ROADS AND BUILDINGS

The environmental damages to the roads and public buildings are other features of the flood. It has been stated that 3306 km of roads 377 culverts and 22 bridges have been

damaged in the flood in the state, on the whole. There are 170 earth slips and 8590 metres of wall collapses in the state. The national highways in these districts have been severally damaged due to heavy rains and run-off water.

The flood has also destroyed many public buildings, especially the schools in temporary sheds and other poorly maintained public buildings.

Destruction of electric power stations and other installations also had been reported due to the storm and the flood.

In sum, the flood had weathered massive environmental and ecological damages to the habitats. The most important feature of these changes is its immediate effects on human populations.

POPULATION MOVEMENTS

The population movements depend upon the severity of floods and infrastructural build ups. People are rescued in boats and other conveyances to the places of relief camps or to their relatives. They normally go back once the flood is receded. The immediate impact may be psychological, which pursue them to take appropriate steps in such an eventuality. However, it remains with the environmental planners to review these situations and implement programmes of development, taking into consideration environmental protection to the utmost. This requires necessary political will and programme planning at all levels of development- agricultural, industrial and commercial sectors. Pollution control programme requires protection of human habitats and environs also.

The states which have high density of population requires special consideration for environmental planning. Similarly, the states having many rivers, lakes and sea coasts. The flood will be a continuing environmental problem for the state. Although people

respond to this natural phenomenon quickly in modern times with modern escape facilities, the rural areas of the countryside still lack such facilities communication net work, roads and conveyances. This creates population movements to urban areas 'en masse'. They, sometimes may not go back to rural areas, as they might have lost all their belongings, especially if they were tenant agricultural labourers. Similar is the case of tribal people residing on the hill tops and forests. Therefore, a permanent solution to these population movements during flood is to be contemplated in terms of regional planning and protection of environment, as a whole, especially for the disadvantaged rural and tribal populations, who suffer most during flood. The urban areas too require adequate planning for building housing colonies. The disadvantaged are the slum dwellers during flood. Only an intergrated development programme can help urbanization meaningful. Environmental protection therefore, is integral to all developmental programmes.

CONCLUSIONS AND IMPLICATIONS

The impact of flood on population and environment has thrown out many implications for consideration with regard to protection of environment and human life. The flood had caused loss of life to people, destruction of their houses, loss of livestock,

and environmental damages to roads and public buildings. It had weathered extensive damages to bridges, railways, agriculture, industrial installations and communications. It has also affected the ecology of the forest areas due to landslides and also destroyed the dwelling units of the tribal people. Inadequate infrastructure and lack of a permanent rehabilitation machinery in these eventualities were other reasons for loss of life and property to many. Construction of houses nearby river basins need careful planning, especially in the urban areas.

The ecological damages in the forest areas require new conservation techniques to be adopted during flood. It calls for comprehensive environmental planning of forest areas, taking into in consideration the ecology and infrastructure of such regions. There need long standing measures to be taken up by the state and central government for meeting the emergent situations like flood.

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