

Lake Fisheries in Kashmir

A Case More Undone Than Done

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The Dal and Wular lakes produce 70% of the total fish production in Jammu and Kashmir. In addition to introduction of carps, negative externalities of tourism, excessive fertilisation of vegetable crops on floating gardens leading to algal blooms have all led to a consistent decline and destruction of the breeding grounds of the local fish species schizothorax. Though fish production in absolute terms may be increasing in the Dal lake, the rate of growth of even carp fish production is declining. The restoration of schizothorax fishery in the lakes of Kashmir on an even keel will ensure growth in socio-economic-cultural terms and the sustainability of fishery.

The state of Jammu and Kashmir (J&K) has an area of more than 2 lakh sq km with a population density of 124 persons/sq km. Among the key economic sectors that govern the economic growth of the state, agriculture occupies the 11th position (PHDCCI 2012). J&K's gross state domestic product (GSDP) works out to more than Rs 63,000 crore and the primary sector, which includes agriculture and allied activities like fisheries, contributes 23% to the GSDP. The contribution of the manufacturing sector is as much as 29%, while the tertiary sector records a healthy 48% (PHDCCI 2012).

Institutions and Infrastructure Arrangement

The official institutional arrangement at the state level for the development and management of fisheries in the state is divided between the state department of fisheries (DOF), the Krishi Vigyan Kendras (KVKs), and the research and development (R&D) in the universities. This is supplemented by schemes and subsidies offered by the National Fisheries Development Board. The central research institution, Directorate of Coldwater Fisheries Research (DCFR) also plays an important role in supplementing the contribution of R&D in the development of lake fisheries of Kashmir.

The state DOF of J&K is a nodal agency that takes care of almost all facets of fisheries development in the state. Established in 1900, when trout was successfully introduced in Kashmir, the DOF was formally established in 1903 as the game preservation department. The objectives and mandate of the department were formalised from 1978, which included sport fisheries and conservation, infrastructural development, and establishment of district level offices. It also

included the development of endemic fisheries, better marketing facilities, hill stream fisheries, recreational fisheries, and introduction and implementation of welfare schemes (DOF 2010). It does appear from the investment pattern in the fisheries sector that this sector was identified as a growth sector only for the year 2002-03 (PHDCCI 2012).

In addition to the role played by the DOF, the KVKs and the university, the Lakes and Waterways Development Authority (LAWDA) and tourism departments are involved in the development as well as use of the lakes of Kashmir.

Contribution and Performance

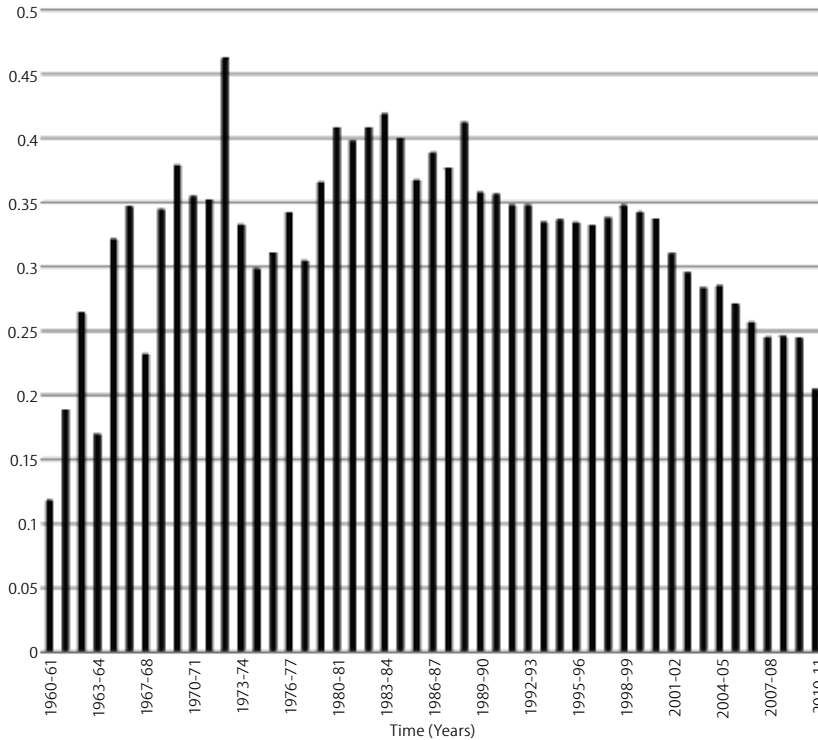
Fish production in J&K was 19,000 tonnes in 2010-11. The total fish production was the output of a total water spread area of 3,89,261 ha. Of the total water spread area available, 3.5% of the area is under lakes and ponds. The J&K fisheries contribute as much as 31% of the total cold water fishes produced in the country (Figure 2, p 67) (DCFR 2010). Figure 1 (p 67) shows the contribution of J&K state to the total fish basket of the country, which is not more than even 1% (DOF 2010).

The contribution of 23% by the primary sector to the GSDP includes the contribution of fisheries too (PHDCCI 2012). The fisheries sector has been highlighted as an important activity allied to agriculture. It provides substantial production base for the agricultural economy and generates self-employment.

The two lakes Dal and Wular produce 70% of the total fish production in the state. The Dal and Wular lakes also have had a flourishing fishery, but an examination of data on fish production shows a decline in fish catches in both these lakes. Though one of the objectives of the DOF is to promote endemic fisheries, the accidental introduction of carps in Dal lake and heavy siltation in Wular lake compounded by other externalities have led to a consistent decline in the production of schizothorax, the local fish species (Qureshi 2013).¹ In addition to introduction of carps, negative externalities of tourism, excessive fertilisation of

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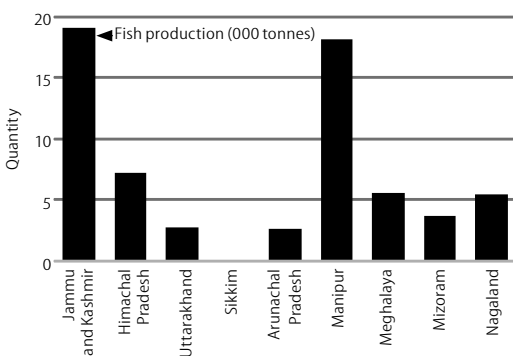
Figure 1: Contribution of J&K to India's Fish Production (%)



Source: DoF (2010).

vegetable crops on floating gardens leading to algal blooms have all led to a consistent decline and destruction of the breeding grounds of the local fish species schizothorax.

Figure 2: Contribution of J&K to Cold Water Fisheries



Source: DCFR (2010).

The problem of fisheries in Kashmir lakes is a double-edged weapon. While on the one hand, the primary stakeholders, the fishers and those who derive primary income from lake fishery are in favour of schizothorax fishery, on the other hand, there is an urgent need to increase total fish production from the lakes to meet the ever-increasing demand of the local consumers irrespective of the species (Qureshi et al 2013). The priorities get further complicated

when we weigh the objectives of DoF vis-à-vis the department of tourism (DoT) (Ministry of Tourism 2012). The whole question boils down to whether the lakes need to serve the interest of the primary stakeholders of the lake, i.e., the fishers, or serve the larger interest of the state economy by generating increased revenue from tourism.

It does appear from the way that lake fisheries of Kashmir are declining that the priority seems to be more towards generation of revenue from tourism rather than conservation and development of lake fisheries which would enable the fishers to earn increased income in terms of return on time invested in fishing.

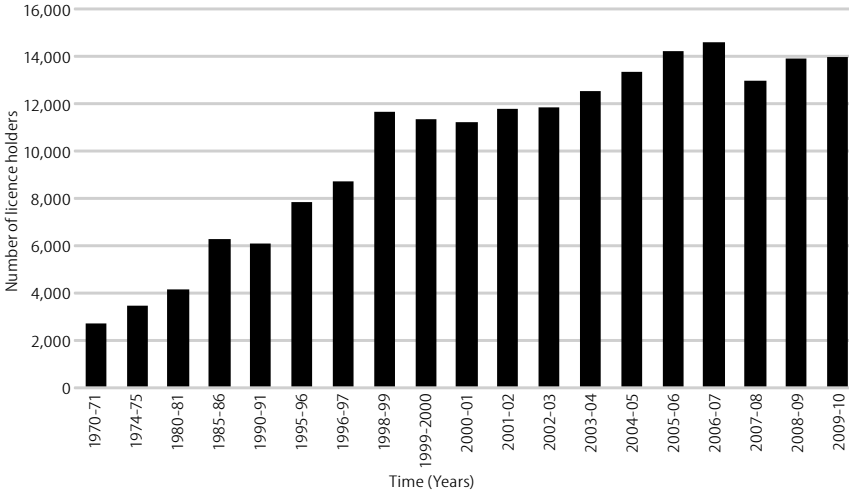
It should be noted that the DoF earns substantial revenue from angling. In 2012, it earned as much as Rs 12-15 lakh per year, and 1,246 licences had been granted in 2012 for angling (DoF 2010). Therefore, the tourism component of lake fishery seems to have priority over safeguarding the interest of primary stakeholders who are earning their livelihoods through fishing in the lakes of Kashmir.

The number of fishing licences in the state shows a steady increase during the period 1970-71 to 2009-10. This does not in any way indicate a flourishing fishery since licensed fishers are eligible for compensation from the department during the ban period. Despite this, the ban on lake fishery for the period March to May has been announced to encourage the breeding of the local species schizothorax, but it may be noted that the dispensation of compensation itself acts as an incentive for registration of more number of people as fishers who are actually dormant and had registered only for availing the compensation offered by the department during the ban period. Therefore, the number of active fishers has actually remained more or less the same over a number of decades. It may also be noted that the maximum number of licences had been given out in the district of Srinagar followed by Bandipora, which are the districts in which Dal and Wular lakes are located (Figures 3 and 4, p 68).

Growth Rates

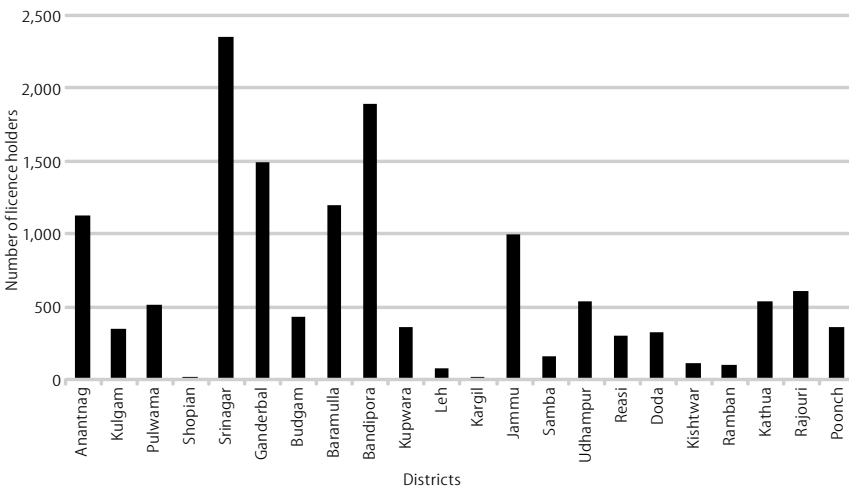
Table 1 (p 68) indicates the compound growth rates of carp, schizothorax and total fish production in Dal and Wular lakes. Growth rates for fish production in Dal lake have been worked out for the period 1980-2010 and in Wular lake from 1990 to 2010.² It can be seen from the table that the total fish production in Dal lake has registered a negative compound growth rate (CGR) of 0.34% for the period 1980-90 while the growth rate for the period 1990-2000 was 1.39%. Again, for the period 2000-10 fish production in Dal lake showed a negative compound growth rate of -2.89%. In the same context it can be noted that the decline in the Dal lake total fish production was largely contributed by decline in local fish species production which had increased by as much as -14.39% during the period 2000-10. At the same time the decadal fish production for Dal lake for carp was 5.86%, followed by 3.54% which further declined to 1.49%, in the three decades for which CGR was estimated for carp fish production. This indicated a decline in fishery in Dal lake.

Figure 3: Number of Fishing Licence Holders in J&K



Source: Department of Fisheries, J&K. <http://jkfisheries.in/>

Figure 4: District-wise Licence Holders in J&K



Source: DoF (2010).

Though the total fish production may be increasing in Dal lake, the rate of growth of even carp fish production is declining.³ This clearly indicated that despite the measures taken by the DoF, the total fish production from Dal lake is showing a declining trend.

In the case of Wular lake the total fish production registered a CGR of 1.70% during the decade 1990-2000 and a negative CGR of 8.78% during 2000-11. It may be noted that in the case of Wular lake the decline in the growth rates was dramatic as far as both the local and carp fish production is concerned. Therefore, it implies that despite the large area occupied by Wular lake the total fishery has actually declined, even though the DoF has been carrying out desiltation measures and implementation of the ban period.

Therefore, the moot point is to address the basic question of the trade-off between the increasing revenues that add to the coffers of the government department or restoration of a fishery enabling the resurrection of an age old traditional socio-economic and cultural heritage of the lakes of Kashmir (Qureshi and Krishnan 2012).

Table 2 shows the Coopock's instability index (CII) of fish production in Dal and Wular lakes of Kashmir (Tesfom 2013).⁴ The CII is a better measure of instability

Table 1: Compound Growth Rates of Fish Production in Lakes of Kashmir

	Period	Carp	Schizothorax	Total
Dal lake	1980-90	5.86	-1.75	-0.34
Dal lake	1990-2000	3.54	-0.62	1.39
Dal lake	2000-10	1.49	-14.39	-2.89
Wular lake	1990-2000	2.32	0.52	1.70
Wular lake	2000-11	-11.56	-3.72	-8.78

Source: DoF (2010).

in comparison to the coefficient of variation since this index takes into account time trends of the data while measuring the instability in the variability of the data (Mitra 1990). The thumb rule of interpreting CII is that if the estimated index is less than 50, then the instability is relatively low and otherwise high. Therefore, it may be noted that the estimated growth rates of total fish production in Dal lake have been relatively stable in the sense that the estimated growth rates do not have to show much variation within the time frame of the data analysed.

But in the case of Wular lake it can be seen that for the last decade considered, the CII is 72.08 which indicates that there is a definite trend in the instability of fish production in the Wular lake for the period 2000-11. This is substantiated by the high and negative CGR of carp fish production in Wular lake for same period of time. As far as instability in local fish production is concerned it can be seen that the instability is very high in the production of the local species, which is again substantiated by the high and negative growth rate during the same period 2000-11. Relatively, the instability in carp fish production in both the lakes for almost all the periods considered was high. The instability was 67.29 for carp fish in the Dal lake during 1980-90 while it was 52.15 in the Wular lake for 1990-2000. Again the instability was high for carp fish production during

Table 2: Coppox Instability Estimates of Fish Production in Dal (1980-2010) and Wular (1990-2011) Lakes of Kashmir

	Period	Carp	Schizothorax	Total
Dal lake	1980-90	67.29	23.25	26.18
Dal lake	1990-2000	45.44	19.72	25.53
Dal lake	2000-10	26.94	119.35	48.00
Wular lake	1990-2000	52.15	26.33	41.16
Wular lake	2000-11	92.96	12.05	72.08

Source: DoF (2010).

2000-11. These estimates of high instability in carp fish production could be attributed to inherent time trend factors that influenced the CGR estimates.

Conclusions

Growth in terms of real welfare, which ought to be reflected by flourishing growth in schizothorax fishery has been replaced by giving priority to increasing

total fish production in the lakes of Kashmir irrespective of the species produced. In order to restore the prime place of importance to schizothorax species in Dal and Wular lakes, it is important that the water quality be improved. The efforts of LAWDA, Kashmir need to be more focused in terms of proper usage of funds and implementation of programmes (Qureshi et al 2013).

The most important point that has to be taken into account is the balance of the stocks of the local species schizothorax and the carps which occupy the same water space. Special care would have to be given to ensuring a sustainable and growing stock of the local species and lowering of carp fish productivity. Carp culture could be promoted as a separate freshwater aquaculture activity in other derelict water bodies, which would yield good income and keep the supply chain of fish to the markets going.

The restoration of schizothorax fishery in the lakes of Kashmir on an even keel will ensure growth in socio-economic-cultural terms and sustainability of a balanced fishery. A well-designed plan of action for the restoration of schizothorax fishery in the lakes of Kashmir is the need of the hour. There is an urgent need to develop hatchery technology for schizothorax. Ranching programmes,

concerted efforts to reduce the dominance of carps, and institutionalisation of lake fisheries of Kashmir through establishment of suitable end to end supply chain arrangements need to be envisaged and implemented. Until such measures are implemented in letter and spirit, the case of restoration of lake fisheries will remain a case more undone than done.

NOTES

- 1 Fish production in Kashmir lakes has been declining over time. The decline in fishery of the local species schizothorax has been marked. The introduction of common carp to a large extent has been responsible for shoring up fish production in Kashmir lakes, but since 2004-05 there has been a dramatic fluctuation in total fish production in Kashmir lakes and this can be attributed largely to increase in pollution in these lakes. Qureshi (2013), hypothesised that there were sufficient grounds for stakeholder animosity in this matter and that the multiple stakeholders are willing to pay (WTP) for alleviation of pollution and enhancement of fish production in the lakes of Kashmir.
- 2 The compound growth rate was estimated with the standard Cobb-Douglas type function. $Y = AX_1^{b_1-1}$ and $r = \text{antilog}(\beta-1) \times 100$
- 3 The declining trends in both schizothorax and carp fish production had been captured by fitting trend lines to the data on species-wise production and total fish production in Dal and Wular lakes. The polynomial trend of degree 6 gave the best fit in most cases (Qureshi 2013).
- 4 Tesfom (2013) used the Coppox Instability Index of the form $CII = |\text{anti ln } \sqrt{\ln V^{-1}}|^x \times 100$ Where $\ln V =$

$$\frac{1}{n-1} \left[\sum (\ln Y_{y+1} - \ln Y_y) - \frac{1}{n-1} \sum (\ln y_{t+1} - \ln y_t) \right]$$

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