EVALUATION OF CONCORDANCE BETWEEN ENVIRONMENT AND ECONOMY: A RESOURCE INVENTORY OF DAL LAKE

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ABSTRACT

Dal Lake is a hot place of a series of ecological restoration and environmental remediation programs nowadays. As ecosystem service and natural resources are closely related with social and economic development. Economic development, the ultimate goal of which is to improve human welfare, is crucially dependent on the environment and natural resources to provide goods and services which directly and indirectly generate socio-economic benefits. Governments in developing countries are becoming increasingly aware that environmental and natural resource degradation endangers the potential for long term development. The natural resources that are known for certain today are only a part that is actually available. Those which are available are those which can be extracted from nature under the prevailing technological, economic and social conditions. There are different viewpoints as to the optimum human population this planet can support - ranging from 15 billion to 100 billion. However crude the estimates may be, one casualty of these estimates has been that the quality of environment in which population would be surviving has not been taken into consideration. One thing is certain that as things stand, there are no infinite reserves of resources that can sustain ever increasing human population. The message is simple - conserve the renewable resources: recycle, improve the technology and process of non-renewable resources extraction and utilization; reduce the per capita consumption, etc.

A natural resource ecosystem is an integrated ecological system, one element of which is a product of direct or indirect use to man. The product may be biological as in the case of forests, agricultural products, fish and wildlife; physical in the case of water, air and soil or both. In all the cases, the distinguishing facet of a natural resource ecosystem is that man has direct involvement in the complex set of ecological interactions. Water resource which is one of the basic needs of man is misused by different ways as man progressed towards new technological developments

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from last few decades. The objective of the present research paper is to analyse the various changes in and around Dal Lake, which have occurred due to different natural and human induced causes from the last few decades.

KEY WORDS: Concordance, Dal Lake, Ecology, Evaluation, Carrying Capacity, Resources inventory.

1. Introduction

The principles of economic development have a universal character, however, the technique of economic development differs from place to place and region to region. This is because of the physical, social, economic and environmental factors, which provide the parameters for human actions and are not uniform everywhere. For a proper understanding of the nature and working of the developmental processes in a region, an understanding of the social, economic, physical and ecological parameters is therefore, essential. India has 16 per cent of world's population, 2.4 per cent of world's land resources and 4 per cent of its fresh water resources. Water is a precious resource. It is the biggest crisis the country is facing in terms of spread and severity affecting one in three people. Water storage is not just an urban problem but worse in rural India. With the lives and livelihoods of millions at risk, it is time for us to think about the better uses of our resources especially that of water bodies.

Till 1947, the excellence of Kashmir Shawls was attributed to their washing in Dal waters. The lake has been a star attraction for the tourists who visited Kashmir every year and it continues to be the most favourite spot of the whole valley. The clearer portion of the lake still acts as an aquatic mirror and reflects the mountain amphitheatre which encloses it on three sides and which is one of its most imposing aspects. The water has seasonal reflections, charm and beauty.

Lawrence turns a poet while describing the unchanting beauty called Dal Lake. Says he: "In the spring the fresh green tints of the trees and the mountain sides are refreshing to the eyes, but it is perhaps in October that the colours of the lake are most charming. The willows change from green to silver grey and delicate russet, with red tone on the stems and branches, casting colours on the clear water of the lake which contrast most beautifully with the rich olives and yellow greens of the floating masses of water weed. The chinars are warm with crimson, and the

poplars stand up like golden poles to the sky. On the mountain sides the trees are red and gold and scene is one of unequalled loveliness".

Today, however, this aquatic glory is fast degrading into an environmental water nuisance, thanks to our own doing. The disastrous effects of our vandalism with the lake could perhaps best be summed up in the alarm bells sounded as: "An environmental time bomb is ticking beneath the shimmering waters of the world famous Dal Lake and environmentalists fear that unless immediate steps are taken for proper management of Lake Water, it would likely disappear by the next century".

Mankind's relationship with the environment has gone through several stages. The Lake environment, including natural habitats, and ecosystems, provides three main types of services to mankind.

(a) The lake environment is a source of essential raw material that supports human activities. In particular, natural habitats provide the basis for food and cash crops, fish stocks, forests, domesticated and wild animals, and other natural assets, all of which benefit human society.

(b) The lake environment serves as a sink that absorbs and recycles the waste products of economic activity, normally at little or no cost to society.

(c) The lake environment provides irreplaceable life support functions without which life would be drastically altered or even destroyed.

Recently, mankind has begun to look for practical options at sustainable development that will permit continued improvements in the quality of life with a lower intensity of resource use. Many current problems have arisen either from over exploitation of natural resources or due to poor planning and design of developmental projects. It is necessary to quantify, as far as possible, all the important biophysical and socio-economic changes, likely to result from the project. Hence the key to sustainable resource use is through monitoring systems and information collection, so that the ecologic-economic interrelationships are understood in proper perspective.

2. Nature of the Problem

Abstracting from particular forms of eco-disability problems, one must go over to the general form and nature of ecological problems. Ecological problems stem from the interaction between human systems and natural systems.

The German zoologist, Ernst Haeckel in 1869 coined the term 'Oekologie' to show the relation of animals both to its organic as well as its inorganic environment. The environment includes both physical or abiotic components and biological or biotic components. The interaction between individual components; between populations, organisms and their environment, is called ecological system or ecosystem. The community with a certain population in a specific area comprises a set of species whose interaction to its habitat and between each other is characterised by an integrated system with some degree of unitary character. Thus, the term ecology is defined variously as 'the study of the interrelationship of organisms with their environment and each other' as 'the economy of nature' and as 'the biology of ecosystems'.

An ecosystem produces diverse organisms and thereby attains stability. It develops from simple to more complex forms through various stages known as successions. Each stage is marked by the addition of numerous new species and ultimately the series of stages develops into a climax or steady state where it is able to control and maintain the whole community of species. All the biotic components, including man, and abiotic components or physical environment in an ecosystem, thus function together within naturally well defined physical and biological laws. The whole system of exchange of materials between living and non-living components with biotic diversity, flow of energy and nutrients, is a closely knit and inter-dependent web of nature which finally leads to maintain the vital life support system. The position of man in an ecosystem is unique as he can operate everywhere, interfere with and eat everything he likes within the bounty of nature. Man sometimes misuses this gift of nature by over-exploiting other natural resources of the ecosystem for his own development.

All natural systems have a well-defined carrying capacity. Interference with the ecosystem beyond this capacity leads to destruction and disintegration of all living and non-living components. Man, in his greed to maximise production, has exploited resources beyond the carrying capacity of the natural ecosystems. Studies have shown presence of high levels of lead, cadmium, arsenic and manganese in Dal Lake which find their way into the fish consumed by people, posing health risks. The lake system is not only shrinking in its surface area, but its waters are also becoming unhygienic, posing health hazards to people. The causative factors for the deterioration or dwindling of the lake system are: (i) The pressure on the lake due to accelerated land use which promotes higher disposal of domestic refuse, garbage and sewage into the water, (ii) The greater recreational demands, particularly use of power boats resulting in the oil-spill and wave-dash, and (iii) higher silt load, agricultural run-off, plant debris and allochtonous material resulting in the filling up of the lake sides and eutrophication. Besides, the illegal encroachments

and reclamation of huge tracts in the form of floating gardens or islands, finally used for vegetable cultivation, houses, hotels and shop site constructions are vitally eating into its life and very existence. All these stresses have resulted in the deterioration of water quality, prolific growth of macrophytes, siltation, weed growth, shoreline changes and consequently the shrinking of the lake area.

3. Objectives of the study

The study aims at highlighting the following objectives:

I) To analyse the various changes in and around Dal Lake, which have occurred due to different ecological and economic conditions.

II) To ascertain the impact of activities of Hanjis on the ecology of the Dal Lake.

III) To suggest a suitable strategy for the conservation and management of water resources especially that of Dal Lake.

4. The Study area

Dal Lake is situated in the State of Jammu and Kashmir, the northern-most state of India. Strategically surrounded by four countries- on the East by Tibet, on the North-East by China, on the North by Afghanistan and on the west by Pakistan. Dal Lake is an Himalayan urban Valley lake, situated to the east and north-east of Srinagar at an altitude of 1586 m above sea level between 34^0 5'-34^0 8' 2.5" N latitude and 74^0 50' -74^0 53' 2" E longitude. It is probably of fluvial origin having been formed from the ox-bows of the River Jhelum.

'Dal' is a Tibetan word, which means 'still'. It is believed that in ancient times, there was no lake here and instead a large meadow known as '*Vitalanimarg*' existed at this place. Later due to a massive earthquake, water gushed into the meadows and took the shape of a lake. The lake is shallow with Saucer-shaped basins. Water flows out of the lake through a weir and lock system at Dalgate into Tsunthi-Kul (Apple-canal) and also through Nallah Amir Khan where from it goes towards Anchar Lake.

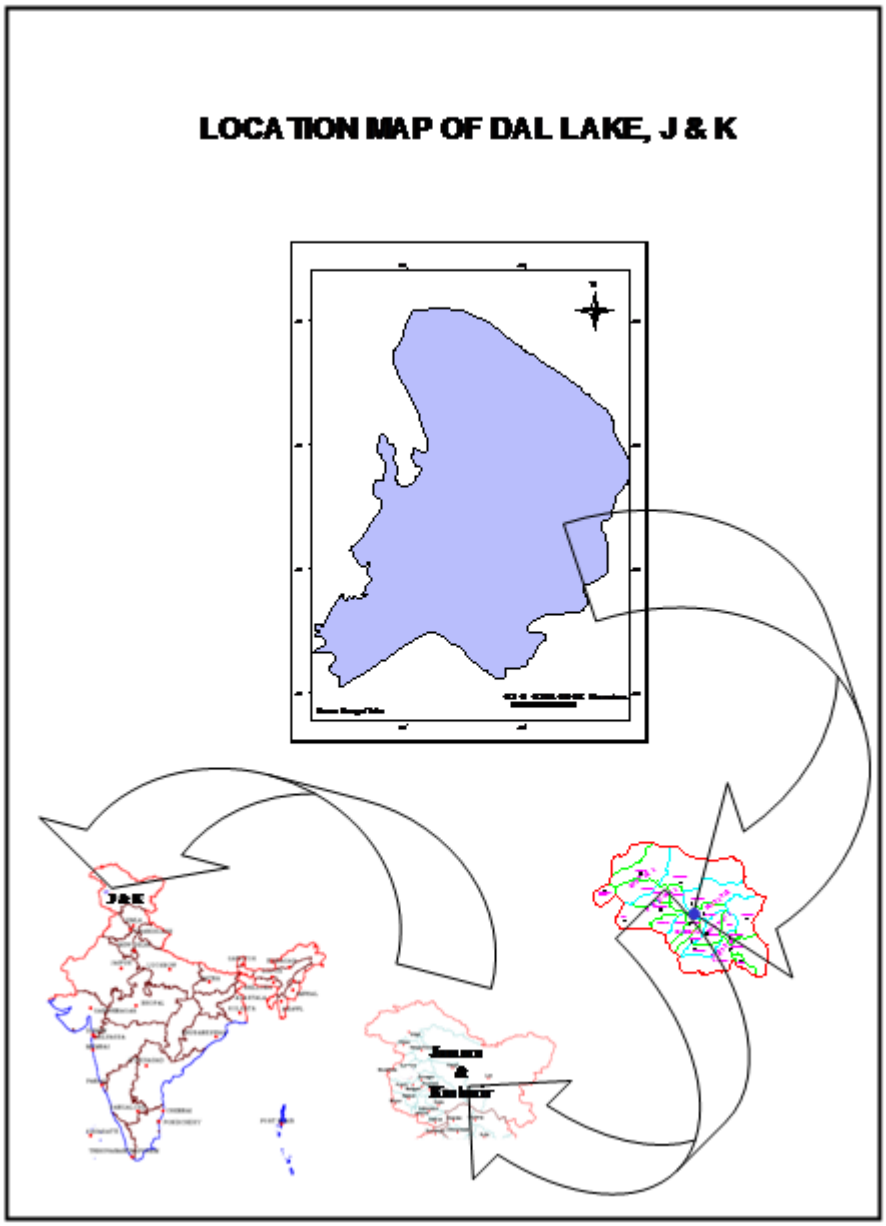

Figure: 1

Until the first half of the twentieth century, ecology was a buzz-word; even in academic circles it had nothing to do with modern dimensions, problems and predicaments. Ecologists, botanists, zoologists, and others involved in the study of biotic, abiotic and symbiotic relationships concentrated on issues like population dynamics of insects and pests in a particular surrounding, habitat, or in terms of specific flora, fauna, humidity, temperature, etc; and visualized their impact on food, resource base and the inter-species struggle for survival. Furthermore, their explorations

were of a piecemeal nature, and were limited to the animal and plant world, and these had hardly anything to do with the overall environmental perspective in terms of human existence.

Even today, with all the furore of an ecological catastrophe, 'ecocide' or 'ecological hara-kiri' and pollution holocaust, the strides that ecological studies have made are limited in many respects. The full implications of the word, especially its socio-economic perspective, are still beyond the comprehension of the masses, whose involvement is necessary for any corrective effort to be successful. And the few who know the implications still continue to ignore the warnings in the hope of nature's self-corrective propensity or from lack of knowledge of the upper limits of population or their distributive effects in space and time or, perhaps, in order to subserve their deluded self interest. Besides, most of the studies hinge on the theoretical paradigm of exponential growth of the factors causing environmental aberrations and the capacity of the pollutants as effect to increase exponentially. In the Third World Countries, in particular, these lack an empirical base. It is no doubt difficult to carry out empirical studies in the ecological field; yet such studies are imperative, and need to be undertaken in the context of their socio-economic implications and within a proper conceptual framework.

In the present context, the conceptual formulations have been focussed around four fundamental facts:

(i) Ecology requires to be understood in terms of the concept of ecosystem, as a functional unit consisting of interacting organisms and all aspects of the environment in any specific area. It contains both the non-living (abiotic) and living (biotic) components through which nutrients are cycled and energy flows. To accomplish this cycling and flow, ecosystem must posses a number of structured interrelationships between soil, water and nutrients on the one hand, and producers, consumers, and decomposers on the other.

(ii) The ecosystem has historical aspects; the present is related to the past, and the future to the present.

(iii) Man, the dominant organism on earth, is strongly dependent on its resource base, and is inextricably tied to his environment.

(iv) Environmental problems in reality are social and economic in nature. Any change in the socio-economic perspective, outlook, and policies is bound to have an impact on the resource base, and in turn on the ecology.

The historical records, memories, and traveler's account show that the Dal Lake was quite large in size in the past. But after the 12th century its shoreline is continuously changing, thereby

reducing its area and shallowing in depth. It is not only, that the size of the lake is shrinking and its shoreline is continuously changing, the rates of reduction in area and shallowness have been substantially accelerated.

The open area of Dal Lake was reported to have been 75 sq. km in 1200 AD. It is clear from table 1 that during the medieval period, the area of the Dal Lake was 76 sq. km. According to Lawrence its area around the ending part of the 19th century was over 25 sq. km which get reduced to only 20 sq. km in 1930. According to the Survey of India maps in 1961 its area further declined and the open area covered only about 13 sq. km. It was during the 20th century when most of the houseboats were anchored and a large number of Shikaras were made for the tourists. In 1978, a study conducted by ENEX (New Zealand) entitled 'A study of pollution of Dal Lake' reported the total open water of the lake as only 12.1 sq.km, which got further reduced to 11.75 sq.km. in 1979. In 1981, the open water area of the lake further got declined to 11.70 Sq. km (Survey of India) and in 1983 (Zutshi and M.R.D. Kundangar) on the basis of maps and surveys of the lake by Montogmerie (1856-60) and Comparing the same with latest dimensions reported that the open water of Dal Lake is 10.56 Sq. km. In 2002, the area of the lake was 11 Sq.km including 20 per cent area occupied by floating gardens (Times of India, 14 February, 2002). However from last few years due to certain measures from the state as well as centre government some lake dwellers have been shifted which has increased the open area of the lake to about 18 sq. kms at present. It is not only that the size of the lake is shrinking and its shoreline is continuously changing, the rates of reduction in area and shallowing have been substantially accelerated.

Table: 1

Dal Lake: Changing Area and Dimensions

S.No	Period	Source Name		Dimensions Length, Breadth	Open water in Sq.km
1.	6th Century A.D.	Nilmata purana	Sureshwari	-	-
2.	12th Century A.D.	Kalhana's Rajatarangni	Sureshwari	-	75.00
3.	15th Century A.D.	Srivar's Rajavali-Pataka	Sureshwari	19 x 4 Km	76.00

4.	19th Century A.D.	Lawrence (1895)	Dal Lake	6.4 x 4 Km	25.60
5.	20th Century (1930)	Survey of India	Dal Lake	5 x 4 Km	20.00
6.	1978	ENEX of New Zealand	Dal Lake	-	12.1
7.	1979	Vass and Zutshi	Dal Lake	-	11.75
8.	1981	Survey of India	Dal Lake	3.98 x 2.94	11.70
9.	1983	Zutshi and Kundengar	Dal Lake	-	10.56
10.	2002	The Times of India " Feb. 14th 2002"	Dal Lake	-	8.00
11.	2010	Rising Kashmir	Dal Lake	-	18.0

Source: Historical Records (Rajatarangni, Ain-e-Akbari, Lawrence and others)

5. Profile of the Socio-Economic Characteristics of Hanjis

A boatman of Kashmir is known as ***Hanz*** in local language and ***Hanji*** is used in Hindustani script. Hanjis are at present living in and around the lake in different localities, which are commonly known as Mohallas. Their forms, structure and size vary from one locality to other. Some localities are as big as more than hundreds of households and some are as small as five to ten households only. The Dal Gate and Gagribal side of the lake has very high concentration of population while the rest of the lake is thinly populated. The persistence of economic backwardness of the Hanjis of Dal Lake, despite improvement in human resource development, however, has emerged as a matter of serious concern.

According to the census of 1981, the Dal Lake and its environs had a total population of 245516 persons. About 166040 people live in and around Dal Lake. Over 22,860 people were permanently residing in houseboats or in the floating gardens, the number temporarily swells during the summer months due to the tourist influx. The population settlement in the Dal Lake is of two types, those who live in the peripheral area of the lake and those who stay in the Dunga boats and hamlets.

The Census of India 2001 presents the total population living in the lake peripherals as more than two lakh. About 7500 people live within the houseboats and 50,000 people in the

hamlets. Besides this, there is a floating population of the tourists who stay in houseboats in the Dal Lake during tourist season. According to the latest census of 2011, the lake is currently being populated by more than 70,000 dwellers, posing a serious threat to the lake. There are more than 775 houseboats, about 400 Dunga boats, 4210 Pucca houses and 3493 huts in and around the Dal Lake. Beside these, there are hundreds of smaller boats or vessels like Demba-Nav and Shikaras. Human settlements within the lake and its periphery are one of the main contributing factors to its pollution. Stein, pointed out the need to keep urban expansion away from the lake to direct it to other places in the vicinity of the town.

5.1 Literacy Rate

Literacy reflects the socio-economic and cultural milieu of a class or community. It also affects fertility, mortality as well as the participation in the work force. The level of literacy accelerates the process of social change and occupational mobility from primary activities to secondary and tertiary activities and promotes social interactions among the different social groups. The literacy rate among Hjanjis as recorded during the field survey is not uniform. It varies from one class to other class and from one income group to other with respect of their occupations.

Hanjis in general, keep their children away from school. On the basis of field survey, the literacy rate among the Hanjis of Dal Lake was only about 23 percent. Out of which the male literacy was about 30 percent and the female literacy constitute only about 15 percent. Correlating these figures with the Srinagar District as a whole, of which 'Dal Lake' is an integral part, backwardness of the community comes to the limelight.

5.2 Occupational Structure

By the term 'Occupational Structure', we mean division of working population in different occupations and professions. The quality of work and the regularity of employment in the active population reflects the economic and social development of a region or class. The Hanjis of Dal Lake are characterized by a low participation rate. It was observed from the field survey that on an average only 16.63 per cent of population living in and around Dal Lake was the workforce (main workers), and 17.41 per cent were marginal workers, who worked for less then 183 days in a year. The non–workers (dependents) constituted about 66 per cent. Comparing these figures

with Srinagar district and Jammu and Kashmir State, the work force among Hanjis is very less. In Srinagar, the percentage of main workers was 30.12 per cent, marginal workers 4.76 per cent and 65 per cent were non-workers in 1981. While in the state as a whole, the figures were, 30.37 per cent as main workers, 13.88 per cent as marginal workers and 55.75 per cent were non-workers.

In order to have a clear picture of income pattern among Hanji's, the average monthly income has been depicted in table 2.

Table: 2

Selected Localities: Average Monthly Income of Hanji's according to Various Income Groups and the Number of Earners in Each Income Group

S. No	Income Groups (Rs)	No. of Families	Percentage of Families	Total No. of Earners	Total Strength of Persons in Families	Percentage of Earners
1	< 2000	110	55.0	207	692	29.91
2	2000-3500	15	7.5	41	152	26.97
3	3501-5000	16	8.0	42	87	48.28
4	5001-6500	15	7.5	46	99	46.46
5	6501-8000	24	12.0	65	161	40.37
6	> 8000	20	10.0	51	135	37.78
All Income Groups		200	100.0	452	1326	229.77

Source: Field work by the author.

A scrutiny of the above table reveals that most of the Hanji's belong to low income groups. About 55 per cent of the total families belong to the monthly income group of below Rs. 2000. Mostly fishermen and some labour class families belong to this income group. Their income depends upon the quantity and size of the fish catch. The labour class too is dependent on the availability of the work and it varies from season to season. In the winter months these people become mostly idle because of the cool climatic conditions, which are bound to occur in a region like Kashmir. Regarding the fishing community as per reports from the surveyed families, they blame their lesser fish catch to government policies. Besides this, the pollution posed to the lake

water has also declined the fish population, which directly influences the fishermen. The child labour is also prevalent in this income group but the return or wages they get from their masters is very scanty. It is only up to twelve rupees a day, which is very sorry state of affairs for their livelihood.

About 35 per cent of the families belonged to the monthly group of Rs 2000 to Rs 8000. In this group, 7.5 per cent belong to the income group of Rs 2000 to Rs 3500. Eight per cent families have monthly income of Rs 3501 to Rs 5000. In the income group of Rs 5001 to Rs 6500, 7.5 per cent and 8 per cent fall in the income group of Rs 6501 to Rs 8000. The Hanji's belonging to this group are mainly engaged in agricultural sector especially in floating gardens and in some peripheral areas where they have got some kind of paddy lands; people belonging to household cottage industries (handicrafts, carpet weaving, needle work and shawl making), blacksmiths, tailors, shopkeepers, businessmen and persons who are in different government jobs. These are working mainly as class IV employees. Regarding vegetable growers their production is not so satisfactory because of the small land holding size per family.

About 10 per cent of the families belong to the income group of more than Rs 8000 per month. These families are mainly engaged in tertiary sector especially in tourism, services and business-related activities. Their incomes too are fluctuating from season to season and year to year. In the winter months some Hanji's are going outside the state for their alternative livelihood. Overall, the present socio-economic and political conditions have forced the dwellers of the Dal Lake to change and shift their business related activities which even their forefathers might not have thought of.

The pattern of income composition among Hanji's varies from season to season and year to year. Their incomes are irregular and vary from one community to other, as there are many groups among Hanji's having different professions. In order to have a clear idea about the source of income, the questionnaire was so set to obtain information from every source viz. primary, secondary and tertiary sectors respectively. The following table (3) gives close picture about the composition of income among Hanji's.

Table: 3

Selected Localities: Composition of Income (in Rupees)

Monthly Income Groups (Rs)	No. of Families	Total per Month Income From Primary Sector	Average per Month Income from Primary Sector	Total per Month Income From Secondary Sector	Average per Month Income From Secondary Sector	Total per Month Income From Tertiary Sector	Average per Month Income From Tertiary Sector	Total per Month Income from all Sources	Average per Month Income From All Sources
< 2000	110	165000	1500	27500	250	22000	200	214500	1950
2000-3500	15	15750	1050	14625	975	13500	900	43875	2925
3501-5000	16	12640	790	30000	1875	13600	850	56240	3515
5001-6500	15	12375	825	45075	3005	19200	1280	76650	5110
6501-8000	24	-	-	86040	3585	92400	3850	178440	7435
> 8000	20	-	-	30700	1535	131700	6585	162400	8120
All Incomes	200	205765	4165	233940	11225	292400	13665	732105	4842

Source: Field work by the author.

An analysis of the table 3 reveals that in the income group of less than Rs 2000 per month, the income from primary source was Rs 165000.00; from secondary source Rs 27500.00 and from the tertiary source the income was only Rs 22000.00 of all the families belonging to this category. There were in all 110 families in this group having average monthly income of Rs 1950.00 only. Between the income groups of Rs 2000 to Rs 3500, there were in all 15 families, having the total income of Rs 15750.00, Rs 14625.00 and Rs 13500.00 from primary, secondary and tertiary sources respectively, with an overall average monthly income of Rs 2925.00. In the income group of Rs 3501 to Rs 5000 there were 16 families having the monthly averages of Rs 3515.00 with 12640.00 from primary, Rs 30000 from secondary and Rs 13600.00 from tertiary sector. In the income group of Rs 5001 to Rs 6500, again there were 15 families with an average monthly income of Rs 5110. From the primary sector they were earning Rs 12375.00; from secondary sector Rs 45075.00 and Rs 19200.00 from tertiary sector. In the income group of Rs 6501 to Rs 8000, there were 24 families having the monthly average of Rs 7435.00 with Rs 86040.00 from secondary sector and Rs 92400.00 from tertiary sector. There was no earning from primary source

because they were either engaged in secondary sector or tertiary sector. The families, which have the monthly income of more than Rs 8000.00 were 20 and have the monthly averages of Rs 8120.00. These were also engaged in secondary and tertiary activities having Rs 30700.00 from secondary sector and Rs 131700.00 from tertiary sector. These were either engaged in tourism or business related activities.

In order to have a more vivid picture regarding total earners in the families, average earners and per capita income among the different income groups, the following table 4 gives a detailed picture.

Table: 4

Selected Localities: Per Capita Income (Rs)

Monthly Income Groups (Rs)	No. of Families	Average per Month Income per Family (Rs)	Total earners in the Families	Average earners in per Family	Average per Month Income Per earner (Rs)	No. of Persons in Families	Average No. of Persons per Family	Average Per Capita Income (Rs)
< 2000	110	1950	207	1.88	1037.23	692	6.29	310.02
2000-3500	15	2925	41	2.73	1071.43	152	10.13	288.75
3501-5000	16	3515	42	2.62	1341.6	87	5.44	646.14
5001-6500	15	5110	46	3.06	1703.33	99	6.6	774.24
6501-8000	24	7435	65	2.7	2753.7	161	6.71	1108.04
> 8000	20	8120	51	2.55	3123.07	135	6.75	1202.96
All Incomes	200	4842	452	2.59	1838.39	1326	6.99	721.69

Source: Field work by the author.

An examination of the table 4 reveals that in the income group of less than Rs. 2000.00, there are 110 families with a total of 207 earners, thus giving an average of 1.88 persons per family. The average per month income per earner was Rs 1037.23 and monthly income per family was Rs 1950.00, with 692 persons in all, thus giving an average per capita income of Rs 310.02. In the income group of Rs 2000 to 3500 there were 15 families having a total of 41 earners engaged in different activities. The average earner per family was 2.73 persons with an average per month income of Rs 1071.43 per earner. The average per month income per family in this category was Rs 2925.00 having 152 persons in all, and thus the average per capita income was Rs 288.75 only.

In the income group of Rs 3501 to 5000 there were 16 families with 42 earners having 2.62 earners per family. The monthly average income per earner was Rs 1341.60. There were in all 87 persons in this income group and the per capita income comes out to be Rs 646.14. There were 46 earners in the income group of Rs 5001 to 6500 having 15 families with an average per month income of Rs 5110.00. The total number of family members were 99 with an average per capita income of Rs 774.24. The income group of Rs 6501 to 8000 has 24 families having the monthly average income of Rs 7435.00. There were 161 persons and the per capita income was Rs. 1108.04. While there were 20 families whose income was more than Rs 8000 per month. These families have average monthly income of Rs 8120.00 with 51 earners and a total of 135 members in all, the per capita income was Rs 1202.96.

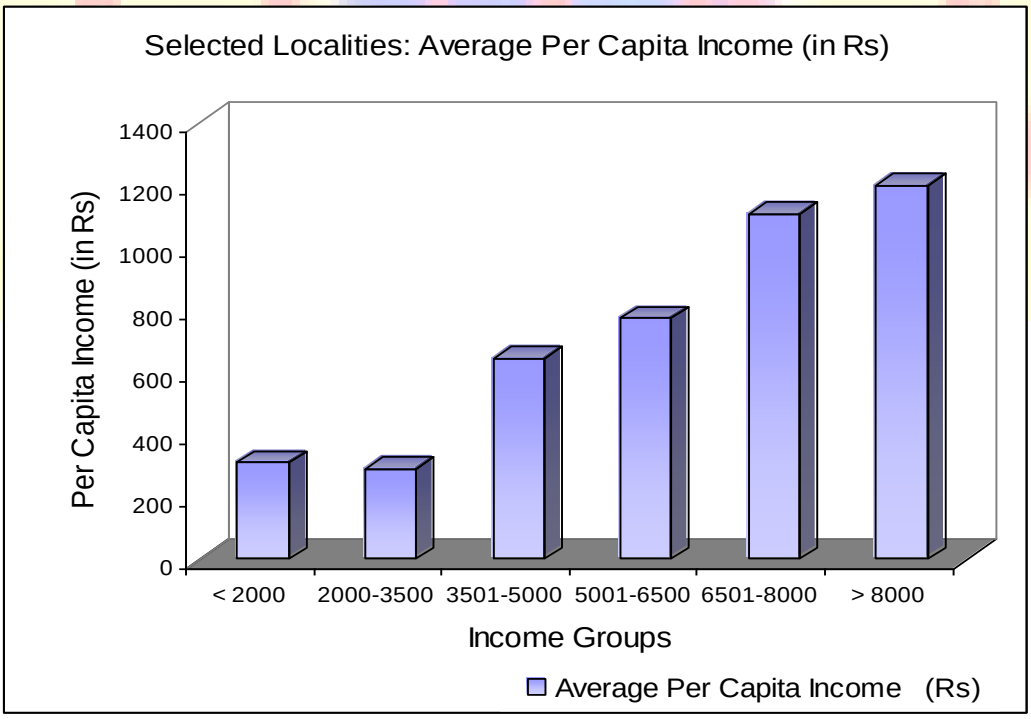

Figure: 2

On the whole, the per capita income among the Hanji's of Dal Lake was Rs 721.69 only. Comparing these figures with the Jammu and Kashmir State as a whole where the per capita income was Rs 7260 in 1997-98, the backwardness, economic deprivation and low standard of life among Hanji's comes to the limelight. So it has a direct impact on the ecology of the lake as these people have no other way but to occupy and convert more and more open water into floating gardens for their gainful activities.

6. Hanjis and Dal Lake

Man's urge for development is old. The reason for the degradation of forests, lakes and rivers by man is all due to his increasing urge and need and his greediness to exploit more and more nature's wealth. The Dal Lake is not far beyond that. Its pristine glory has been changed by the same inhabitants who are and have benefited from it, from times immemorial. However, it is not only the lake dwellers who are responsible for the ecological degradation of the lake, but equally government agencies, policy makers and political factors too are responsible for its destruction.

Hanjis though living here from centuries are not fully aware about the ecological degradation of the lake. Though some of them have attained modern means of life but still their habitat has not changed. The following table, 5 gives an idea of Hanjis about ecological degradation of the lake.

Table: 5

Selected Localities: Awareness of Hanjis about Ecological Degradation of Dal Lake

	No. of Households	Percentage
Fully aware	17	8.5
Aware	29	14.5
Not aware	89	44.5
No idea	65	32.5
Total	200	100.0

Source: Field work by the scholar.

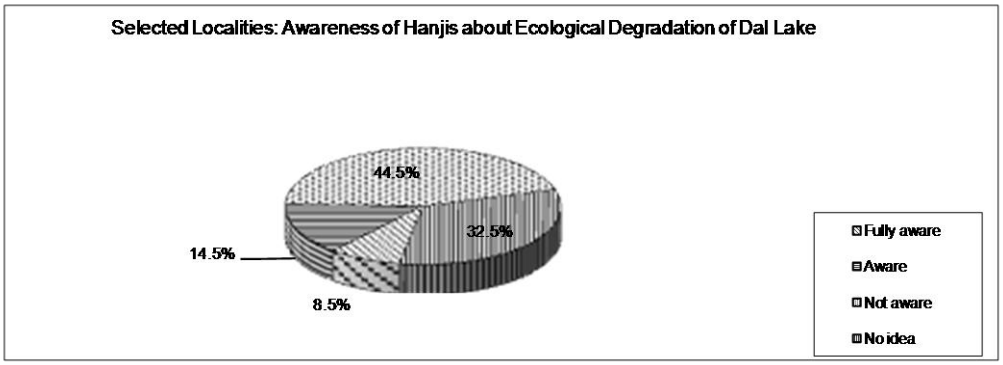

Fig: 3

An examination of table 5 reveals that only 23 percent of the households surveyed were fully or partially aware about degradation of the lake. There were 44.5 per cent who were not aware about the lake's degradation and 37.5 percent haven't any idea about this. This clearly shows that these people are still much neglected ones of the society because of lack of education and other government programmes. In order to have a more detailed and clear picture regarding awarness of Hanjis about the degradation of lake, following table gives a clear out-look.

An analysis of table 6 reveals that 53 per cent of the households were throwing their sewage and toilet disposal wastes directly into the lake. Only 15 percent were using septic tanks and 32 per cent were using pits which they later use as a fertilizer in the floating gardens

Table: 6

Selected Localities: Sewage and Toilet Disposal Sites of the Households

	No of households	Percentage
Into the Lake	106	53
Septic tank	30	15
Pit / Fertilizer	64	32
Total	200	100

Source: Field work by the Scholar.

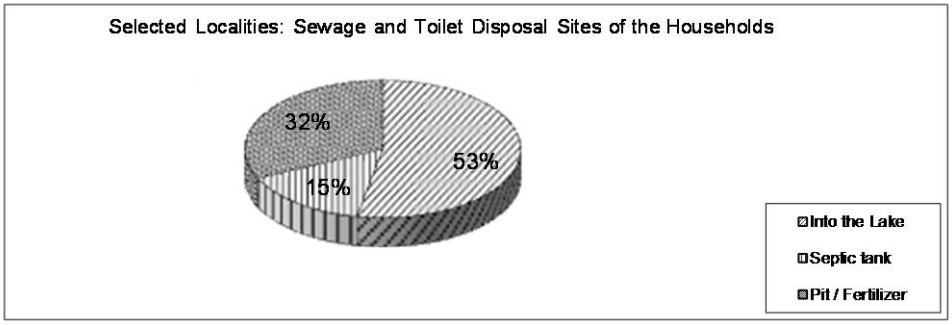

Fig: 4

Regarding solid waste disposal of the Hanjis, the following table 7 gives a full picture. An analysis of table 7 reveals that 33.5 per cent of the households were throwing their solid waste directly into the lake. Only 3.5 per cent households were using municipal waste disposal sites and

Table: 7

Selected Localities: Solid Waste Disposal Sites of the Households

	No of households	Percentage
Into the Lake	67	33.5
Municipal waste area	7	3.5
NGO pits	122	61.0
For land filling	4	2.0
Total	200	100.0

Source: Field work by the Scholar.

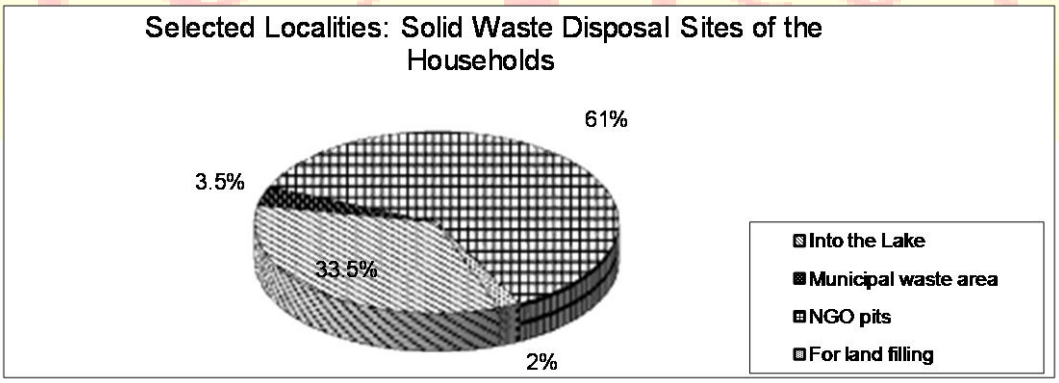

Fig: 5

2 per cent were using it for land filling purposes. Two NGO's, Green Kashmir and HOPE (Human objective to protection the environment) have done a good job from last three years as they are regularly collecting the solid waste from the pits, they have installed near the households. And 61 per cent of the households were using these pits. From the last three years, Green Kashmir alone has collected about 144 tonnes of solid waste with the daily average of about 1500 kg. Similarly HOPE has collected about 8.5 tonnes of solid waste in some parts of the lake during the last three years. So there is a need to encourage more NGO's to take all parts of the lake in this campaign, so that all the household waste can be taken away from the lake area. The increasing pressure of vehicular traffic, tourism and other related activities too has posed threat to the ecology of Dal Lake by pollution and deforestation. The response of 200 households surveyed regarding these activities are given in table 8.

Table: 8

Selected Localities: Awareness about the Impact of Tourism and other Related Activities on the Degradation of the Lake

	No of households	Percentage
Pollution (Water)	95	47.5
Traffic Pressure/ overloading	38	19.0
Deterioration in Quality of life	58	29.0
Deforestation	9	4.5
Total	200	100.0

Source: Field work by the Scholar.

An examination of the table 8 reveals, that 47.5 per cent of the households were aware about the pollution of lake mainly that of water pollution. Nineteen per cent reveal that the increasing vehicular traffic in the Boulevard road is responsible for air pollution which affects human health as well as the lake water also. Twenty nine per cent reveal that the quality of life has worsened due to increasing tourists, traffic and thereby because of increasing pollution level of the lake. Only 9 per cent feel that deforestation has lead to the ecological degradation of the lake.

In the above discussion, it is clear that this unique ethnic group (Hanjis) despite living in the heart of Srinagar City are still lagging far beyond the rest of Kashmiris. The low literacy rate besides the poor social and economic conditions of Hanjis is one of the main factors responsible for the degradation of Dal Lake. So it needs an immediate and drastic measure to conserve this fresh water resource on war footing basis.

7. Ecology: A Development Perspective

Environment is indeed a matter of general concern. This is a basic attribute on which the whole life and economic system is built up and hence is of vital importance. The basic concept of the discipline of geography contained in its obsession with the study of land, man and his economy, has provided the geographer a certain and new outlook, insight and approach towards understanding the environment. Man has essentially a synthetic approach and is capable of providing due weightage to all the components of the environment and his contribution in this sphere is, therefore, unique in many respects. The environmental studies have to incorporate the natural hazards as the significant attribute because at local level the interaction between the physical and human element does influence the environment of the region or the locality.

From times immemorial man's role in changing the face of the earth has been of paramount importance. The world as the home of man has been shaped up and modified according to the growing need of the mankind. So the distinction between physical and man-made environment is disrupted and there develops an 'ecological imbalance'. The balancing factors in environment and human relationship are multi-dimensional and complex in nature. At a time when environment cannot absorb the vagaries of human exploitation, environment pollution occurs. Environmental pollution is not necessarily the result of industrial and economic development alone. It may also occur because of ill-development or under development. Besides, ecological environmental quality is not necessarily good in a low level of technology or low level of development. The valley of Kashmir in general and Srinagar in particular is not far beyond this. The unplanned growth of urban development and increasing number of hotels, restaurants, houseboats, besides the increasing vehicular traffic rush in the vicinity of Dal Lake has changed its overall outlook.

The problems of the human future range far beyond ecology, yet ecology is an integral part of them. Ecological knowledge can make possible the 'appropriate' harvest of ecosystem, contribute to planning such that the use and the disturbance of environment are balanced, and clarify the meaning and potential dangers of pollution and retrogression.

In the present scenario, the ecological concepts which place the man inside the ecosystem, another dimension relating to the human perception of changes in environment, has been added. So that future course of development will undoubtedly be determined by the outcome of how the human civilization reacts to the present phase of large-scale changes in the environment.

7.1 Linkages between Ecological, Economic and Social Systems

The ecological and economic systems have myriad of intricate interconnections, the simplest and most obvious is the ecological which provide raw materials to the economic systems and absorb the waste generated by the economic systems. Therefore, the economic system will always be constrained by the production and the waste absorption capacities of the ecological system. The moment one or both of these capacities are exceeded, ecological crisis and reactions are bound to occur. Economic system can indeed, be predicated as having a more or less parasitic role in the biosphere.

On the one hand ecologists lay down an environmental imperative that requires an end to economic growth or sharp curtailment of it, as the price of biological survival, while the economist may counter with a socio-economic imperative that requires the continuation of growth as the price of social welfare. In fact, the ecological, socio-cultural and economic systems are inter-connected and inter-dependent and they have to be considered with a holistic and not sectoral view point.

Both ecological and economic values can be served in a variety of ways, but combining ecological and economic values adds geometrically to the complexity of a development programme. Thus, the ecologist wants the overall development of the surroundings, the development in a scientific and sustainable way. He also pleads for preservation of unique system as environmental heritages in the spirit of an obligation to future generations, because he knows that man can never reproduce such ecosystems and that these can act as standards for assessing the impact of man on nature in future, and as gene reservoirs. The ecologically sustainable development is to maximize human well being or quality of life without jeopardizing the life-support system. The quality of life has certain variables viz. economic, ecological, socio-cultural and political which might be available for a better standard of life. Thus it can be said that the quality of life depends on economic as well as non-economic resources.

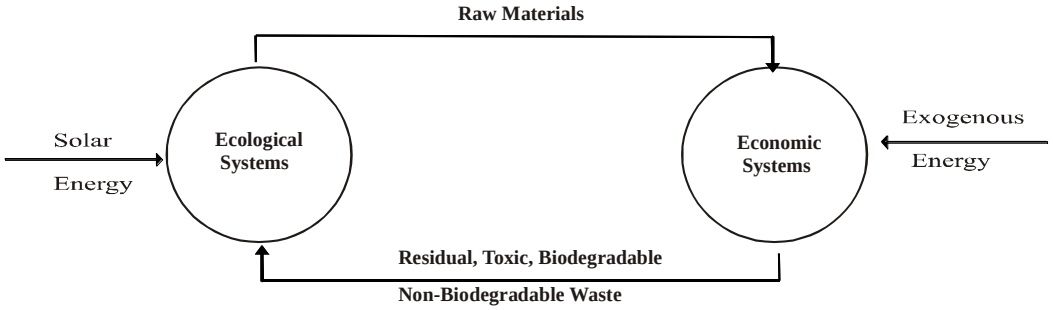

Fig. 4 Broad Linkages Between Ecological - Economic Systems

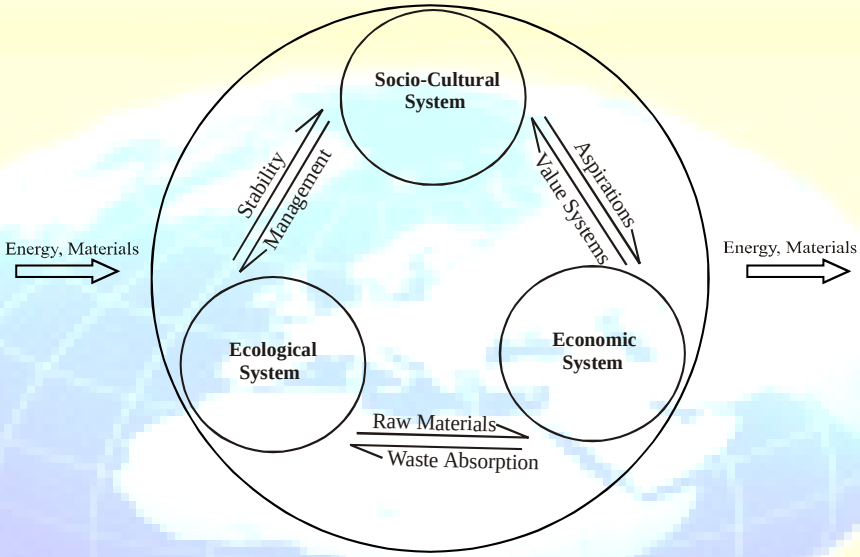

Fig. 5 Broad Linkages Between Ecological, Social and Economic System

So the use of ecology in development planning has the aim, both enhancing the goals of development, and anticipating the effect of developmental activities on the stability of ecosystem attributes, in general, on the natural resources in particular, and on the process of the large environment as well. Thus, an ecological appraisal of a particular type of development will focus on the area of the resource to be exploited and also on large environment and human inhabitants.

More often than not, a particular regional development results in an increase of size of population and its different activities. It is very necessary that this increased level of population or its activity be in conformity with the carrying capacity of the environment.

8. Conclusion

The environmentalists woke up to the impeding danger to the very existence of the Dal Lake rather very late. It was only when a lot of damage had been done that the State government, alarmed by the possible extinction of the Lake, decided to take the corrective measures. It constituted the Dal Development board in the later years of 1970s with a Rs 80 crore project to restore its natural beauty and grandeur. The enthusiasm with which the project was launched, however, did not last long and the process of degradation of the Lake continued. Another attempt to save the Lake was made in 1980s with the formulation of a Rs 200 crore Dal Development Project. The effort suffered due to the then prevailing conditions in the valley.

Meanwhile, illegal and indiscreet encroachments, increased agricultural activities on floating gardens, land reclamation, massive constructions in and around the Lake, unchecked addition of layers of silt, wild growth of weeds, the deterioration of the quality of water due to the inflow of pollutants and contaminants- all played havoc with the Dal Lake. The single largest contributing factor, the experts feel, was the closure and conversion into the metallic road of the serpentine outlet of the Lake, the Nallah Mar, which ran through the heart of the old Srinagar City working as the respiratory system of the Lake. The result was not unexpected. In the span of less than 50 years the Lake shrunk from 48 Sq. Kms to a mere 15.42 Sq. Kms. The red algal bloom along the Lake periphery was the latest addition to the worries of environmentalists who saw it as the first sign of the death of the Lake. Some scientists who are not as pessimistic, however, attribute it to the mechanical de-weeding which replaced the manual de-weeding some years ago.

The Lake calls for our immediate attention. Government efforts alone would not yield the desired result. We have been literally throwing crores of rupees into the Dal Lake in the name of its restoration. The ongoing project to save the Lake would also meet the same fate as of the earlier plans unless there is single-minded determination on the part of the concerned officials to reclaim the Lake and a massive public awareness about its importance. A 'Save Dal' hoarding near Jawahar Tunnel, half - hearted drive to remove few encroachments now and then and a periodic mechanical deweeding have not taken us anywhere. Let us deal with the 'Dal Lake as Topmost Priority'. If continuous flow of money is any problem, let the government divert financial resources to achieve the objective in, say, three years. Even if it means suspension of other development works in district Srinagar for as much time, let us willingly chose the option. Let us hand over this gift of nature to our future generations in its purest form.

The Dal Lake is not dead yet. It is breathing. Let us allow it to recover into a healthy water body. And let a Lawrence of the 21 st century, while walking down the Bouleward, sing the song of "the Lake par excellence of Kashmir".

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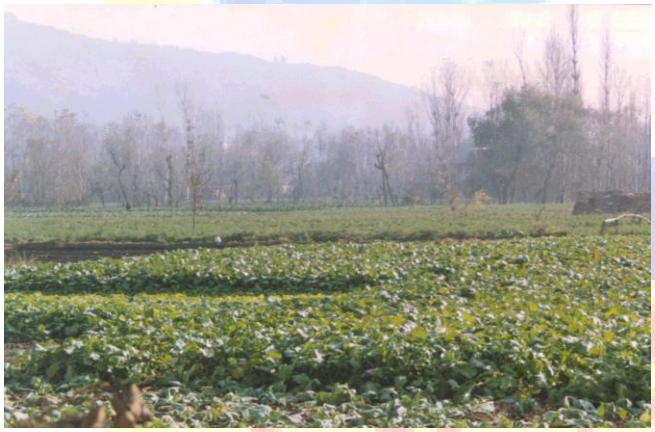
A View of Floating Garden

Conversion of Open Water into Floating Gardens



Floating Gardens Converted into Agricultural and Residential Land