

# Cicfri NEWSLETTER

Quarterly organ of the Central Inland Capture Fisheries Research Institute Barrackpore

SPECIAL COMMEMORATIVE ISSUE

JANUARY 1990

ISSN 0970-6143

## NATIONAL WORKSHOP ON RESERVOIR FISHERIES



*Shri Kiranmoy Nanda, Hon'ble Minister for Fisheries, Govt. of West Bengal, inaugurates the Workshop by lighting the lamp*

A National Workshop on Reservoir Fisheries was held at Barrackpore from 3-4 January 1990 under the auspices of the Central Inland Capture Fisheries Research Institute and the Asian Fisheries Society, Indian Branch. During the two-day colloquium, a galaxy of fisheries experts converged to Barrackpore to deliberate upon this crucial topic. Reservoirs being the most important among the inland capture fisheries resources of the country, the Workshop on Reservoir Fisheries attracted the attention of distinguished profile of fisheries specialists in the

country. More than one hundred registered delegates; representing the Central and State Governments, Agricultural Universities, Fisheries Colleges, Universities, Financing Institutions, Developmental Agencies and registered societies, participated in the Workshop.

The Workshop spanned into four technical sessions *viz.* Reservoir Fisheries Management - General Issues, Conservation and Environmental Management, Case Studies from Regions and Limnology and Trophic levels.

## Inaugural Session

The Workshop was inaugurated by Shri Kironmoy Nanda, Hon'ble Minister for Fisheries, Govt. of West Bengal on 3rd January 1990 at a colourful function at Barrackpore. The inaugural Session was presided over by Shri M. Muniappa, Secretary (Fisheries), Govt. of Karnataka.

## Shri Kironmoy Nanda

While addressing the delegates Shri Nanda described the Workshop as a timely event, as the Central and State Governments have identified the



*Inaugural session. Seated on the dais are (from left) Shri G. Gananeela, Dr. Arun G. Jhingran, Shri M. Muniappa, Shri Kiranmoy Nanda, Prof. H.P.C. Shetty, Dr. V. D. Singh and Dr. V.K. Unnithan*

reservoirs as a priority sector in inland fisheries. He pointed out that the country has made significant progress in developing scientific know-how for reservoir fisheries management for the last two decades and he was optimistic that the wide-scale application of the technologies will lead to considerable production hikes from Indian reservoirs which may add about 0.3 million tonnes of additional fish at a moderate yield rate of 75 kg per hectare. He called for concerted efforts by researchers, policy makers, administrators and the fisherfolk to optimise the fish yield from Indian reservoirs. He lauded the

efforts of CICFRI in organising the workshop which provided an excellent forum for effective interaction among the various agencies. Emphasising the need to bring more fishing activities under the cooperative sector, he said that the cooperatives will go a long way in ensuring that the benefits of increased productivity will really reach the fishermen who toil in water. The Minister appealed to the delegates to give sufficient thoughts on the socioeconomic considerations related to capture fisheries development which was highly labour-intensive and provided opportunities for skilled, semi-skilled and unskilled rural poor. Mr. Nanda suggested that the state

Government functionaries should strive to imbibe the expertise available at the research organisations to the maximum extent in order to optimise the fish yield from the reservoirs. He expressed the hope that the National Workshop, while delving deep into the pros and cons of reservoir fisheries development in the country, would make special efforts to link the productivity with economic and nutritional prosperity and social justice.

Shri Nanda released the proceedings of the Workshop on Exotic Aquatic Species conducted by the Asian Fisheries Society during April 1988 at Mangalore.

The address of Shri T.N. Narasimha Murthy, Hon'ble Minister for Fisheries, Govt. of Karnataka was read by Shri G. Gananeela, Director of Fisheries, Govt. of Karnataka. The Minister, in his address, stressed the need to make the technologies developed by the Institute acceptable to the common man. Pointing out that India has



*The Hon'ble Minister (Right) being received by Dr. Arun G. Jhingran, Director, CICFRI and Prof. H.P.C. Shetty, Director of Instructions, Fisheries College, Mangalore*



*Shri Gananeela, Secretary (Fisheries), Govt. of Karnataka, Dr. M.J. Bhagat, Ex-Scientist, CICFRI, Barrackpore, Shri Kiranmoy Nanda, Hon'ble Minister, Govt. of West. Bengal and Dr. Arun G. Jhingran, Director, CICFRI, Barrackpore. (From left to right)*

very rich inland fisheries resources, next only to China, he expressed the view that the production level from these resources remained at a very low level. He called upon both researchers and administrators to put in their best efforts to bridge the gap between the production potential and the actual yield.

A key-note address prepared by Dr. B. C. Sarma, Joint Secretary (Fisheries), Ministry of Agriculture & Cooperation, Govt. of India, was delivered by Dr. V.D. Singh, Deputy Commissioner (Fisheries). In his key-note address, Dr.Sarma pointed out that the productivity of Indian reservoirs can be increased from the current level of 14.5 kg/ha to at least 100 kg/ha by bringing them under scientific management practices. The main constraints, according to him, were the non-availability of suitable fish seed in adequate quantity, lack of post-stock management care, unimaginative exploitation policies, inadequate infrastructural facilities for fish seed production and lack of extension support. While stressing on the role of cooperatives in reservoir fisheries development, Dr. Sarma disclosed that the Central Government was launching a massive scheme to develop 27 000 ha of reservoirs in the states of Karnataka, Gujarat and Maharashtra. Conceived in the Seventh Plan, the scheme will take off during the Eighth Five Year Plan under the aegis of the National Cooperative Development Corporation (NCDC). More than 4660 fishermen and 90 fishermen cooperative societies in 332 reservoir sites are expected to be benefited by this 10.96 crore project. He pointed out that the Government of India has recently undertaken preliminary surveys on monitoring and evaluation of stocking practices in some selected reservoirs, involving an FAO consultant. Future strategy for reservoir fisheries should be oriented towards creation of facilities for seed production, he said.

He called upon the State Governments to give serious thoughts to undertaking remedial measures for removal of the constraints hampering the reservoir fisheries development and to formulate an action plan upto 2000 AD. Dr. Sarma advocated large-scale pen and cage culture operations in reservoirs not only to raise the stocking material but also to produce table fish. Citing examples from Alabama (USA), Thailand and Cambodia, he said that production rates upto 18 t/ha/yr have been achieved from this system of culture. He wanted the expert gathering to discuss merits and demerits of introducing exotic species into Indian waters and to come out with some useful recommendations. Eventhough many researchers have expressed their concern regarding the introduction of alien species, some of them might turn out to be useful, if their introduction is carefully planned. In many parts of the world, induction of exotic species has proved to be complimentary to the indigenous fish fauna resulting in increased productivity.

He expressed his confidence that the Workshop would yield fruitful results and outline the future strategy to be adopted for reservoir fisheries development in the country.

Shri M. Muniappa, Secretary (Fisheries), Govt. of Karnataka also spoke on the occasion. He released the Asian Fisheries Society (IB) souvenir. Prof. H.P.C. Shetty, Chairman, Asian Fisheries Forum, Indian Branch, in his introductory remarks, stressed the importance of reservoirs in the development of inland fisheries in the country. Reviewing the technological advancements made in this sector, he said that the state Governments, cooperatives and financing organisations have a key role to play in the adoption of modern techniques in reservoir fisheries management. He expressed the hope that the scientists, beurocrats, academicians and policy-makers participating in the Workshop would

give the guidelines for an integrated approach to reservoir fisheries management which has the potential to bridge the gap between the demand and supply of inland fish to a considerable extent.



*Dr. Arun G. Jhingran, Director, CICFRI delivering his welcome address.*

Earlier, Dr. Arun G. Jhingran, Director, Central Inland Capture Fisheries Research Institute, Barrackpore extended a very warm and cordial welcome to the guests and delegates. Welcoming Shri Kiranmoy Nanda, Hon'ble Minister for Fisheries, West Bengal, Dr. Jhingran described him as a constant source of inspiration and guidance. Shri Nanda has been extending his patronage and support to every sphere of the Institute's activities. He was gratefully concerned with the fisheries development not only in West Bengal but the country as a whole.

*A technical session in progress. On the dais are Dr. Kuldip Kumar, Shri D.V.H. Dixitulu and Dr. V.V.Sugunan*



## Technical Sessions

The scientific deliberations of the Workshop were conducted under four technical sessions followed by a plenary session. The technical sessions discussed general issues, conservation and environmental management, case studies from States, and Limnology & Trophic levels.

### I. General Issues

The first technical session viz., General Issues in Reservoir Fisheries Management was chaired by Shri J.V.H. Dixitulu, Fisheries consultant and Editor, Fishing Chimes. Dr. Kuldip Kumar, Chief Warden of Fisheries, Himachal Pradesh was the Co-chairman and Shri V.V. Sugunan, Senior Scientist, CICFRI, Barrackpore acted as the Rapporteur. Seven scientific papers were presented in the session.

Dr. B.S. Saxena, the noted Fisheries Economist presented a paper entitled 'Potentialities, production and problems of Indian Reservoir Fisheries'. This was followed by the paper on 'Harnessing reservoirs for increasing production' by Dr. S.C. Pathak of NABARD. "Development of reservoir

fisheries - areas of hope and despair", by Shri S. Paul and V.V. Sugunan and "Problems from silting in reservoirs - an overview" presented by Shri P. Ray. Shri V.K. Bali presented a paper on "Possibility of incorporating common carp-calbasu hybrid into the reservoir fisheries" and Shri A.B. Mukherjee talked on the "Design of wave dissipating structures for protection of floating net cages".

Prof. Saxena highlighted the huge production potential available in the reservoir fisheries sector and he suggested a speedy implementation of Inland Fisheries Bill 1986. He also suggested a Reservoir Fisheries Development Agency on the lines of FFDA's. Dr. Pathak's paper viewed the whole gamut of reservoir fisheries from a banker's perspective. He expressed the view that all the technological development made in the reservoir fisheries should be integrated into projects so that financing agencies like NABARD can contribute their mite in the speedy development of reservoir fisheries in the country. He identified the multiplicity of agencies owning the reservoirs, lack of uniformity in the post-harvest and marketing arrangements and the lack of scientific

management as some of the constraints in this field. He also emphasised the need for long-term leasing of water bodies and quantifying the targets for production which would enable the funding agencies to gauge the development process.

Shri S. Paul talked on the need to develop imaginative developmental policies for reservoirs which are economically sound, ecologically sensible and socially justifiable. Based on the observations covering 20 Indian reservoirs, he found that the remunerativeness of fishery operations in reservoirs not only depended on the productivity but also on the post-harvest arrangements and the royalty system prevalent among the states. He was of the view that the social benefits accrued to the society should also be taken into consideration when return on investment is calculated. Shri P. Ray narrated how the siltation rate in some of the Indian reservoirs exceeded 3-4 times the rate originally envisaged while conceiving the project. Sometimes the siltation has been found to be 16 times what the engineers foretold. Consequently, the life span of the lakes reduced from 21% in Tungabhadra to 77% in Mayurakshi. He also correlated the siltation rate with biomass and fish production.

Shri V.K. Bali's claim of producing 50,000 cross-fertilised ova and 20,000 hatchlings out of the hybridization between common carp and calbasu evoked an animated discussion. Some scientists were of the view that the so-called hybrids could be, in fact, gynogenetic progeny, as the two fishes have different chromosome numbers.

Shri A.B. Mukherjee presented an overview of the information available on the water thrust parameters like wave spectrum, wave length, wave period and wind velocity. This information, according to Mr. Mukherjee, can be utilized while designing cages for Indian reservoirs.

The Chairman expressed the view that no reservoir as a unit can sustain a full-fledged processing and marketing system. He suggested networking of a chain of reservoirs into a processing and marketing system. He was highly optimistic about the proposed Reservoir Fisheries Development Agency (RFDA). Dr. Kuldip Kumar stressed the need for conservation of fish faunistic resources of the country. He also expressed the view that the State Governments should restrict themselves to the developmental activities, as they are ill-equipped to manage the marketing systems.



*A view of  
the audience*

## II. Conservation, Genetics and Environmental Management

This session was chaired by Dr. S.C. Pathak, Manager, NABARD; Prof. S.K. Konar, University of Kalyani being the co-chairman. Shri M.N. Venugopal, Asst. Professor, College of Fisheries, Mangalore was the rapporteur. Eight papers were presented in this session viz., 'Need for avoiding exotic germplasm in reservoirs' by P. Das, 'Electrophoretic analysis of surface mucus in three species of Indian major carps' by B.K. Padhi and A.R. Khuda Buksh, 'Comparative study of esterases of fishes of Manair reservoir and those of local tanks of Warrangal district' by T.M. Reddy and V. Lakshmipathi, 'Reservoir Fisheries - present status in the North-Eastern Region' by M. Sinha, 'Fisheries of Freshwater river prawn, *M. malcolmsonii* in Indian reservoir' by Sk. M. Jamil Ahmed, 'Management of complex pollutional problems of Indian reservoirs to increase fish yield' by S.K. Konar and others, 'Water Pollution problems in Indian reservoirs' by H.C. Joshi, and 'Man-made ecological deterioration in Panchet reservoir, Bihar' by R.K. Banerjee and Ashok Mukherjee.

Dr. P. Das highlighted the possible adverse effects of the introduction of exotic fishes in the country. He was of the view that the indigenous species were superior to the exotic varieties in all respects and therefore he did not find any merit in introducing species like silver carp, tilapia and common carp into Indian reservoirs. However, other viewpoints were also expressed on the subject. Prof. Shetty advocated an open mind on the issue and he wanted the experts to review the present stand on introduction of exotic species. Dr. M. Sinha pointed out that the North Eastern region has a

number of reservoirs and many more are being constructed. But none of them has adopted scientific management norms.



*Ms. Mitali Dey presents her paper*

Shri Sk. M. Jamil Ahmed described how the giant freshwater prawn constituted a sustained fishery in some of the Indian reservoirs. After being trapped into the reservoirs due to obstruction of its migratory pathways, the prawn got adapted to lentic conditions and survived in the lakes. 'Adverse effects of industrial effluents and pesticides on the environment and biotic communities of the reservoir ecosystem' have been presented by Mr. T.K. Ghosh and Ms. M. Dey. Similar case studies in Byramangala and Panchet reservoirs were presented by Dr. H.C. Joshi and Dr. R.K. Banerjee respectively.

### III. Fisheries of Reservoirs

The third session, Fisheries of Reservoirs - case studies from regions was chaired by Dr. Y.R. Tripathi, Ex-Director of Fisheries, Govt. of Uttar Pradesh with Dr. B.S. Saxena as the Co-chairman. Dr. Y. S. Yadava, Sr. Scientist, CICFRI, Barrackpore acted as the rapporteur. Thirteen research papers were presented in the session.

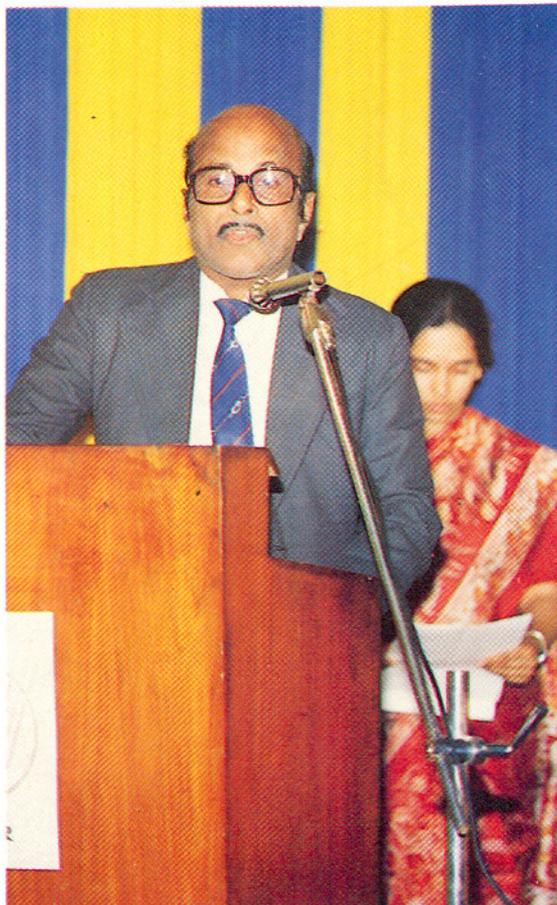
The first paper *Fishery in Vallabhasagar reservoir, Ukai - a case study* was presented by Shri A. Magotia. The paper discussed the salient features of Vallabhasagar reservoir and the developmental measures to enhance its fish yield.

Dr. B.N. Saigal in his paper *Significance of pre-impoundment survey in rivers with special reference to Sardar Sarovar Dam on Narmada* outlined the ecological consequences of the proposed 10 Dams on the main river and c. 19 Dams on the tributaries of the Narmada river system. The pre-impoundment studies covered c. 180 km stretch of the River Narmada and significant differences in the hydro-dynamical, ecological and faunistic features were highlighted.

The paper *Present status of fisheries of Hirakud reservoir, Orissa and strategy for enhancing yield and betterment of the fishermen communities* presented by Shri Sirajuddin Khan described, in detail, various aspects of Hirakud fisheries and outlined the techno-administrative strategies for its - development.

Shri M.T. Bhartiya presented the paper *Management of reservoir fisheries through fishermen cooperatives in Maharashtra - constraints and measures*. The paper discussed the present practices,

developmental constraints and measures for optimising fish production from reservoirs in Maharashtra.



Prof. H.P.C. Shetty

The paper *Assessment of optimum fish yields from reservoirs in Tamil Nadu* was presented by Ms. G. Prabhavathy. Using time series data on catch and effort, she described optimum yield from 4 reservoirs and 1 lake in Tamil Nadu.

Dr. J. Daniel Jameson in his paper *Studies on the competitive growth and production of carps in an irrigation tank* discussed the relative growth of carps in a seasonal irrigation reservoir in Tamil Nadu.

The paper *Management techniques adopted for achieving a record yield from Aliyar reservoir Tamil Nadu* by Shri C. Selvaraj outlined the success story of application of scientific management measures for enhancing the fish production from Aliyar reservoir. Consequent to the adoption of such measures, a record fish yield of  $167.22 \text{ kg ha}^{-1}\text{yr}^{-1}$  was obtained from the reservoir during 1988-89. Dr. P.M. Mathew in his paper *Reservoir fisheries in Kerala - an approach for management* gave a detailed account of the reservoir resources of Kerala and the strategies for their development.

The paper, *Maximum sustainable and economic yields of fish from reservoirs in Rajasthan, Uttar Pradesh and Gujarat* by M. Devaraj and P.K. Goswami was presented by Dr. J. Daniel Jameson. Based on surplus production model, MSy, fmsy, MEY and Fmey were estimated for fisheries of certain reservoirs in northwestern India.

The paper *Molluscs from a eutrophic reservoir Khandia in Jhalawar (Rajasthan)* presented by Dr. S.N. Gupta described the systematics, morphometric characteristics and ecological significance of molluscs from this reservoir. Dr. M. Babu Rao in his paper *Effect of eutrophication on the biology of fishes in Hussainsagar - a case study* said that the fast pace of eutrophication in Hussainsagar had threatened the existence of the reservoir which was constructed in 1542 for water supply.

In his paper *A note on the length-weight relationship of Puntius kolus (sykes) from Bhatghar reservoir, Maharashtra* Shri P.L.N. Rao discussed the well-being of fish as observed through the length-weight relationship vis-a-vis ecology and fish fauna of the reservoir. The last paper, *Preliminary*

*observation on the fishery potential of Nasik district in Maharashtra with special reference to Girna Dam reservoir fisheries* was presented by Shri M.A. Khalid. The paper, besides suggesting improvement of the reservoir fishery, analysed the fish catch and highlighted the efficiency of various gears used in the reservoir.

The chairman in his concluding remarks desired collection of comparative data on regional basis, if not on all India basis. The Institutes were urged to undertake long-term studies on reservoir ecosystems to fill the existing lacunae.

The fourth session entitled, **Reservoir limnology and trophic levels** was chaired by Dr. Arun G. Jhingran with Dr. K. K. Vass, Principal Scientist, CICFRI, Barrackpore as the Rapporteur. The paper, *Energy flow with perspective to fish production in Nanak Sagar reservoir (U.P.) India*, by C. S. Singh, A. P. Sharma and B. P. Deorari was presented by the senior author. The paper was an attempt to work out energy flow pattern in the reservoir, highlighting the prevailing low conversion efficiency in the impoundment and the need to increase it. Dr. K. S. Rao and Ms. Usha Choubey presented a paper, *Studies on phytoplankton dynamics and productivity fluctuations in Gandhisagar reservoir*. The authors attempted to present various parameters of algal dynamics in relation to carbon fixation. The authors opined that temperature was the prime factor controlling the phytoplankton behaviour.

The Chairman while summing up the session underscored the need to elucidate energy pathways in clear-cut terms to make the management strategies effective and production-oriented.

## PLENARY SESSION

The Plenary Session was chaired by Prof. H.P.C. Shetty and Shri R.P. Tuli was the Co-Chairman. The Session considered, at length, all the suggestions emerged from various Technical Sessions and formulated a set of recommendations as follows :

*The present status of reservoir fisheries development in the country has been considered in detail, based on the material presented by several scientists in various sessions. The Workshop has made the following recommendations :*

1. It has been emphasized that a meaningful and development-oriented strategy should be formulated for the development of reservoir fisheries during the VIII Plan period. In this context it is recommended that an integrated organizational structure should be set up for the purpose of reservoir fisheries development in the various states. This may be set up in the form of Reservoir Fisheries Development Agencies. Initially, these agencies should be set up to undertake the developmental work on pre-determined lines to cover selected reservoirs having varying characteristics. Each of these agencies should have a management committee of experts and connected administrators for coordinating and initiating effective development strategies. While agencies might be set up in the central sector, they could be made parts of the centrally sponsored schemes for substantial financial assistance flowing from the centre. The management pattern of these agencies, which could be broadly on the pattern of Fish Farmers' Development Agencies, should take into account the special characteristics of the

*reservoirs and their fisheries development. In working out the detailed pattern of the technical and managerial staff set up, for the supervision and control of the activities, the responsibilities of the agencies should include setting up of farms for the purpose of stocking the reservoirs to ensure the development of an enduring fishery that would provide maximum sustainable yield.*

2. It is further recommended by the Workshop that at the state level there should be management committees to lay down the policies and to coordinate the working of the various developmental agencies in the states. Likewise, at the central level too, a committee may be set up to review the working of the agencies in various states and to recommend measures for the improvement in the working of the developmental systems from time to time. The Development Commissioner/Agricultural Production Commissioner may be the Chairman of the state level reservoir committee with the heads of user-departments being the members. So far as the management committee is concerned, it is recommended that the Chairman may be the Director of Fisheries.

3. In the case of inter-state reservoirs, the Workshop has recommended that a coordination committee with the

Development Commissioners and the representatives of the major user-departments (e.g., irrigation, power generation, flood control, fisheries, pollution board, etc.) may be set up to review the progress from time to time. It is further recommended that Development Commissioners, in whose states the major reservoirs fall, may be the Chairmen of the committee.

4. The Workshop has come to the conclusion that each of the reservoirs may not be having units to set up fullfledged marketing infrastructure. At the same time, it is realized that the Department of Fisheries may not be a suitable agency to undertake wholesale or retail marketing work as such. Realizing the need to have a proper marketing infrastructure, so as to ensure adequate returns to the producers and to make fish available to the consumers at a reasonable price, it is recommended that a viable infrastructure facility covering a few area may be set up for wholesale as well as retail marketing of fish. Each area may cover a few states taking into consideration the routes of movement of fish from various reservoirs to central points where cold/freezing facilities are available. As a long-term policy, it is also felt that in the event of nation-wide marketing network, the supply of marine fish from various coastal centres to the central place be ensured.

5. It is felt that the existing fish marketing ventures should suitably be strengthened to undertake marketing work keeping in view the need for integrating these in course of time with a national network for the marketing of fish. Where marketing organizations do not exist, these may be set up for the main pupose of providing infrastructural facilities for the supply of fish to the markets. It is also

recommended that without formulation of enduring system of marketing fish, nothing should be done in a haste and normal marketing facilities should be allowed.

6. It is recommended that the railways may be prevailed upon by the Ministry of Agriculture to provide refrigerated-bogies on all important routes on priority basis, with a view to connecting a cluster of reservoirs with main marketing centres, for transportation of fish. The charges for transportation of fish should be at the concessional rate and at par with the agricultural products.

7. It is recommended that, on experimental basis, the development of fisheries in selected reservoirs may be entrusted to the private sectors on a reasonably long-term basis. With reference to the experiences gained in this respect, such schemes may be suitable in course of time.

8. It is recommended that the State Fisheries Departments, in consultation with the CICFRI, may select suitable spots in reservoirs for location of cages/pens which may be recommended to the Fisheries Development Agencies/Fishermens' Cooperative Societies for operation. In this connection, it is further recommended that the private agencies may be encouraged to import full-fledged cage systems from abroad, in a joint venture with the technical guidance from the CICFRI, for operation in the selected reservoirs. It is felt that with the experiences gained in such operations, a project can be formulated for the development of fisheries in the reservoirs in pens/cages. Species that may be developed and the feed to be utilized may be decided after careful consideration. The cages may be utilized for raising both table fish and/or stocking material.

9. Introduction of commercially important exotic species may be allowed only in confined aquacultural systems and cautious approach be made regarding their stocking in open systems.

10. Concerted efforts may be made by all developmental agencies and research institutes on scientific lines.

11. In the areas, such as N.E. region, where there is a plan to construct a number of new reservoirs, necessary cautions may be taken by the concerned authorities to carry out preimpoundment surveys so as to be able to formulate developmental strategies in these reservoirs keeping in view the imperative need for maintaining ecological balance.

12. The studies on breeding and behavioural aspects of *Macrobrachium malcolmsonii* and other freshwater prawn

species may be undertaken by research organizations for developing prawn fishery in open waters.

13. The State Directors of Fisheries may be made members of the Environmental and Pollution Boards of the country.

14. In order to check silting and pollution in reservoirs, interim/long-term measures like configuration of earth and development of forestry on sites, and suitable engineering devices and strict enforcement of laws for mitigation of pollution may be taken up in the ecosystems.

15. The AFSIB may organize a special workshop on pollution of ecosystem-its hazards and remedies.

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Edited by : V.V. Sugunan and Y.S. Yadava  
Publication Assistance : H. Chaklader  
**Published by** : **Arun G. Jhingran, Director, CICFRI.**  
Printed at : Graphic Binding Works  
61. Surya Sen Street  
Calcutta-700 009