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Damaging River Ecology Of Beas River Of Himachal Pradesh

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Abstract-

Beas and its tributary are one of the most heavily dammed and intervened rivers of Western Himalayas. Towns like Manali, Kullu and Mandi are encroaching into its river beds and on the other hand its riverbed is facing the threat of mining activities in Kullu, Mandi, Kangra. Floodplains and larger river beds of the river have been encroached . Ecology of the river is under threat and flow of the fishes to upstream and down-stream in the river has been stopped due to the construction of multiple dams. Water flowing out of the dam reservoir has increased the level of erosion of soil in the downstream regions. Many large sewerage treatment plants (STP) have been constructed and are functioning on the banks of the river. There has been constant leakage of sewage water directly into the rivers especially during the rainy season. Creation of dumping and garbage treatment plants near the river has also impacted the quality of the river water of Beas river. Time has come to redefine our fundamental understanding regarding the rivers. Rather than treating them as a non-living resource ,we have to recognize their status as a living entity.

Damaging River Ecology of Beas River of Himachal Pradesh-

Rivers are gifts of nature that contribute to the sustainability of life on earth and humanity has realised it since the advent of human civilization. Health of the river and its ecology is directly connected with the preservation of biodiversity and welfare of humanity. Presently anthropogenic activities have wreaked havoc with morphology of the rivers and quality of its water. One example can be the Yamuna river in Delhi is the most glaring example, where Yamuna has been polluted within a few kilometres within the city of Delhi. Rivers are also facing the threat of encroachment into their riverbeds , extraction of gravels and sand. This has a direct impact on the nature of the rivers and it also increases the destructive capacity of rivers too. Construction of dams with the purpose of irrigation ,drinking water supply and electricity generation has also impacted the flow of water and silt which the river carries with it.

River is a natural entity that needs space to flow to wax and to wane. The integrity of all water bodies must be considered sacrosanct. But now this space is encroached upon ,not only by illegal construction but also by legally permitted construction of Residential buildings and roads. The floodplain zoning policy for the Himalayan river must be developed after studying the pattern in the changing course of the river. Flood plains of the river can be divided into the Inner floodplains and the Outer floodplains. Inner flood plains are the land within the river channel, which is exposed when the river wanes during the summer. The Outer flood plains are the land that is susceptible to flooding when the river overflows its bank.

Beas River Spanning 470 km through Himalayan Region of Northern India, Originating from Rohtang Pass in HP and merging with Sutlej River at Harike Wetlands in Punjab. The Beas river has undergone substantial modifications that have impacted ecology and fish diversity. A Report from the central Inland Fisheries Research institute, Barrackpore has identified a total of 54 fish species in River Beas. According to Survey Indian Major carp comprised 28.28 % of fishery in the Beas, with minor ranking second at 22.44 % followed by common carp at 22.02% and other species at 17.15 catfish on the other hand were the least prevalent , accounting for 8.54% of fishery. [1]

Himalayan rivers have more than 600 dams, adding to the upstream flow velocity and causing significant sediment accumulation around the impoundments. It is imperative to plan any development intervention whether it be a hydropower project or a highway - with the precautionary principle and the safety of towns ,people and the environment as the supreme consideration.

When such risks are omnipresent ,hydropower generation in the Himalayan ecosystem cannot be classified as environment friendly ,people friendly or clean technology by any measure , on the contrary ,such projects have added to the magnitude of likely future disasters arising out of earthquakes or glacial lake outbursts floods. [2] Similarly River Beas and its tributaries are heavily dammed and it faces problems like obstruction of pure water and sand. These dams have stopped the flow of fishes upward and down-stream. Water flowing out of these dams were deficient in the silt content and this increased the soil erosion captivity of the downstream of the dam. This in the long run led to the creation of a deep rift in the lower stream of the damned Beas river. As can be seen what happens to the Beas rivers once it flows out of Pandoh dam it turns itself into deeper and deeper gorge. The water of the dam is lower in the oxygen content and this water when allowed to flow downstream it kills many freshwater fishes. Blockage of the silt in the dams also hampers the natural nourishment of floodplains in the downstream region. The Pong dam also gives a much bigger example of damage to the natural ecology caused by the construction of the dam. Freshwater fishes of the river Beas have been replaced by fishes on stopped water of dams which are often introduced by humans for economic gains.

Impact of Riverbed Mining-

Riverbed mining is now posing existential threat to the river Beas because it is destroying its natural morphology and aquatic ecosystem. Beas river has been dammed and channelised at many places and similarly is the fate of its tributaries like Parvati , Serwari and others. Dams on Beas and its tributary have changed the nature of fishes in these rivers and these dams also blocked the upward and downward migration of the fishes. Oxygen deficient nature of dam waters ,emission of methane and lower temperature of the dam water has a direct impact upon the native species of the river ecosystem and replaced them by the other species which are more suitable to the new ecosystem. Pong dam saw the introduction of exotic species into the dam on Beas.

Riverbed mining has immoral impacts on various components of the terrestrial and aquatic ecosystem, river morphology , water quality , aquatic biodiversity , riparian biodiversity , solid and landscape biodiversity and socio- ecological factors. Mining of the river has been categorised into three components by the scholars: upstream mining, downstream mining and lateral channel instability. Once the upstream-mining happens then the slope of the river bed starts to increase the erosion of the river stream to many kilometres. Downstream incision is very often the result of large and consistent mining of the stream and river will result in the down-stream incision. This very often leads to scarcity of sediments downstream which further

[1] Sonakshi Modeel , Ram Krishna Negi , Monika Sharma , A Comprehensive DNA Barcoding og Indian Freshwater fishes of Indus River System ; Beas. Published 02 feb 2024, article no- 2763 (2024)

[2] Hydroelectric Dams in the Himalayas - A Risk Not Worth Taking - Gopakumar Menon , April 13 the 2022.

exacerbates the upstream erosion. Lateral channel instability can be understood as the constant changes in the bank erosion and changes in the channel width of the river. [3] Riverbed mining when occurs upstream increases the cumulated load of the sentiment carried by the river which directly impacts the morphology of the river. This leads to deposition of sediment downstream . Mining leads to increased erosion of the river and this increases the speed of water runoff. This increases the possibility of regular and more devastating floods in the river. Alternation in the sediment transport and flow has a direct impact upon the aquatic habitats and ecosystem existing downstream. Benthos are organisms existing at the bottom of rivers and Haeckel has coined this term in the context of freshwater. Benthic macroinvertebrates play very important ecological functions and they maintain the flow of material and energy in river ecosystems through their food web linkages. Benthic macroinvertebrates provide flood for the fishes and healthy flow of these nutrients to a river can result in increasing the overall biomass and diversity of the river. This gives a boost in the number of native species and fishes.[4] Now the benthic diatoms of the rivers are being studied as the best indicator to judge the ecosystem.

Mining and erosion increase the turbidity and transport of pollutants in the river . Riverbed mining depletes groundwater and it also negatively disturbs the habitat of zooplanktons, phytoplankton , macrobenthos and fishes. This also impacts the spawning habits of fishes like trout as the level of activity increases in the riverbeds.[5]Mining and erosion also brings about the morphological characteristics of the river downstream. Recognizing the interconnectivity of the upstream and downstream ecosystem of the river will help provide a more correct understanding of the river ecosystem. .

Example of Mand area in Kangra suffers from mining-

Environmentalists are demanding that the Mand area in Fatehpur and Indora subdivisions of Kangra district be declared no -mining zones. They have alleged with the connivance of the government authorities illegal mining is going on. They are demanding that if mining is not stopped then the locals should be shifted to safer areas from their present low-lying area. In the memorandum the samiti has claimed that the mand area had fertile agrarian land but it has turned barren due to illegal mining and flash floods in the Beas. It stated that the then state government had given its permission to set up a stone crushers unit here in 2009 but now 16 stone crushers have been set up. The rampant illegal mining activities that carried out even during the ongoing two and half -month blanket ban are playing havoc with the ecology and agrarian land in the area. The administration and authorities have turned a blind eye to the violation. The Mand Area Environment Protection Samiti has strongly opposed the new mining policy of the state government which allowed the JCB machines to extract minerals from the riverbed up to depth of 2m. It feared that the new mining policy would encourage the mining mafia to indulge in illegal mining activities that will ruin the Mand area. [6]

[3] Kamboj Vishal et al., Ijsrr 2017,7(1), 504-520 ijsrr, 7(1) Jan- March .2017

[4] Minshall, Wayne; Shafii, Bahman; Price, William J.; Holderman, Charlie; Anders, Paul J.; Lester, Gary; Barrett, Pat (2014). "Effects of nutrient replacement on benthic macroinvertebrates in an ultraoligotrophic reach of the Kootenai River, 2003–2010". *Freshwater Science*. **33** (4): 1009–1023. doi:10.1086/677900. JSTOR 10.1086/677900. S2CID 84495019.

[5] GM Kondolf , Hungry Water: Effects of Dams and Gravel Mining on River Channels, Environmental Management 21,533-551, Springer ,1997

[6] Rajiv Mahajan , Green Body flags illegal mining in “mand “ area Himachal Tribune 6 september 2024

Problem of Flash -Floods-

Due to the increased intensity of flash -floods in the Beas river basin has brought the focus of many researchers to this rising problem. Study conducted by Sachchidanad Singh, Panaj R. Dhote, Praveen K.Thakur , Arpit Choukesy and S.P. Aggarwal tried to look into this problem by using a multi-criteria indexing technique. The flood hazard index (FHI) was computed by implementing an analytical hierarchy process (AHP) model on 6 hydrologic parameters influencing flood hazard, namely rainfall intensity, curve number (CN) grid, time of travel, slope, Manning's roughness coefficient and drainage density. The AHP model calculates the normalised weights for each parameter using pairwise comparison matrices. The rainfall intensity and curve number were the factors having the highest normalised weight of 34.52 each. Subsequently, the estimated weights of the parameters and hazard level-wise rating scores were used in a GIS environment to generate FHI. The generated flash-floods map was validated by historical flash-floods ground points, field observations and remote sensing data. The results depicted that the river reaches in the north and east of the Beas basin are susceptible to flash-floods which are mainly governed by heavy rainfall intensity and high runoff characteristics. The river stretches namely Bahang–Manali (Beas), Kullu–Bhuntar (Beas) and Manikaran–Kheer-Ganga (Parvati) have been categorised into very high and high flash-floods zones.[7] While such studies provide new and better understanding of the problem of flash floods, they fail in calculating the role of anthropogenic activities in the exacerbation of the problem of flash floods. Beas river and its natural river bed has been facing constant threat of encroachment by human activities on the name of road construction, muck dumping and in case of Kullu town's encroachment into its banks on the name of parking and embankments which further adds to the fury of the river when monsoon comes. This can be seen from Bahang till Aut that either the river is being exploited for sand and gravel or its banks have been captured for the construction of roads or houses.

Construction of Sewage Treatment Plants on the banks of Beas river. -

There are presently three major treatment plants within the distance of five kilometres on the right bank of Beas river. These plants are very close to the river Beas rather they are within the floodplains of the river Beas. During monsoons and heavy rains brings the threat of untreated discharge of sewage into the river. At Present the STP is functioning with full capacity and the DPR for the requirement /capacity of 3.0 MLD has been prepared amounting to Rs 6.17 crores and has been submitted for approval to the higher authority. Works undergoing: For connecting the left out households to the sewer line, estimated cost amounting to Rs. 1053. 89 Lakhs has been approved and work is under progress. A sewerage scheme for Marhi area is being executed with an estimated cost of Rs.114.32 Lakh and it has been proposed to construct a 20 KLD STP at Marhi. It is proposed to complete the work by 31st December, 2019. Proposed STPs at Manali: Location Capacity of STP (MLD) Sector1 & Sector-2 4.21 Jagatsukh 0.32 Kanyal & Sector-3 9.17 Old Manali 1.28 Total capacity 12.34 MLD State Government Budget (f) Sewage/Septage management with low cost treatment technology for rural areas.[8]

[7] Identification of flash-floods-prone river reaches in Beas river basin using GIS-based multi-criteria technique: validation using field and satellite observations, Sachchidanand Singh, Pankaj R.Dhote, Praveen K.Thakur , Arpit Chouksey & S.P.Aggarwal,Natural Hazards , volume 105,pp2431- 2453,(2021).

[8] Report On Prevention and Control of Pollution in River Beas: A Revised Action Plan for Rejuvenation of River Beas, Districts- Kullu, Mandi, Hamirpur & Kangra (HP) (Submitted in compliance to the Hon'ble National Green Tribunal (NGT).

Manali is going to have the first eco-friendly sewage treatment plant (STP) in Gojra Bihal which will benefit thousands of people of the Old Manali, Chachoga , Prini, Jagatsukh, Nasogi , Gaderni and Vashist areas which has approximately 50000 population. It has the capacity of 17th MLD. [9]

Channelization of River Beas from Palcan to Aut-

Proposal for channelization of River Beas from Palchan to Aut under HP Flood & River Management Project has been submitted to the Govt. of India for funds amounting to Rs. 585 crores, which has principally been approved and final approval from Govt. of India is awaited. After approval of the fund, the channelization will be completed by 31-03- 2023 as proposed by the I & PH Department which has principally been approved and final approval from Govt. of India is awaited. Recently the Central Water Commission has returned the detailed project report to the Himachal government along with certain objections. According to the famous environmentalist Guman Singh who is the coordinator of the Himalayan Niti Abhiyan, the channelization project should be implemented before the conduction of proper scientific study of the long term impacts of the river channelization project. He asserted that many studies recently showed that channelization cannot reduce the destruction caused by rivers. There is a need to understand the hydrology and geology of the river because these twin factors will react to the channelization of the river. Guman singh asserted that the river bed of Beas is rising due to accumulation of debris and this channelization will further increase the impact of the flood in the future. [10]

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Impact of Dam on the river-

.. Fine sediment plays a key role in the healthy functioning of river ecosystems as it provides nutrients and connectivity throughout the river basin soil-sediment cascade (Fryirs 2013;Wohl 2015). However, excess sediment supply in river corridors can have detrimental effects on water quality and river ecology (Owens et al. 2005;Wohl 2015;Wharton et al. 2017;Owens 2020).

[9] Abhinav Vashisht Kullu,Himachal's first eco-friendly STP to be constructed in Manali, 11 February 2023.

[10] Beas River Channelization again hits the brick wall, Times of India, Rohit Mullick / Sep 2, 2024,

[11] Rajiv Mahajan , Green Body flags illegal mining in "mand " area Himachal Tribune 6 september 2024