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# IMPACT OF NATURAL DISASTERS ON ENVIRONMENT AND DEVELOPMENT

by
CHANDI PRASAD BHATT

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# IMPACT OF NATURAL DISASTERS ON THE ENVIRONMENT AND DEVELOPMENT

(EXAMPLES FROM HIMALAYA AND EASTERN AND WESTERN GHATS)

by

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# IMPACT OF NATURAL DISASTERS ON THE ENVIRONMENT AND DEVELOPMENT

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## INTRODUCTION

World is undergoing through several environmental crises. The population is on ever increasing trend exerting tremendous pressure on our natural resources. We have come to a situation where the fate of human civilization is at the verge of extinction. Traditional water springs are drying up, atmosphere is getting polluted, agriculture productivity is declining due to the degradation in soil fertility. Today the incidence of soil erosion, landslides and shifting of river courses are getting more frequent then what it used to be earlier. Millions of people and many developmental activities are getting affected by the above calamities all over the world. In a nut shell, these hazards have put a serious question mark on the well being of our socio-economic, cultural and political fabric in which the worst sufferers are the people form lower strata of the society.

In a report published by the Swedish Red Cross Society: "Prevention is better then cure", It was revealed that, maximum number of human casualties during 1960-1981 are form the various developing countries viz. Bangladesh-6,33,000, China - 2,47,000 Nicaragua-1,06,000, Ethiopia-1,03,000, Peru-91,000 and India- 60,000. Among the various natural calamities. cyclone and flood had taken the maximum toll in south Asian countries. Because of cyclone alone, during the said period, 3,86,200 people died in Bangladesh and 24,930 people died in India. Similarly, flood claimed 39,000 life in Bangladesh, 14,700 in India, 2,100 in Pakistan and 1,500 in Nepal. Thus we find that the fishermen living along the coast, city slum dwellers, and the people living in the mountains or foot hills are the worst sufferer of these natural calamities.

## CENTRAL HIMALAYAS

In the recent times there seems to be a qualitative increase in the frequency of natural disasters specially in the mountainous tract and along the foot hills. Rivers emanating from the mountains such as the Himalaya, Eastern and Western Ghats are getting restless during every successive monsoon suggesting the magnitude increase in the frequencies of natural disaster. Specially in Himalaya which is considered to be the symbol of our religious belief, cultural and natural heritage

and the most sacred mountain is gradually decaying, nevertheless, it has influenced every sphere of our life but it is one of the youngest mountain in the world which is still in its formative stage. The evidences for its youthfulness comes form the incidence of frequent earthquakes and the presence of fault chains.

In the name of developing this region, network of roads have been dug in various parts which was followed by the exploitation of forest depriving the delicate slopes form vital green cover. This has paved way for soil erosion and creation of innumerable landslide zones. Rivers originating form Kashmir to Arunachal Pradesh are on rampage carrying enormous quantity fertile soil cover. This has not only threatened the very existence of the people living in the Himalaya but also posed a serious threat of submergence to the people living in the lower plains in northern India. There could be a component of natural process giving rise to the present crises but certainly to accelerate the threat of this catastrophe, our system has contributed significantly.

Central and Eastern Himalaya are the focal point of these disturbances. Central Himalaya which is the source of the Ganga is one of the most environmentally sensitive region in the Himalaya. Alaknanda, a major tributary of the Ganga, originate form Satopant and Bhagirathi Kharak glacier meets Bhagirathi river at Devprayag and called the holy Ganga thereafter. This river was known for its uncontrollable energy which has been further aggravated due to the tempering by external agencies.

## RECURRING FLOODS IN THE ALAKNANDA

River Alaknanda and its tributaries are known to experience floods and landslides in a 10 to 20 year cycle. According to the available data, river Nandakini was blocked for three days during 1857, the temporary dam subsequently breached causing large scale flooding and damage in the Alaknanda valley. Similarly on Birahi river a dam was formed near village Jhinji in 1868. This artificial lake was called Gudiyar tal the breaching of this lake killed 73 people and damaged Lalsanga bridge near Chamoli.

Etkinson(1886) writes in the Himalayan gazzateer " A landslide rolled down into Godiyal tala tributary of Birahi Ganga and threw away half of its water causing flood in the Alaknanda valley The flood killed 73 people and swept away two wooden bridges. In 1893 , a giant rock cliff broke away near Gauna village blocking the river Birahi." Later two geologist Heim and Gansser (1939) made the following observation in their book-central Himalaya " Birahi river was damed for one year due to landslide in 1893 and the temporary dam on Birahi broke on 26 th August

1894 causing havoc in the lower Alaknanda valley. The landslide debris comprised limestone and Dolomite covered 1-5 sq km, having a thickness of 300m with volume measuring 150,000.000 cubic meter. The lake was 4 km. long and 700 m wide. The average depth was around 120-150m with a water spread on the surface measuring 165m. The landslide originated form 1000 to 1200m. One more old landslide has been found on the western side of the mountain, this seems to have originated form much higher elevation. it has covered not only the Birahi valley but also the valley facing the Gauna village. The dimension of this landslide was 3 km. in length and 500m in breadth."

Gauna tal breached on 26th August 1894 causing unprecedented damage to the villages and Srinagar town in the Alaknanda valley. However, no damage of life was reported as the advance warning system worked efficiently. Around Badrinath, the Alaknanda was blocked in 1930 raising the water level upto 9m and caused flood damaging many houses. An avalanche came down along the Dronagiri rivulet a tributary of Dhauliganga in 1957 blocking the river near Bhapkund and forming a 3 km. long lake which was later filled with debris. Similarly between 1967-68 near village Reni a landslide formed a temporary lake which breached in 1970's Alaknanda flood. This devastating flood of 1970 is known to everybody.

There was a devastating flood in the Alaknanda on 20th july 1970. Its impact extended from Hanuman Chatti near Badrinath and Reni ( at the confluence of Dhauli Ganga and Rishiganga) to 320 km down stream at Haridwar and Pathri. During the flood, in the upper catchment of Alaknanda. 55 people along with 142 cattle perished, 6 motor bridges and 16 pedestrian bridges were destroyed. Permanent damage caused to 3 motor bridges and 10 km stretch of motor road damaged beyond repair, In the fury of flood. 25 stranded buses. 604 houses of 101 villages, 513.30 acres of standing crop. 47 water mills. 27 cow sheds and 4 lift irrigation machines were washed away. 100km away, at Srinagar( Garhwal), ground floor of I.T.I. building got choked with 6 feet thick silt. The Bari tal in Rishiganga, China tal in Patal Ganga and the Gauna tal which in existence since 1894 having 1.5 km length, 700m width and 100m depth was also filled with the rocks, uprooted tree stumps and debris.

The spilled over water form these lakes generated flood in Birahi river Gauna lake accommodated more then 4 crore cubic feet slit at the cost of her existence, thus minimising the devastation of the Alaknanda. Even today, the inscription of the destruction is engraved in the lake which was formed 99 years ago in the Birahi river. On that fateful day, China and Gauna lakes assimilated the major devastation

in their depth. Because of them the far flung Ganga plains were saved. Had the debris not been consumed in the depths of these lakes, the magnitude of the disaster would have been many fold. During the flood, Alaknanda forced even the Ganga to carry its silt and rock debris resulting in the choking of the Ganga canal. the density of silt during the flood becomes 3.6 against the normal 0.3 in the Ganga canal for Kharif crop was badly affected due to the choking of the Ganga canal near Mayapur head regulator.

Having experienced the 1970 Alaknanda flood, we have realised that the natural calamities if not stopped completely can atleast be minimized. So far the question of torrential rain is concerned, the area falling between Urgam valley of Bemru village on the right flank of the Alaknanda also received the same quantum of precipitation. But except for raising the water levels of the rivers no silt of rock debris were transported by the water and no significant landslides have been reported. The reason being no man made activities were initiated in this region such as road construction, forest felling etc.

After the Alaknanda flood Dasholi Gram Swrajya Mandal (DGSM) realised more effectively the interrelationship between forest and the people. Public education programs were organised to educate villagers about the significance of forest for their well being. This awakening ultimately gave rise to the historical Chipko movement. The movement was initiated form Mandal forest near Gopeshwar when forest department refused to give Ash tree which being used for making various agricultural implements and instead allowed out side company to cut the same for earning foreign exchange. This step motherly treatment hurt the sentiment of the local people who collectively resisted the forest department policy which was against the people and the forest. The step motherly treatment hurt the sentiment of the local people who collectively resisted the forest department policy which was against the people and the forest. The direct action was launched on 24th April 1973 by clinging to the trees which were to be felled. this was most dignified, non-violent way of protecting the forest. Forest department has to go empty hand but a forest compartment 60 km away form Gopeshwar was allotted for felling where again they'd to face defeat against the determined protest form the volunteers of DGSM and the local people. Similarly when we came to know that 681 ha of forest situated in Paingmuranda was auctioned for Rs. 471.00, DGSM organized people awareness program in this region. We knew that this area was badly damaged during the Alaknanda flood and comes under Nanda Devi national park (now biospherc reserve). Also Rishiganga, a tributary of the Dhauli Ganga flows through this forest. In absence of the DGSM volunteers and the men folk of the village, forest department

and the agents of the forest contractors fried to sneak into the forest to cut the trees. But the attempt was foiled by the awakened women folk on March 1970 who courageously resisted the felling. This was the famous rent Chipko movement which not only saved the forest in the catchment of Rishiganga but put a blanket on all proposed felling in the region. Government of Uttar Pradesh also formed a committee to review the forest felling and finally legitimately recommended cancellation of the working plan in the Alaknanda valley.

Floods and landslides are the recurring phenomena in the Alaknanda valley after the 1970's flood. Many villages and towns are facing this threat during every monsoon. Agricultural fields, houses, cow sheds etc. of the villages Pakhi. Tangni, Ganal and Darml are reeling under the threat of destruction. A question mark is put in the future of the developing towns like Joshimath and Gopeshwar. After 1962, heavy construcational activities are going on in these towns. Large number of trees were cut during the constructional activities in Joshimath to provide better facilities to the tourists who come to the area for skiing and other winter sports. In the past it has been found that Joshimath town was sinking at may places due to unregulated construction with out having provision for water outlet. A high level committee was constituted to look after this problem and suggested the remedial measures by Uttar Pradesh government ( Joshimath committee report 1976). The remedial measures suggested by the committee ware implemented but then it was too late. The threat of sinking and subsidence still persist.

At Gopeshwar the district head quarter of Chamoli district and Tehshil head quarters at Karanprayag and Tharali are heading towards man made disaster. more then half a dozen villages around Gopeshwar are facing the problem of degradation. One can see the horrifying situation prevailing in the eastern side and above the Gopeshwar town. During the construction of roads and government girls inter college, a forest which was growing on the old land- slide debris was cut . During recent monsoon, flood and landslides damaged property worth lakhs of rupees. For draining out the waste and monsoon water, scuppers were made haphazardly.

Their openings are directed towards the villages like Papriyana . Pandul and Kothiyal. During rainy season these scuppers floods the above villages posing serious problem to the villagers. This facility made for the urban dwellers become curse to the rural people. On 15th August 1991, these villages along with Gangol and Dewal have been damaged by landslides and torrential rain. Many such Himalayan villages are facing a situation where a man is sitting on a tumbling stone, underneath is a snake and below is a deep gorge . If he losses the balance, either the snake will bite him

or he may fall into the deep gorge.

Traditionally, in the hills, during the construction of even a house, care was taken to select the direction, availability of forest, water and other house hold necessities. Even the soil was tested for load bearing assessment and the height of the house was maintained according to the ecological constrains of the area, There was a proverb in Garhwal, that "living along the river means inviting death." These traditional practices have been forgotten which were evolved through time and the surrounding.

In Uttarakhand we find this tradition in the architectural design of the ancient temples which have never violated the ecological constraints of the region. The height and design of the temples in being decided on the basis of various geological and environmental factors. We have an example form Badrinath temple which was constructed centuries ago. The location of the temple is such that the Narayan parvat protect it like eyebrow form winter avalanches and snow storms. The height is also kept low keeping in mind the load bearing capacity of the terrain and the threat posed by river erosion at the toe. During early seventies Jayashree trust of Birla's wanted to increase the height of the temple form 17.6 feet to 78 feet. This move was the complete violations of the law of the nature for which we had to launch a movement similar to the Chipko movement ( Bhatt 1974, Tiwari 1974-75.)The front portion of the temple which was already broken for renovation is being repaired under the expert guidance.

Himalaya has enormous potential for hydro-energy and the efforts are being made in the past decade to harness this energy. But the approach and methodology used seems to create more hazards then bringing the prosperity. Flaws are many which I am not going to discuss here. But to give an example which will demonstrate that how flippant we are in our approach when we venture out for such projects. A run of the river scheme was proposed near Lambagar 15 km. down stream form Badrinath. A 9 km long tunnel would be made to divert the Alaknanda water form Lambagar to Vishnuprayag. We knew form our experience of the area that the barrage site is prone to landslide and snow avalanche during winter. This is beyond the vision of our planner as they normally visit the area during summer when the region is snow free. During our independent study conducted in the winters have clearly shown that the location proposed for barrage axis is fully covered with avalanche and some time the Alaknanda gets temporarily blocked at the barrage site ( Bhatt et al. 1985).

The earthquake of 20th October 1990 in Garhwal is a recent phenomena and

known to every body. It came around 2.53 AM and considered as one of the devastating earthquake in the history of Garhwal. The magnitude recorded by the seismologists was 6.6 in Richter scale. According to the earthquake monitoring station., more then 40 tremors hit the area and lasted for 40 seconds. It has brought about many morphological changes such as breaking down of rocky cliffs, development of racks., activation of old landslides and creation of fresh landslide zones ( Pandey, 1992). It has claimed 800 people, 4000 cattle and wounded 5000 people in the districts of Uttarkashi, Tehri and Chamoli. In 2000 villages, 25,000 houses were completely damaged and nearly 75,000 houses developed cracks. 630 school and college buildings were destroyed and 370 crore worth of government property perished (Pathak et al 1993). Maximum casualties were reported form Jamak village where 72 people died followed by Didsari-45, Gawana-44 Hina-39 and Raithal-30 . During my visit to the earthquake affected areas. I have found that a funnel was dug below the Jamak village during the construction of Maneri hydro electricity project. According to the villagers. huge quantity of explosive was used during the construction of the tunnel. The villagers used to feel the tremor of this man made earthquake to the extent that their utensils tumbled in the kitchen. The project supplied cheap cement and steel to the local people which they used for making their houses pukka with RCC lintel tops. Because in hills, cemented houses are considered as status symbol. Therefore, during the earthquake, the rigid structure could not with stand and crumbled. However. the traditional houses ( Kuthar) based on local Jor-Tor technology were more of less remained unaffected in which wooden beams were used. Besides Jamak, the other villages mentioned above are all situated in the vicinity of the Maneri project. Thus we find that in Uttarkashi, our so called developmental program has definitely played a decisive role in aggravating the furry of the natural calamity earth quake.

On the same day two people died in Chamoli district and a dozen houses were damaged in Kedarnath puri. But the highest temple of Kedarnath and Treijuginarayan situated at 12,000 and 7500 feet respectively remained unaffected. These are age old temples constructed keeping in mind the local constraints.

## NORTH EASTERN HIMALAYA

During the year 1992 , a Chipko- Arunachhal ( Brahmputra)expedition was undertaken with a view to asses the extent of environmental damage caused in different river valleys. Since we knew that the present day landscape is the out come of 1950's earthquake therefore, to get the insight of the damage caused by this earthquake, we interviewed various old and experienced people during the journey through the area. Assam earthquake came on 15th August 1950 during the

night which damaged 25 to 50% agricultural fields. However., there was not much of human loss. but many areas got activated causing landslide debris to roll down into the river valleys., damming the rivers temporarily. For example., river Suwansiri was damed and the breaching of the temporary dam eaused flash flood along with changing the river course. Similarly the river was blocked again at Siyang- Diwang on 17th August flooding the lower valley. We have been told that more than half of the basi ghat hamlet. Sadiya town and Parsuaram kund was destroyed. The river bed of Brahmputra raised to 3m near Dibrugadh. Many rivers such as Ranga, Suwansiri, Sijog, Gay, Siyang, Diwang, Digru, Kundi, Lohit and Dihang and their tributaries have been severely affected by the earthquake of 1896 and 1950. These earthquakes not only increased the quantum of silt in the river bed but at the same time blocked the river courses giving rise to temporarty reservoirs. Breaching of these reservoirs along with causing the flash floods also reduced the depths of river beds. The silt carried by these rivers spread in the lower plains. The confined channels of the rivers in the mountains become wide and breaded in the lower plains posing serious threat to life and property of the people. A forest near Roig and Teju have become completely destroyed due to the deposition of silt. Today one can see the stems of the trees protruding out of the silt. Thus the natural disaster have been regulated through the unfortunate geographical changes.

A decade ago, there was negligible pressure by the local people in Arunachal Pradesh forest. Presently, the industrial demand form the plywood and their industries situated in Assam are exploiting the Arunachal Pradesh forest. As the forest of Assam is there for the name sake only. villagers have commercial buyers. Currently, the accelerated pace of forest denudation going on in Arunachal Pradesh, we do not know that way this destruction is going to contribute in future the destiny of natural disasters.

## EASTERN AND WESTERN GHATS

The eastern ghats and western ghats are following the foot steps of Himalaya . The lush green areas of Godavari valley are no more untouched. To earn more revenue and to feed the need of big industries, forests have been cut on a large scale. In east Godavari alone, till 1986, forest form more then 11,000 ha area was felled. Network of roads were constructed by big industrialist to facilitate the transport of logs. Presently this work has been extended in the catchment of the tributaries of Godavari namely. Sabri, sileru, Pamleru, indravati etc. Today the damage caused due to the deforestation has not only affected the people in the vicinity, but has extended into the lower plain.

Floods are known to occur in Godavari basin. Significant floods have been reported

in August 1886, October 1900, August- September 1907 and August 1953. During 1953, flood the water level rose to 19.9 feet, upto rajmundari, people narrate the story of destruction caused by the flood, in 1986 Godavari water level reached 22 feet causing unprecedented damage in Adilabad- Karimnagar, Khambli Warrangal, East and West Godavari. The magnitude of damage extended upto Rajamundari form where Godavari delta starts. Many big and small developmental schemes were affected. In east Godavari, 1669,000 people were affected form 724 villages spread over 2,417 sq. km.81 people and 1,000 cattle perished nearly 1,43,000 ha standing crop was destroyed and governmental and non governmental property worth 42.451, 664 rupees was damaged (Bhatt 1987, Data on Damage caused in East Godavari 1986)

I have traveled along the Godavari and its tributaries viz. Pamelem, sileru and Sabri during 1987 and found that the area is badly affected by landslides. There also I realised that how closely forest and land, forest and people and forest and water as related to each other. If we disturb any one, the impulse is being felt in the all others. A NGO called Sakti is working under the leadership of Dr. Sivarama Krishnan to protect the mango and Tamarind trees. They have successfully protected the cutting of the trees in which the district magistrate also assisted the organisation.

In Andhra Pradesh cyclones are known to occur very frequently. The most severe cyclone of 1977 claimed many life and property worth crores of rupees. However, today due to the availability of cyclone forecasting system, the loss of life has been reduced but the flood associated with cyclone is still creating havoc in the barren eastern Ghats. The cyclone of 9-12 May 1990 has taken a heavy tool of life and property. The wind velocity recorded around 240 km/ hr and reached the interiors of Khambli. During the cyclone the Agency areas (hill) of the district witnessed landslides and flooding causing damage to life and property specially in such agency areas which were barren.

Agency area of Vishakhapattanam, is Vaderu which covers 11 Mandals. these Mandals were affected by the cyclone. During the cyclone. vaderu recorded 855 mm rainfall between 9-12 May 1990. This torrential rainfall gave rise to many landslides and flash flood killing 60 people, damaging completely 2500 houses belonging to 11,710 families in 2303 villages. 9210 houses were partially damaged and 1065 has crop and orchards costing 2.85 crore rupees and 5865 cattle and 2187 sheep and goats were also perished . The coffee and sericulture plantation was badly damaged. 13 motor roads, 31 bridges. 142 minor irrigation schemes and 16 lift irrigation projects were also affected by the cyclone (Statement Vaderu division

1990). Barren areas experienced landslides, rivers flooded the lower valleys, river Braha changed its course half a km near Narsipattanam, the Ravanapatti village completely destroyed. When the flood water started crossing the danger mark in Tandwa reservoir, all the reservoir gates were opened releasing 143,000 c.s. water per second against the normal discharging capacity of 4,300 c.s. per second and during the emergency it could be raised to 75,000 c.s per second. Thus one can imagine the magnitude of water gushing out form this reservoir flooding the lower Tuni town. Similar was the case of Pumpa reservoir, however the major mishap was avoided by the people living in the Anawarum who decided to break the bund of the reservoir form one side and saved their life and property. Many such reservoirs choked with the quantum of silt brought by the flood during the cyclone.

All the three sides of the Eastern Ghat bore a barren look. Intensity of the soil erosion and landslides have been increasing day by day. the catchments of the major reservoirs and devoid of any vegetation. 100 acres of agricultural land was claimed by landslide debris in Gumpolli village situated in the Agency head quarter near Vaderu.

One of the major reason for the devastation was the lack of forest cover which has been destroyed by various ways. One of the reason cited was the construction of dams at upper Sileru, lower Sileru and Markand. the people affected by the projects have not been properly rehabilitated and are presently doing agriculture in the hills which has exploited the extensive forest cover. This is the case of only one Agency, but in other areas no such activity has rendered the slope barren. thus, the significant contribution made by our system in accelerating the process of deforestation followed by destruction can not be ruled out ( Bhatt 1990 , Godavari experience).

## DISCUSSION

Every year we see the magnitude and intensities of natural disasters are increasing and adversely effacing the life and property of the people along with obstructing a various developmental projects. Though the cyclones and earthquakes are natural calamities, but the associated floods, landslides, soil erosion avalanches etc, have a definite component of man induced effect. There fore, using the modern scientific know how even if they can not be stopped completely, theirs fury can atleast be reduced to a tolerable limit. When every there is any calamity we run with the rescue and relief, under such circum stances the act is logical, but in principal we should be prepared to take the precautionary measures well in advance to avoid such ugly situations. This can be achieved only when our development should not conflict with the natural calamities.

For Himalayan ranges, it has been said that they are still rising pushing the Tibetan plateau behind and are so delicate that a mere touch makes them cry like a baby. We need a scientific approach to maintain the fragility of the Himalaya and its natural heritage. In the name of developing this region, the forest have been mercilessly destroyed. Whether it is the catchment of the Alaknanda, Joshimath and Gopeshwar, the situation is I like. Agitation like Chipko movement were launched against mining and various constructional activities. the parent institute of the Chipko movement- Dasholi garm swarajya Mandal have started the every lasting program of afforestation and environmental education. These camps are mainly attend by the local people- specially the village women. Such programs should be propagated in various hilly area of the country and the awakening of the people should be harnessed for constructive purposes. Sensitive area should be demarcated and except for the traditional right, all commercial exploitation should be banned.

We can compensate the damage caused to the property in the districts of Uttarkashi, Tehri and Chamoli due to the earthquake but the devastation caused to the terrain can not be compensated by any relief measures. Till date there is no authentic information available regarding the damage caused to the forest , land, soil etc. This is a very sorry state of affair and needs immediate attention of the concerning agencies.

Assam earthquake of 1950 was a completely natural phenomena, after the earthquake nobody bothered the damage caused to the terrain during the earthquake., Ignoring the gravity of the terrain situation, the vital forest cover was mercillessy damaged both in Assam and Arunachal Pradesh. This pushed the states into the verge of destruction in the successive floods. Under the present circumstances, it looks impossible if not difficult to revert back the area into pre 1950's situation, There is no immediate solution available in the near future except for self satisfying imaginative one, assuming that the area will some some how come under the rain shadow reducing the precipitation which is just impossible. Or the region form where rivers enter into the plains are covered with lush green vegetation. Practically speaking, the solution lies in reforesting the barren areas both in the catchments and the river valleys through peoples participation. This environmental upgradation program should be launched as people's movement and seems to be the only answer to the present crises.

In the eastern and western Ghats, local tribal people's traditional rights on forest should be protected and respected The program of agroforestry should be launched

with a view to cater the local needs and re-greening the barren denuded areas. Nevertheless, this work is already going on in some places but needs a boost and momentum. The people displaced by various river valley projects should be encouraged to participate in the afforestation and environmental conservation drive. This will help them to desist form presently engaged agricultural practices in the forest areas.

## CONCLUSION

Humanity is too small in front of the nature . And we all know our limitation that natural disasters can not be prevented completely . But with the help on modern scientific forecasting system and technological know how the process can be brought to a manageable limit. The projects aiming at giving the quick returns should be discouraged specially in areas which are prone to natural calamities. In such identified areas emphasis should be given to the programs which are long lasting and can sustain on permanent basis. While formulating any policy related to the forest and environment, care should be taken to install the people in the center who are experiencing the impulse of the natural surrounding in their everyday life. A critical review of the existing natural resources should be made before initiating any development program in any region of the country.

Provision should be made to collect information regarding the nature and frequencies of the natural calamities in the sensitive areas in the country through international satellite network. This will help in making the forecasting system more effective and meaningful in reducing the damage. The disaster forecasting information should be based on to various user agencies with out much red tapism, the regions prone to natural disaster should be mapped and marked clearly with a view to monitory them vary closely. Detail scientific investigation should be carried out in areas which have been affected by the earthquake, cyclone and flood before venturing into any developmental activities.

(Translated from original Hindi article)

## REFERENCED


1. Prevention is better then cure: the Swedish Red Cross-second edition. ( 1984) Stockholm. Geneva.
2. Bhatt. C.P., (1992) Aduregyan awam kalpanik biswas per Himalaya. secher khani ghatak.
3. Etkinson. E.T. ( 1886), The Himalaya Gazetteer, Vol 3, Part_1
4. Heim.A. and Gansser. A ( 1939). Central Himalaya Geological observation of Swiss expedition 1936.Zurich.
5. Bhatt. C.P. Juyal. N. and Kunwar. M. (1985) Vishnuprayag Project: a risky venture in higher Himalaya. In environmental degeneration in Himalaya. concept and strategies.
6. Misra. M.C. (1976) , Commissioner Garhwal Mandal, High level committee report on Joshimath sinking.
7. Bhatt.C.P. ( June 1974) , Badrinath, Dinman.
8. Report of the renovation committee on Badrinath:
9. Pathak.S., Pant. B.R and Pandey.G. (1992) , The Garhwal earthquake: Aftermath in the hills. In the future of large projects in the Himalaya Pahar Nainital.
10. Pandey. H.N. ( Oct. 20 1991). Geological report on the Uttarkashi earthquake.
11. Bhatt. C.P. ( 4th August 1987), Godavari Ki god mei ab tootkar girega Pahar. Jansatta.