

Degradation of Wet lands in Kashmir Valley Aggravated Floods Fury

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The ecosystems of wetlands of Kashmir valley is under tremendous anthropogenic pressure since more than four decades. The loss of wet lands of Kashmir valley were acting as a buffer for floods, aggravated the present situation of flood fury. The disastrous damage caused to life and property could have been minimized if the water bodies like Wuller, Ancha, Dal, Nagin, Mansabal and other wetlands that had been preserved. All these wetlands act as a sponge that retains excess waters. Wullar, Dal, Anchar, Nagin, Manasbal and other small lakes are classical example of that.

During the British and Maharaja period used to consider Wuller and other lakes as a buffer for the flood where water can be absorbed. A century ago, Wuller extended up to almost 190 Km² and would spread to over 270 Km² during floods. Human encroachments into the lake are the chief reason for the lake shrinking. Wullar Lake which was once spread across 20200 hectares now remains restricted to a mere 2400 hectares. In the last 30 years, nearly 50% of the wetlands in the Kashmir valley has been encroached upon or severely. The Wullar wet land area has reduced from 157.74 Km² to 58.71 Km² during 1911 to 2010. Some of the reclaimed marshland measuring about 25 Km² has been transformed in to willow plantation by the state.

A survey was conducted in 2006 under court orders revealed that 60,000 kanals area in the lake have been encroached mainly by raising plantation under social forestry programmes of forest department. Wuller has lost its capacity to regulate water flows leading to increased floods in valley. In addition the sewage from Srinagar and other towns upstream passing into river Jhelum that flows through Wullar has degraded the lakes water quality. Due to disturbance in the ecosystem of Wullar lake has aggravated the flood phenomena in the Kashmir valley.

The Jammu and Kashmir state experienced catastrophic rainfall on 1st of September to 7th of September 2014. The onset of monsoon over J&K region takes place by 1st July and with draws by mid- September. On September 4th 2014 J&K experienced 30 hours long rainfall has broken the record of many decades, the major parts of the state recorded an average of 250 to 300 mm rainfall. It indicates that some parts of the state have experienced more than 450 mm of rainfall in 3 days. Even moderate rainfall also recorded in Ladakh. Kashmir valley has experienced such floods fury in the past. Geological and historical records reveal that wetlands of the Kashmir had played significant role to control the floods. A worth mentioning phenomena was observed that there was delaying in the flood peak by one or two days. Water level of flood hit area start rising after 5th September. It was a final point, which can be made in connection with influence of drainage net work on runoff concerns. Presence of Lakes (Wullar, Dal, Mansabal and others small lakes) played their role for delay in peak of flood and absorb (store) high runoff peaks. History of Kashmir valley has buried the evidences of wet lands of the Kashmir valley have played a vital in controlling the floods in Kashmir valley.

The value of Gods –*Kashmira*, Sanskrit poet Kailidasa writes about Kashmir valley (translation) “The place is more beautiful than

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the heaven and is the benefactor of supreme bliss and happiness. It seems to me that I am taking a bath in the lake of nectar here “*Kalhana*” has also discuss about floods in Kashmir valley in *Rajatarangini*. He has discussed about lakes and river Jhelum of Kashmir. Aryans while immigrating to Bharatvarsha had crossed this river (Indus) which is considered the base for Indus valley civilization. Both these rivers Indus and Jhelum (Sindhu and Vitasta) are in mentioned in Rig Veds. In “*Nilmat Puranam*” Sindhu gets mentioned thus “*Ganga Sindhu tu vijneya Vitasta Yamuna tatha*”

Vitasta (Wyeth-Jhelum). River Vitasta (present Jhelum) has been called variously as “*Vitasta*” in Veds, “*Hydaspes*” of Aryans and central Asian’s and “*Bidaspes*” of Ptolemy. Mugal emperor Jahangir called it “*Bebat*”. The present river is generally now known as Jhelum after a place called Jhelum, now in Pakistan.

In Nilmat Puranam there is a description of Wullar (*Mahapadamasar*) and river Jhelum (*Vitasta*) ‘ As *Vitasta* meanders from its abode of *Nila Kunda* (spring Verinag), many rivers *Vishoka, Rambh, Ara, Romish, Dud Ganga, Lidder, Aral, Stunt kol, Aran, Pohra* and many other join it. As per Nilmat Puranama legend the area of *Mahapadmsar* was then named *Candrapura* ruled by king *Visvagasva* (Kalhan also mentions a large city *Candrapura*) submerged under the Wuller (*Mahapadmsar*)

There are references that during 12th century King Prahlad built Prateshwara temple in the island of Mahapadmsar. The water rose again as the tributaries to Mahapadmsar had increased including Vitasta (Jhelum) and one of those days flash floods again increased the volume, submerging the temple indicates that the water level was much below the level of the base of the submerged temple, when the temple was constructed which rose suddenly and gave no chance for retrieval of idols. This could have been between 12th and 14th century.

In Rajatarangini there are references of fluctuation of water level of the lakes and floods in Kashmir valley. The imprints of glacio-fluvial geomorphic landforms (modified by glacier and river) reveals that Kashmir valley has experienced floods and heavy precipitation in the past geological time.

The major ailment of the Wullar wet land is siltation, large quantities of silt are regularly deposited by the Jhelum, Madhumati, Erin, Phore and other streams entering the lake. The rate of siltation has been estimated a 3.33 acre per ft. per year. Siltation has already claimed about 90% of it and the remaining 10% will disappear unless corrective measures are taken. Deforestation in the catchment areas of Jhelum and its tributaries has increased the siltation rate many times higher than the calculated rates with the result there was Wullar has lost its capacity to store water leading to floods in the valley. The entry of raw sewage and plant nutrients are continuously adding the nutrients pool resulting in serious weed infestation.

Anchar lake is a single basined connected on the eastern side with Dal lake through an inflow channel nallah Amir Khan via Gilsr and Khushalsar. A network of channels of Sindh enters the lake on its western shore forming delta. The lake is also fed by springs with in basin and alone the periphery. Further, a number of channels from agricultural field’s effluents from the settlements and surface drains from catchment area flow directly in to it. The lake outfalls in river Jhelum at Sangam on its northeast direction. The total catchment was 66 Km².

In recent year significant encroachment have been taken within the lake. According to Lawrence the area of the lake in 1893-94 was 19.54 Km² has now been reduced hardly to 6.8 Km² of which 3.6 Km² are marsh. Unabated encroachments still continue at alarming rate. The main disturbance in the lake is from the heavy silt flowing from Sind nallah. The siltation process has greatly affected the lake ecology and storage capacity of the lake. The entry of raw sewage from the immediate catchment and managed carrying of sewages from the adjoining areas amount to a daily load of 2.0 tones of nitrogen and 1.7 tones of Phosphorus resulting serious weed infestation and water quality deterioration.

The lake Dal is located within catchment area covering 316 Km² in the Zabarwan mountain valley in the foot hill of Himalayan range, which surrounded it on three sides. The average elevation of the Lake is 1583 m. Dal Lake in Srinager has seen numerous reclamation all along its periphery in marshy

areas which has drastically reduced the lake area to just about 1200 hectares almost half of its earlier spread. The depth of the water varies from 6 mts (20 ft) at its deepest at Nagin Lake to 2.5 m (8.2 ft), the shallowest at Gagribal. The length of the lake is 7.44 km with a width of 3.5 km. The lake has a shore length of 15.5 km and road run all along the periphery. Irreversible changes through urban expansion and road building have been made along the shore line to accommodate the tourist growth. Two Islands built in the basin have further restriction on the flow of the lake and as a result marshy lands have emerged on the peripheral zones, notably in the foothill area of Shankaracharya and Zaharawan hills. These marshy lands have since been reclaimed and converted into large residential complexes.

Dal lake is nicknamed the Jewel in a crown of Kashmir or Srinagar's Jewel. The lake covers an area of 18 Km² and is a part of natural wetland which covers 21.1 Km² including its floating gardens. The latest data reveals that the lake, which has shrunk from 75 Km² to mere 11.56 Km². There are more than 350 floating gardens which are known as "Rad" in Kashmiri. The wetland is divided by causeways into four basins. Gagribal, Lokud Dal, Bod Dal (although Nagin is considered an independent lake) Lokud Dal and Bod Dal each have an Island in the centre known as *Rup lank* (or Char Chinari) and *Sona lank*, respectively.

Houseboats in Kashmir were first introduced in the 19th century by the British raj officials. As per some houseboat owners, the first houseboat on Dal Lake was built soon after the Indian mutiny of 1857. The first recorded houseboat was said to date back to 1888.

Geology: There are two theories regarding the formation of Dal lake. One version is that it is the remnants of a post glacial lake which has undergone drastic changes in size over the years. Second view is that it is a fluvial origin from an old flood spill channel or oxbow lake of the Jhelum river. The dendritic drainage pattern of the catchment signifies that its rocks strata have a low level of porosity.

The Dachigam-Telbal nallah system is conjectured to follow two major lineaments.

Discontinuity surfaces represent the angular and parallel drainage pattern. The water table cuts the hill slopes, which is evidenced by the occurrence of numerous springs in the valley. Seismic activities are recorded under Zone V of the seismic zoning map of India, the most severe where frequent damaging earthquakes of intensity IX could be expected. Kashmir valley has already experienced an earthquake of 7.6 on Richter's scale in 2005 (Muzzaferabad earthquake). But there is no existence of disaster management provision in Jammu and Kashmir.

Hydrology: The shallow, open- drainage of Dal lake is fed by Dachigam- Telbal nallah (with perennial flow) Dara nallah and many other streams. The lake is classified as "warm monomictic" under the sub-tropical lake category. The complex land use pattern of the valley is reflected in urbanized Srinagar in its north with rice fields, orchards and gardens in the lower slopes, and barren hills beyond steep sloping hills. The flat topography also has an impact on drainage conditions. It receives an average annual rain fall of 65.5 cm in catchment area. The average annual flow, according to discharge measurements has been estimated 291.9 million cubic metres with Telbal nallah accounting for 80 % of the total and 20 % contributed by other sources. There are two outlets from the lake, namely the Dalgate and Amir Khan Nallah that connects the lakes of Nagin and Anchar. Dalgate is controlled by weir and lock system. The out flow from these two outlets has been estimated as 275.6 MCM. Further, the silt load has been estimated at 80,000 tonnes per year with 70 % contributed from the Telbal nallah, with 36,000 tonnes recorded as settling in the lake.

The major environmental problem facing the lake is eutrophication, which has required immediate remedial measures to combat it. Alarmingly, the size of the lake has shrunk from its original area of 22 Km² to present area of 18 Km² and there is a concerning rate of sediment deposition due to deforestation in the catchment area. The water quality has also deteriorated due to intense pollution caused by untreated sewage and solid waste that is fed into the lake from peripheral areas and from the settlements and house boat. Encroachments of

water channels and consequent clogging has diminished the circulation and in flow into lake, so with the building up of phosphates and nitrogen, this has led to extensive weed growth and consequences negative effect on the biodiversity of the lake.

Manasbal Lake is located in the Jhelum valley, north of Srinagar city in the state of Jammu and Kashmir. It is deepest lake (at 13 m) in Kashmir valley. The lake is surrounded by the Baladar Mountains on the east, by an elevated plateau known as Karewa comprising lacustrine, fluvial and loessic deposits on the north and bounded the Ahtung hills in the south.

The drainage basin for the lake, covering an area of 33 Km² has no major inlet channels and is thus fed mainly by precipitation and springs (more than 1200 springs) Lake water outflows to the Jhelum river through a regulated out flow channel. World Wide Funds (WWF) conducted an extensive survey of the lake in 1997 attributed the reasons for the deterioration of the lake, particularly on its banks, gradually turning it in to a stinking marsh, due to the following.

1. Large scale illegal encroachment on the periphery on Ganderbal and Qazibagh sides in the form of 1000 of trees, vegetable gardens, toilets, residential structures, garbage dumping sites.
2. Siltation due to noxious run off from adjoining fields, stone quarries and lime kilns.
3. The flow of sewage and use of fertilizers in the agricultural fields in its adjoining villages.
4. Eighty percent of the lake was seen under the thick blanket of weed.

All rivers like Vishoka, Rambh, Ara, Romish, Dud Ganga, Lidder, Aral, Stunt kol, Aran, Pohra and many other tributaries of the Jhelum are depositing huge amount of siltation in the lakes of the valley with the results shrinkage of wetlands storage capacity. The Jhelum has changed its course and caused lateral erosion. All the newly developed colonies are located on the old channel, flood plains, meander core and terraces of the Jhelum and dry beds of the lakes. When you will not respect the River and Lakes you have face such disasters.