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Dal lake of Kashmir: Problems, prospects and perspectives

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Abstract

The Dal lake in Kashmir is a fresh altitude fresh water lake. This lake is main source of attraction for tourists and is main source of economy for the people in its catchment area. During the course of time, this lake has shrunked to a great extent due to encroachments. Further the discharge of effluents, sewage, sediments and other nutrients has make this lake eutrophic (nutrient rich).this eutrophication results in the over growth of aquatic plants, which in turn decreases the oxygen supply of lake and ultimately its death. If timely measures are not taken to mitigate these severe effects on lake, then the lake will die of its own death. So there is a great need of taking serious steps at individual, community and at government level to save this lake.

Keywords: Eutrophication, limnology, lotic, lentic, phytoplankton, zooplankton

1. Introduction

The Indian Sub-continent spans the latitudinal range from 80S (Kanyakumari) to 360N (Kashmir) with different attitude ranging from mean sea level up to 5000 meter above mean seal level (m.s.l.). There are mainly two types of climatic zones the truly tropical region encompassing the Peninsular Indian below the Vindhya mountains covering the areas between 80 and 230N Latitude, and the temperate cum arid zone between 240and 360N. However most of the region is well supplied with both lotic and lentic habitats. Natural lakes are comparatively few in numbers restricted mainly to the northern region both in the low lands and above the timer line, but man-made lakes are quite numerous (K.K. Vass). The valley of Kashmir is often termed as The Paradise on earth. It is famous for its lakes, clear streams, green turf, magnificent trees and mighty mountains. The Dal Lake is situated in the heart of Srinagar city on the foothills of the Zabarwan hills. This lake is like a jewel in the valley of Kashmir. This lake is one of the main source of attraction for tourists. This lake is also main source of income for many people living in its catchment area. This lake is natural habitat of for many species. This lake is home for many migratory birds which came here after covering a long distance from Siberia during winter. Unfortunately this like is at the brink of extinction due to various reasons. The present piece of work deals with the "Water quality Assessment of polluted fresh water Lake Dal" situated at an altitude of 1583m. Above m.s.l. It would be logical to pointedly draw the attention to the fact that the water body located in the coastal belt of India (i.e. the Kolleru Lake) is characterized by high temperatures, humidity and wind action while the second one which is situated almost on the Tropic of Cancer is characterized by extreme temperature and low humidity and finally the water body situated at 1583 m. above m.s.l. i.e. the Dal Lake of Srinagar is being considered among the high altitude lake which is a region of low temperature of gradually thinner atmosphere. The rare fraction of air at high altitude apart from bringing fall in temperature, deficiency of oxygen (in case of extreme cold) etc. also at the same time increase the intensity of isolation and solar radiation. The intensity of glare which is further accentuated by the reflections from the surface of snow fields and glaciers above the timberline exercises a profound influence on the immunological conditions of both the lotic and lentic bodies of water. A part from causing deeper penetration of light in the aquatic media it provides greater energy per unit area than at the sea level. For instance it produces on average only 193,500 watt/m² at 2000m. Above m.s.l. in comparison to 225,800 watt/m² at 4200m. Above m.s.l. on the southern slope for the greater Pir Panchal range. In particular phytoplankton consists of diverse assemblage of nearly all major taxonomic groups.

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Many of these forms have different physiological requirements and they vary in response to physico-chemical characteristics such as light temperature, nutrient regimes (Wetzel, 1983) and these parameters themselves scientifically vary at different altitudinal planes. Furthermore for carrying out comparative study of fresh water resources based on altitudinal variations all the physico-chemical and biological studies are necessary in order to monitor variations at different altitudes.

Significant variation have been found to occur in phyto and zoo-plankton which in turn reflect variations in carbon uptake based on difference in the physical and chemical characteristic in around the water bodies of various places which finally exhibit differences in metabolism of respective water bodies.

Methodology Used:

1. Surveys: A monthly survey was conducted in order to gather data about tourist volume, tourist receipts, marketing avenues, waste generation, water quality, catchments etc. The survey was also conducted in order to gather information about various developments at various allocated sites.

2. Data collection: Data about water quality, amount of dredged material, rate of dewatering, etc. was collected from different departments of government and semi government agencies like State pollution control board, Lakes and waterways developmental authority, Center of research for development, different NGO's etc. Data was also collected for different eco-tourism developments such as dredging, dewatering, aeration etc.

3. Interviews and Questionnaires: Interviews were organized to different people of both public and private organizations. Some of the persons who were interviewed include Director Lakes and waterways developmental authority, Director Center of research for development, Garden officers, Wild life warden etc.

A questionnaire was also prepared with help of concerned councilor. The questions were based on different aspects related tourism. These include questions regarding waste generation at point and non-point sources, tourist facilities, ecotourism developments, impact of catchments on tourist places etc.

The distribution and collection of questionnaire was based on:

i. On site evaluation: On site evaluation of questionnaire was done at various tourist sites which include Mughal gardens, Dachigam national park, Dal Lake Etc.

ii. Pick and drop method: The questionnaire was dropped at various tourist accommodations like Hotels, Resorts, and Houseboats etc. and later collected from each site.

4. Data Interpretation: Data collected from different agencies was interpreted by going through literal works published in different research journals, thesis and newspapers.

Description of the Lake:

Lying in the Eastern side of the Capital city Srinagar, at the foot of the Zabarwan Mountain, with Shankar Acharya (Takhtai-Sulaiman) in its south and Hazratbal (Dargah) in its west is the lake par-excellence -the Dal. The current surface area of Dal lake is 15.50 Sq. km, and is divided into five basins:-

- 1). Nehru park
- 2) Nishat
- 3) Hazratbal
- 5) Bari Nambal
- 4) Nigeen

1) Nehru Park:- It is one of the ecologically significant basins of Dal Lake. Because of the presence of house boats, hamlets infested with habitation, floating gardens agricultural funds with the water body and mushrooming of hotels complexes on the periphery and the outflow through main gate known as Dal gate. The open water over of this basin is about 1.5 sqkms and volume of water being $7 \times 10^6 m^3$ approx.

2) Nish at: Basically a portion of Dal lake has been designated as Nishat basin. The surface area of this basin is 4.61 sq.kms.

3) Hazratbal: Ecologically important basin due to inflow channel loaded with steam water and silt besides huge amount of raw effluent into the lake. The surface area of this basin is 6.96 sq. km.

4) Nigeen: Regarded as paradise for aquatic sports and water skiing it is comparatively deeper than other basis. The surface area of this basin is 1.67 sq.km and volume of water being $1.22 \times 10^6 m^3$.

5) Bari Nambal: It is lagoon based and one of ecologically degraded basins of Dal Lake. It is connected to Nehru Park basin through a channel called Nowpora. The recent estimation shows that the surface area of this basin is 0.76 Sq. Km.



Dal Lake of Kashmir

Geological Features:

Geological evidences show that the entire valley was once a glacial lake and it found its outlet in the south-west of the long burial among the rocks there is ample evidence in the layers of sediments, mud and shells that have by now hardened into stone and solid rock, folded and faulted in many places along with the remains of plant and animal life that lived amidst them during different geological periods.

Catchment Area:

The area of the dal lake catchment is about 314 sq.kms, about twenty times more than the lake area. The catchment consists of mountain ranges on its North and Northeast. On the other sides it is enclosed by flat arable land. The main geological formations are trap, agglomerate, slate, limestone and clayey material. In some parts of the catchments freshly deposited alluvium is also present. The denudation of forests is the outcome of human activity of the past. It is reported that Arrah Valley from Harwan upwards was rich in coniferous forest with a mixture of Cedrus Deodar in higher reaches. These mountains therefore were not always bereft of vegetation as is seen now. Natural causes may also be responsible in reducing the vegetal cover of the catchments. Around the lake shore, the lower slopes of the catchments have been utilized for paddy cultivation, orchards and gardens. The North catchments comprise mainly outer suburbs of Srinagar city and are extensively used for paddy cultivation. The topography is very flat mid drainage is via canals and open drains which in parts are badly contaminated with sewage and rubbish. The Srinagar city catchments are fully urbanized and in most parts it drains via Nowpora, Lal Bazar, and Brari Numbal etc. into the Dal Lake.

The surface runoff results in loss of fertile top soil and consequent siltation of the lake. Adverse land use and biotic interference in the catchments area have further aggravated the problem of sediment and nutrient inflow to the lake.

Human Settlements:

Man's quest for rapid material development, even at the cost of destruction of the fragile, but very vital Eco-system is the cause of our present day environmental problem. This Ecological Misbehavior of man, though leading to some progress in the living standards of modern man, is not sustainable over long terms. Human settlements within and on the periphery of Dal Lake are one of the main contributing factors for the environmental deterioration of the lake. Due to the population explosion and the rapid rate of urbanization the pressure on the lake and its surroundings has increased alarmingly.

A population of about 7500 people lives within the house boats and an equal number outside this area in other boats. The total population living within the outer catchments of Dal Lake has been estimated at 1,78,000. There has been a substantial population growth of the people living in the Lake area also. The number of people living in the hamlets within the Dal Lake is estimated to be about 50,000 comprising 6000 families.

Results and Discussions (Need of Study):

The Dal Lake has been the center of Kashmiri civilization and is among the most beautiful National heritages and it's important as a tourist resort cannot be underestimated.

The lake has played a major role in the economy of the State through its attraction of tourists and its utilization as source of food and water. Traditionally the vegetable markets of Srinagar have been supplied from the famous floating gardens and irrigated land within the lake area.

Grave concern is being voiced by police from different walks of life over the deteriorating conditions of Dal Lake. As a result of heavy anthropogenic pressure, the lake ecosystems are becoming poor in quality and posing health hazards to the people. Large areas of the lake have been reclaimed and converted into floating gardens. A large number of residential buildings, restaurants and hotels have come up along the lake front. Over the year the lake has turned shallow due to siltation and deposition of plant debris. Many

undesirable changes in the biological communities have taken place and some important species have either declined or have completely disappeared.

During the current century Dal lake has undergone far reaching changes both within the lake and in the catchments. Two additional islands were built which further obstructed water circulation. A road was laid along the south – east part to improve communication which separated a large part of the lake creating marshy area along the fringes of Shankaracharya and Zabarwan mountains. This marshy land has since been reclaimed and developed into huge residential and commercial complexes.

Under the aegis of the popular Government the Lakes and Waterways Development, Authority embarked upon formulation of the Project Feasibility Report and initiated activities with the preparation of CIS based maps for environmental impact studies and planning. Simultaneously the pace of progress of various activities which had already been taken up in hand was accelerated.

The conservation in the catchment's area spread in Dachigam and Dara Danihama area was entrusted to the J&K Soil Conservation Department. The programme in Dachigam area has already been completed, conservation in Dara Danihama has been undertaken in an area of 49 sq. kms. Out of which treatment for 20 sq. kms. has been completed. The conservation programme also includes the river training works in various nallahs in the catchment which is targeted to be completed next year.

Setting Basin at Teilbal has been commissioned and has successfully arrested annual estimated silt load of 80,000 tons which would otherwise flow into the lake.

Eco-friendly Dredging operations were initiated with simultaneous environmental studies. The dredging of the protruding islands in the Hazratbal Lake Basin towards the lake side of Northern Foreshore Road which delineates the Northern Shoreline of Dal Lake and is a continuation of age old Boulevard Road from Nishat to Habak has been undertaken. This was only possible by the induction of two indigenously designed portable amphibian cutter suction dredgers.

Besides, the clearance of marshy and silted up shoreline of Northern Foreshore Road has also been undertaken which will not only extend the water expanse but will also maintain an average depth of 2.50 mtrs. Below the minimum water level the area where one could walk on the hard land mass within the lake has been transformed into a clear water expanse and is fit for recreation.

About two lac twenty five thousand tons of nutrient rich bed material has been dredged out till date. This has been deposited in the low lying areas of hinterland in dyked areas. These areas are planned to be developed into an ecological barrier, fish ponds, camping grounds and way side picnic spots. The dredged material is carried in the form of slurry through HDPE pipeline with a lead of up to one and a half km. The solids get settled and decanted fresh water is allowed of flow back to the lake through bio filters.

The cutter suction dredger will also be deployed for dredging out of some hamlets and deepening of navigational channels. About 6000 Kanals of land and 3741 structures are to be acquired within the Lake body. The progress for acquisition

of land has been dismal so far probably because of ground situation. The structures and land are situated in 48 hamlets. People's participation and co-operation was lagging and with relentless persuasion and motivations 340 structures have been acquired and the effected people shifted to existing colonies.

Due to the continued inflow of nutrients into the various Basins of Dal lake the intensification of weed had reached its peak and as a result swimming and other recreational activities had come to a complete halt. In order to keep the nutrient balance and to improve Lake Aesthetic a massive scientific dewatering operation both mechanical and manual was resumed under close scientific monitoring.

Physiographic and Ecological Features (Hydrographic survey and Genesis of the problems):

Surveys for the lake were conducted in 1982 by Minor Ports Organization indicating the Lake area as 24 Sq. Km with the following break up:

- | | |
|---------------|----------------|
| a) Water body | 15.42 Kms. |
| b). Marsh | 1.26 Sq. Kins. |
| c). Built up | 7.32 Sq. Kms. |

As a result of increased tourist influx and population explosion in and around the lake, the lake eco-system has undergone environmental degradation. The open area of the lake was 75 Sq. Kms. In 1200 AD which has reduced over the years to just over 15 Sq. Kms. The area in and around the lake has undergone rapid urbanization with mushrooming of commercial and residential buildings such as Hotels, Guest Houses, Restaurants, and the number of house boats and doongas in the lake has gone up from a few hundred to about two thousand. The built-up areas have been stretched beyond limits due to human follies and greed. The very life and existence of lake has been jeopardized.

Morphometry and Hydrology:

The Dal Lake morphology reveals that the lake measured 8 kms. From North to South and 3 kms from east to West. The depth of the Lake was reported to be in the range of 6 to 9 Meters. The Nagin basin is found to be the deepest part. The present capacity of the lake is $28 \times 10^6 \text{ m}^3$

b. Inflow.

The Hydrology of Dal Lake is complicated by the extreme diversity of its catchments which ranges from Srinagar city with high population density to paddy fields and high mountain ranges. Further, more a large proportion of the flow from (he Teilbal nallah is diverted for indignation of paddy field and gardens through a complex network of canals, Based on a gauging of the major streams over the past few years, the average inflow has been estimated to be 292 million m^3 of which 80% is contributed Teilbal Nallah and 20% by other sources including springs within the lake body. The water level of the lake fluctuates appreciably as a result of varied amounts of precipitation received in the form of rain and snow and the changes in the quantity of water that flows into the lake from the feeding channels.

c. Outflow

The lake has two main outlets. one being the Dalgate which discharges into a link channel "Tsehunti Khul" for final discharge into river Jhelum. This outlet has a lock gate provision for flow regulation and navigation purpose. The other outlet is through Nallah Amir Khan which links Dal Lake and its adjunct Nagin Lake to Lake via Gilsar and Khushalsar. The total outflow through Dalgate and Nallah Amir Khan is about 213 x 106 m³ and 27 x 106 m³ respectively.

Dal Lake has shrunk from 26sq.kms (1900) To 11.5sq.Kms (2004). Scientific estimations life of Dal Lake is 154 +/-12 years with no conservation efforts more than 50000 people live within Dal lake hamlets 25-30 MLD of sewage finds its way into the lake annually. The maximum total coli form numbers range from 640-2400+MPN/100 pollution load at non-point source is 55% and at point source 25% net inflow of the nutrients every year is about 15 tons (p) and 322 tons (n) 40000-50000 tons of dead and allochthonous material are added every year. 4141 families live in the lakes 11 hamlets. Among structures within lake-pacca house (3928 families) contribute 49.01% lake endangered species now also include: *Crossocheilus diplochilus affinis*. *Botin birdi carassius*, *schizothorax esocinus* just 2.11% of Dal dwellers are fully aware about current conservation efforts there is increase is to the extent of 50% increase in the chlorophyll a concentration bacillariophyceae population has increased by as much as 40% 7.99 tons of fish loss annually from the lake due mechanical harvesting besides huge fish losses there is increase in biological population : change in the morphology of aquatic weeds accompanied by rapid re growth (3-4 weeks) and occurrence of algal bloom.

Manually dewatering at the lake:

Certain developments in this catchments area also had the effect of adding to the waste flowing into the Dal. The two most important streams feeding the Dal are the Dachigam Nallah and the Telbal Nallah, which carry water from the high-altitude Marsar Lake. Since the 1950s, massive deforestation has been taking place, as the demand for farmland has grown. The consequence of deforestation is only too evident. Today, the Dal bears an annual silt load of 80,000 tons. In the absence of drainage, much of it is deposited in the lake near its northern shore as it is blocked by a bund Fu the middle of the lake. The land thus formed has been claimed for farming and pastoral activity, and this has added to the load of organic waste in the lake. The impact of deforestation, LAWDA (lakes and water ways development authority) studies show, is illustrated by the fact that soil run-off from the north-facing slopes of the Dachigam forest reserve is minimal but on the south-facing slopes where forests have been hacked away, it is very heavy. As serious as soil run-off is the fact that farmers in the catchments area use increasingly heavy loads of nitrogen and phosphorous fertilizers and these run off into the lake.

The run-off from the fields and untreated sewage has the same impact. "Human waste is excellent manure," says Kroiss. Once in the water, the raw sewage and fertilizer run-off cause plant life to grow prolifically. Weeds and algae, along with bacteria, proliferate. As the plant life soaks up

oxygen from the water, other forms of aquatic life like fish are slowly strangled. Several pockets of the lake are already in the grey zone of near-death. In the Brari-Numbal area, hit hard by the construction of the Marpalan road, the dissolved-oxygen level has been found to be less than 5 milligrams per liter; meaning that there is almost no oxygen for aquatic life to breath Dredging operations under way as part of the effort to save the lake.

Other key indicators of water quality have shown steady deterioration. Phosphorous content in the Gagribal basin of the lake, along the fringes of which run the Boulevard hotels and houseboats, rose from 70-506 mg/l in 1977 to 136-5,060 mg/l in 1996. An even more dramatic deterioration was evident in the Bud Dal basin, where phosphorous levels rose from 65-620 mg/l to 136-8,106 mg/l. The levels of ammonia and nitrogen showed even more significant increases. LOW a figures show that 5.5 tons of phosphorous and 88.9 tons of nitrogen drain into the Dal each year from human settlements, hotels and farms. Figures which are alarming by any standards.

Warning signs that the Dal might be on its last legs came dramatically in August 1991, when there was a red algal bloom in the Bud Dal basin next to Centaur Hotel. The bloom was found to be of a type known as Euglenineae, a species almost entirely dependent on inorganic nitrogen and indicating dangerous pollution levels in the lake. Since then, tile growth of exotic aquatic weeds such as *salvinis natans* (water fern), has been prolific. The invasion of water fern into traditional lotus zones of tile lakes has been reported recently, and weeds like *Lemna* sps have been found by the LWDA to be overwhelming native species in many areas. One common Dal lake species, the *Eurayle ferox salisb*, has disappeared altogether. Some 50,000 tons of weeds are believed to die in the lake each year, and their decomposition adds to the pollution load leopard *Panther pardus* (V) and Himalayan black bear *Selenarctos thibetanus*, brown bear *Ursus arctos*, but apes, are rare, wild boar *Sus scrota*, Himalayan musk deer *Moschus chrysogaster* (V), serow *Capricornis sumatraensis*, wild boar and long-tailed marmot *Marmota caudata*. It also includes Snow leopard (*Panthera uncia* -rare), Kashmiri Otter's, Barking Deer, Cheetal, Nilgai, Markhor, Musk Deer, Himalayan Black Bear, Shapu, Ibex, Blue Sheep, Leopard, Grey Langur, Marmot and Lynx. Although introduced in Kashmir, Brown trout *Salmo trutta* is now part of Kashmir ecosystem.

Environmental planning of Dal:

The environmental planning of Dal Lake started way back in 1970's under the aegis of Common Wealth Fund for Technical Co-operation engaged expert group of consultants (ENNEX Newzeland) in the seventies. This group conducted a detailed survey and study of Dal Lake for two years touching physical, socio-economic and other aspects which resulted in documentation of the available data and suggesting remedial measures for up-keeping the environmental health of the lake as under:-

- To minimize as far as practicable, quantities of nutrients and sediments entering the lake by treatment of catchments area.
- To remove nutrients from the lake by removing weeds.

- To control water flow and water level fluctuation of the lake.

The main recommendations of ENNEX were to take up contributory catchment area conservation by way of afforestation and anti-erosion works in the ravines and Nallahs, constructing Settling Basin to trap the sediments and check its flow into the lake, to provide peripheral sewerage to stop flow of any nutrients into the lake, to improve the water circulation, to resort to marginal dredging close to the shoreline and removal of sedimented silt deposits and creation of suitable depth in the lake and navigational routes, to do manual and mechanized selective dewatering and harvesting of weed, to check the man made incursions and to delineate the lake boundaries.

The State Government appointed a Technical Committee of experts comprising Engineers, Town Planners, Architects, Scientists, Educationists and Citizens representing various sections of society for examining the ENNEX recommendations and commenting on the draft project report.

The Committee while agreeing to the broader project objectives suggested changes in regard to containing the man made incursions and policy of dealing with the lake dwellers. It was reasoned that the population which ash encroached upon the lake shall have to be removed. The Western Foreshore alignment was accordingly suggested to be along a middle course in between Doal Demb and Rainawari bank which would contribute further area towards the lake water body.

O. D. A. (Overseas Development Administration, United Kingdom) Report (1985):

In the year 1985 the Ministry of urban Development, Government of India, engaged a team of experts from overseas Development Administration, United Kingdom (ODA) to look into the problems of the lake and advise the State Government on the issues involved. The Technical consultants of the ODA MAS BBJV of United Kingdom (Biwater Balfour and Betty Joint venture) were invited in 1987 by the Government of India to survey and study the project under an integrated development concept for Srinagar city and to look into the possible funding prospects. The field studies were started in the year 1989 when it synchronized with the onslaught of militancy in the State. The studies and subsequent implementation of integrated project had thus to be abandoned due to security considerations.

- Recommendations of Prof. Dr. Helmut Kroiss. In the meanwhile a note expert Prof. Dr. Helmut Kroiss of Vienna University of technology was/invited by the Government of India to study the problems of the Lake. He examined the issues and broadly agreed with the project Feasibility Report. His remarks are:-
- “Lake Dal”. “The beauty of Kashmir” is in a critical stale, since waste water, solid waste and fertilizer discharge, to the lake have caused increased Eutrophication with excessive growth of weed and algae in most of the area. This has also resulted in deterioration of water quality.

- All actions within the lake such as dewatering, local aeration and skimming of algae help to light the symptoms of the degradation process but will not be able to restore the desired water quality and sustainable ecological development for the future.
- The lake and its beauty are of vital importance for the economic development of Srinagar city and the whole Kashmir valley because of its tourism potential and ecological importance.
- An action plan to improve the situation and to achieve sustainable good quality of the lake has to be started immediately and where activities have already started any kind of discontinuity should be avoided.
- There is an agreement that the driving force for the Eutrophication process is the excessive discharge of nutrients (phosphorus and nitrogen) to the lake.
- There are four main sources of nutrients entering the lake:

1. Nutrients contained the influent (Tailbal Nallah) coming from natural run-off, waste water discharge and erosion in the catchment area.
2. Waste water from the inhabitants living in the peripheral areas of the lake.
3. Waste water from the inhabitants living within the lake.
4. Surface run-off and infiltration from agricultural activity along the coast of the lake (mainly Eastern and Northern coastline).

It is important to reduce all the sources of nutrients in order to improve the situation. There are short term technical measures (e.g. sewer systems with

Teilbal Nallah catchment. Agriculture always plays an important role in nutrient flows and will have, to be included in short and long term strategy.

Salient features of Project Feasibility Report:

The Authority was advised by the Planning Commission to prepare a project feasibility report for conservation on NLCP pattern which would envisage conservation programmed under the aegis of Government of India but the rehabilitation of the lake dwellers who are to be relocated outside the lake area would be the responsibility of the state government. Accordingly the lake, conservation activities have been identified as:-

- I. Afforestation and soil conservation in Dachigam and Dara Danihama Catchment areas.
- II. Trapping of debris and sediments from the catchment area by way of construction of setting basin at Teilbal.
- III. Marginal dredging of all marsh areas, dredging of some hamlet land and landscaping the rest including procurement of a cutter dredge and its accessories.
- IV. Acquisition of land and structures within the lake body involving 6000 kanals of land and 3741 structures and relation of affected families
- V. Prevention of Pollution by way of diversion of sewage and drainage from the peripheries in Habak, Hazratbal, Nagin and Dal lake areas including low cost options, house boat sanitation and Sewage. Treatment Plant.
- VI. Construction of Green Buffer areas/Ecological Barriers along Northern & Western Foreshore.

- VII. Delineation of the Lake body by way of Northern Foreshore Road and Western Foreshore Pedestrian Mail.
- VIII. Improvement of Lake Hydrology & Hydraulics by way of gated regulators along the boulevard, modernization of navigational Lock at Dalgate, improvement to Nallah Amir Khan, construction of Cut and Cover Conduit at Brari Numbal as outfall channel on River Jehlum and improvement of Navigational routes,
- IX. Establishment of Eco Monitoring Laboratory at Habak and subsequently and National Aquatic Research institute & Museum at Gupt Ganga.
- X. Selective Deweeding in Dal and Nigeen Lake.
- XI. Solid waste management
- XII. Total cost of Conservation on 1997 pricing is Rs. 297.90 crores

Suggestions for Maintaining Water Quality of the Lake:

- Encroachment up on rivers, lakes and streams must be stopped.
- House boat owners must be forced to adopt safer and special methods of sanitation to prevent water from pollution and the deweeding of lakes must be regular affairs.
- The residents of the area should clean their surroundings as the system is practiced Tanzania
- The town administration should restrict themselves in throwing dirty water through regulated cannels to the nearby lakes, rivers and wet land areas but the situation in Srinagar city is opposed to this.

So in nutshell we can say as a good citizens of the valley, we should take all measures to protect and preserve our water resources. There may be some unscrupulous elements of the society which bends upon harming the shape and hydraulic characteristics of our resources such people do not only pollutes the lakes, but also prosperity and beauty of our valley. Thus it becomes obligatory on us to take all necessary measures to keep the Anchar and other lakes clean. This will not prolongs their life, but add a breath to the valley.

Conclusion:

Our collection conscious popular perception and natural expectation that 'though I will create pollution someone else will take care of it particularly the government' though our system is devoid of any genuine

Accountability, inadequacy or vacuum in the existing system in meeting the challenges posed by a problem situation is not taken care of by anyone .we consciously pass the buck .This type of attitude is not only harmful for the development of dependable and accountable system, but also has and is characterized by the holds of lacunae in the present set of job accomplishments. Ours is a unique situation where there is lack of vision enforcing environmental problems we never evolved appropriate policies, plans and programmes. Whatever little we do, it is non-dynamic, reactive rather than being pro-active. law is an accepted strong medium of regulating behavior of the people but our environmental regulative laws tackling of complex either motivation for non-polluters for the polluters or both .No consistent and legal path of serious deliberation at the stage of drafting and consideration on the floor of the legislators, before becoming

the law of the land cover is in vogues .Several bills are presented and rushed through the legislators with the members devoting very little of their quality time to deliberate ,debate and decide on their contents and impacts . Both the government and people is not taking any necessary action against pollution is contributed through us. If we think efficiently and effectively we will differently feel that we are ourselves guilty.If the serious and timely measures will not be taken on prority basis,the lake will die of its own death.

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