

Governance and Institutional change in Traditional Commons: Lessons from Chhattisgarh,India

Dinesh K.Marothia*

Abstract

Chhattisgarh, an Indian state, has innumerable multi-use common water bodies (MUCWBs). These water bodies are being administered and controlled under different property rights regimes by different state departments. Fisheries in MUCWBs dates back to time immemorial in Chhattisgarh and have been traditionally managed under common property regime. In recent past fisheries in MUCWBs have been managed under cooperative governance structure – an internal institutional structure model of distributed governance system. Fishermen communities/resource users groups and the state or local village government shared the responsibility of managing fisheries by combining appropriate institutional skills of local resource users/local committees and technical, administration and financial resources available with the states. Fisheries cooperative societies (FCSs) have been assigned usufruct rights to use MUCWBs for fisheries subject to certain socio-economic and administrative conditions. Under the Fisheries Policy of Government of Chhattisgarh, first preference has been/is being to FCSs to leased in MUCWBs irrespective of water spread area. MUCWBs can only be leased out to fisherman groups and individual fisherman if FCSs do not bid for leasing in MUCWBs or FCSs are not existing in a particular village. Further, in order of priority, fisherman community is being given first preference to lease out MUCWBs. The issues related to management of traditional MUCWBs by FCSs are complex due to different categories and characteristics of these common water bodies, scale, size and coverage of FCSs and multiple stakeholders and agencies involved in governing the water resources. Looking to the importance of MUCWBs for fish culture, irrigation, and other domestic uses in Chhattisgarh this study was undertaken to provide an overview of governance structure of fisheries in MUCWBs and to discuss outcomes of an indepth analysis of four FCSs, which have covered different categories of MUCWBs administered under different property rights regimes. This study has also discussed performance of individual fisherman who have leased in MUCWBs Findings of a quick well focused case study of Self Help Groups is also presented. The study has suggested workable institutional arrangements for sustainable management of MUCWBs to reduce poverty and vulnerability of poor stakeholders.

Keywords:

Multi-use common water bodies, fisheries, fish cooperatives, property rights regimes, distributed governance, institutions

* Vice-President, National Institute of Ecology,50-B Pocket C, Sidhartha Extension, New Delhi 110014, Corresponding address:19,Professor Colony ,Krishak Nagar,Raipur –492006, Chhattisgarh,India,email:dkmarothia@yahoo.com

1. Introduction

A sizable proportion of the people in rural India depend directly for their livelihood on traditional common pool renewable natural resources like soils, water, fisheries, forests, pasture, wildlife, and biodiversity. India is endowed with extensive multi use common water bodies(MUCWBs) in the form of small water storage bodies, village ponds irrigation and multipurpose tanks. MUCWBs constitute an important component of community assets in India. These water bodies have been used as traditional commons by the village communities since centuries to meet their domestic needs and practicing fish farming.

In India fish farming in MUCWBs dates back to time immemorial and still plays a fundamental role in sustaining the livelihoods of millions of rural poor, providing food and nutritional security and opportunities for diverse and variable categories of income and employment generation. Governance and institutional structures of MUCWBs for culture fisheries hold considerable potential to contribute to poverty alleviation. In recent years there has been a spurt in the growth of fresh water aquaculture in the country. The present production level of about 2.2 tons/ha/year from fish farming can be raised considerably by streamlining the production from inland culture fisheries and enhancing productivity and production including diversifying aquaculture practices with well design institutional arrangements for governing inland fisheries in MUCWBs. In a few Indian states, including Chhattisgarh, efforts have been made to design more efficient policies and governance regimes for sustaining culture fisheries in MUCWBs in view of devolution process of Panchayat Raj Institutions(PRIs) or local governing institutions in terms of function, functionaries, and funds. MUCWBs are being administered and controlled by different State Departments and local village governments under different property rights regimes in the state of Chhattisgarh. A few evidences are available in the state of Chhattisgarh when ponds and tanks degraded under open access system brought under a state or private or community management regime through appropriate changes in institutional arrangements and authority system (Marothia 1992a, b, 1993, 1995, 1997a, 1997b, 2002, 2004a). In recent years fish culture in ponds and tanks has been managed under internal institutional structures of distributed governance or shared management system in India including in the state of Chhattisgarh.¹ Fishermen communities/resource users groups and the state or local government (panchayat) shared the responsibility of managing fresh water aquaculture by combining appropriate institutional skills of local resource users/local committees and technical, administration and financial resources available with the states. In the state of Chhattisgarh freshwater aquaculture has been managed under cooperative governance structure – an internal institutional structure model of distributed governance system.² Fisheries cooperative societies (FCSs) have been assigned usufruct rights to use these water bodies for culture fisheries subject to certain socio-economic and administrative conditions(Marothia 2004b,2006,2007). Under the Fisheries Policy of Government of Chhattisgarh first preference has been/is being to FCSs to leased in village ponds /village irrigation tanks irrespective of water spread area of these water bodies. The village ponds/tanks can only be leased out to fisherman groups and individual fisherman if FCSs do not bid for leasing in the MUCWBs or FCSs are not existing in a particular village. Further, in order of priority, fisherman community is being given first preference to lease out ponds/tanks. The issues related to management of tanks and ponds by FCSs are complex due to different categories and characteristics of these common water

bodies, scale, size and coverage of FCs and multiple agencies involved in governing the water resources. Looking to the importance of ponds and tanks for fish culture in the state of Chhattisgarh this study was undertaken to provide an overview of governance structure of culture fisheries in ponds and tanks in the state and to discuss outcomes of an indepth analysis of four fish cooperative societies, which (FCs) have covered different categories of ponds and tanks administered under property rights regimes. This study has also discussed performance of individual fisherman who have leased in panchayat ponds. Findings of a quick well focused case study of Self Help Groups(SHG) is also presented.

2. MUCWBs and fish farming in Chhattisgarh: An Overview

MUCWBs in the form of village ponds, irrigation and multipurpose tanks are extensively distributed in all the villages of the state of Chhattisgarh (Marothia 2004b). Fisheries in MUCWBs is an old age livelihood activity for a large number of poor people in Chhattisgarh. MUCWBs have traditionally been managed and controlled for fish culture under the common property regime. However after 1952 most of the MUCWBs have been transferred to panchayat (local village government) or irrigation department depending on water spread area. Nevertheless these MUCWBs are still multipurpose and multifunctional in nature with inherent interdependencies.. MUCWBs cover 52211 village ponds and 1616 irrigation tanks with 70000 ha. and 83873 ha. water spread area respectively in the state. Of the total water spread area (153873 ha.) available in the state, 79 percent and 87 percent area has been developed under 40967 village ponds and 1462 irrigation tanks respectively for fish culture in the state.

Chhattisgarh state has well structured organizational network to manage freshwater aquaculture in the village ponds, irrigation tanks and reservoirs. The state has two tier cooperative structure to manage and develop freshwater aquaculture. At apex level Chhattisgarh State Fish Cooperative Federation (CSFCF) is responsible to manage reservoirs, fish farms and hatcheries for fisheries development. At second level of cooperative structure again three tier panchayat organizational setup (Village Panchayat, Janpad Panchayat and District Panchayat) is working for assigning fishing rights or lease of village ponds and irrigation tanks. The administrative and functional jurisdiction of Village Panchayat, Janpad panchayat and District panchayat are restricted according to water spread area of ponds/tanks. Lease of ponds or tanks with water spread area of below 10 ha, 10 ha. to 100 ha. and 100 ha. to 200 ha. is assigned by village panchayat, Janpad and district panchayat respectively. The State Department of Fisheries assigned lease to all ponds/tanks above water spread area of 200 ha. The lease amount is used for promoting fishers activities by panchayat institution and State Department of Fisheries (SDF). The SDF is engaged in coordinating state - central government schemes, capacity building of fishermen communities, and assisting cooperative societies in promoting fisheries activities and fish production. Lease of ponds/tanks are being assigned on priority basis to registered fish cooperative societies (FCS), fishermen group (FG) and individual fishermen (IF).It is important to mention here that in case if FCSs are not existing in a particular village or do not bid for village ponds/tanks, *only then* these water bodies can be leased out to fishermen groups or individual fisherman or SHGs by respective panchayats. A large number of ponds and tanks are used for fish culture by the fish cooperative societies in the state. Fisheries cooperative societies in the state has nearly 50964 active members (GOC 2003-04).

For FCS, FG and IF the maximum water spread area per member/person of village pond and irrigated tank is restricted to 0.50 ha and 4.00 ha. respectively. However pond with 1 ha water spread area can be given on lease to local fishermen. The lease duration for ponds/irrigation tanks is for five year. The ponds/tanks can be leased to the same FCS, FG, IF based on performance. In case FCS, FG, IF are not interested to take ponds/tanks on lease the same can be leased out to self help groups of the local village. A FCS can be given more than one pond/tank on lease with the restricted norms of water spread area per member. Similarly, based on size of water spread area of ponds and tanks, lease can be assigned to more than one FCS. Village panchayat, Janpad panchayat and district panchayat make wide publicity in village and also issue notification in local news papers for allotment of ponds/tanks on lease within their working zones. The Representatives of SDF, Fish Farmers Development Agency (FFDA) and panchayat scrutinize the application before assign the ponds/tanks on lease to FCS, FG and IF.

The lease amount for village ponds and irrigation tanks is currently fixed at Rs.1000 per ha. and Rs.240 per ha. per year respectively with provision of 10 per cent increase after every two years. The lease amount can be deposited in three installments in the proportion of 35 per cent, 30 per cent, 35 per cent respectively during the same financial year. The lower lease rent for irrigation tank is due to restriction imposed by the State Department of Water Resource Development (SDWRD) on use of feed and manure in all departmental tanks. The FCS, FG, IF have to deposit lease money in stipulated time. Interest rates of 2.5 per cent on lease money is charged for the late deposit of lease money. Lease can be cancelled after 3 months, in case of non-payment of lease, after serving three notices. For the seasonal irrigation tank lease amount is fixed on availability of water during a year, and fish production levels (maximum fish production level achieved during last five years is taken in to account). It is worth mentioning here that panchayats (village, janpad and district) earn in the range of Rs16 to 31 million per year from leasing out ponds/tanks. State Department of Fisheries earn in the tune of Rs 3.20 to 4.6 million from leasing out tanks of above 200 ha. water spread area Chhattisgarh state produces 1.11 lakh tone fish production with average fish yield of 2373 kg. and 69 kg from village ponds and irrigation tanks respectively. Fisheries sector has created nearly 80 lakhs man days gainful employment during 2003-04 through 785 cooperative societies and 1336 fishermen group and individual fishermen.

3. Data Base and converge of the Study

This study was confined to village ponds and irrigation tanks situated in Boriya Khurd, Barbanda, Serikhedi, Kura, Uparwara, Thekbandha villages of Dharsiwa block and Mana, Bana, Kurra, and Dumartarai villages of Abhanpur block of Raipur District in Chhattisgarh, India. These ponds and tanks have been used for culture fish farming by FCSs, IFs, and SHGs. The study area in which the selected FCSs, IFs and SHGs are located, represents fairly well agro-climatic socio-economic condition of Chhattisgarh plain. The climate of the study area is characterized by sub-tropical parameters. The average rainfall of the study area varies between 1187 mm to 1200 mm. The onset monsoon season extend from the mid June to early October, which accounts for more than 90 percent of the total precipitation of the rainfall during the month of July-August. The winter season (November to February) is relatively warm and short with mean temperature of 25° to 30°C between

December and March followed by very hot and dry weather in May to June 40°C to 45°C (summer season). In the study area four general classes of soil are found i.e. gravely sand, sandy loam, loam and loamy clays corresponding to the locally known names Bhata, Matasi, Dorsa and Kanhar. Seventy percent of the soil comprise of Kanhar. Dorsa, Matasi and Bhata consist of twenty, five and two per cent respectively.

A set of three questionnaires were designed and pre tested to collected required information for fisheries cooperative societies, fishermen household, and profile of tanks and ponds covered by respective FCSs, IFs, and SHGs. Four fisheries cooperative societies, located in the four villages (Boriya Khurd, Barbanda, Serikhedi, and Kura) of Dharsiwa Block of Raipur District were selected for in-depth analysis (see Map-1. for location of water bodies covered by four FCSs, and individual fisherman, and SHGs). All the four FCSs functioning in the rural areas have usufruct rights over village water bodies. The FCSs, IFs and SHGs selected for this paper have covered different categories of ponds and tanks administered under different property rights regimes. We could not include FGs for our analysis, as they are not existing in the study area. However, four community ponds which were leased in by individual fisherman from village panchayat were included for comparative analysis. Also six SHGs are involved in fish culture in the study villages (three each in Dharsiwa and Abhanpur blocks), we have included all of them for comparative analysis.

All the above tanks/ponds covered by four FCSs, IFs, and SHGs are multiuse and multifunctional in nature involving multiple stakeholders. Information regarding profile of fisheries cooperative societies, IFs and SHGs (including salient features of management structures, decision making arrangements, output and distributing gains), physical and technical attributes of ponds and tanks, and general characteristics of fisherman households was collected from respective FCSs, IFs and SHGs. Information of fish yield and input use, disposal pattern and distributive gains were collected for three years from the record of FCSs and SHGs. However, this information was available for one year for pond/ tanks leased in by IFs from village panchayats. The required information to analyze the performance of fisheries cooperative societies, IFs, and SHGs was gathered from the all the four fisheries cooperative societies, IFs, and SHGs during June-August 2004. Audit reports of the FCSs were the main source for obtaining information on yield, income, input use, disposal pattern, and distributive mechanism. Data of audit reports were cross checked with information gathered during focused discussion sessions with members of the FCSs. The basic information regarding physical and technical characteristics of irrigation tanks was collected from the State Department of Water Resource Development and Soil and Water Conservation wing of State Dept. of Agriculture. Data regarding ponds/ tanks constructed during *Ex-Zamidars* (landlords) tenure were collected from village panchayats. Details of types of ponds /tanks used for culture fisheries along with ownership, management and leasing authority structure are given in table 1. Features related to categories of irrigation tanks, village common ponds, duration of availability of water, multiple institutions involved in water use and management, ownership and leasing authority structure, variation in lease rents and restrictions on application of feed, manure, and medicines to cure or prevent fish diseases are also provided in table 1.

MAP 1: Location Map of Study Area

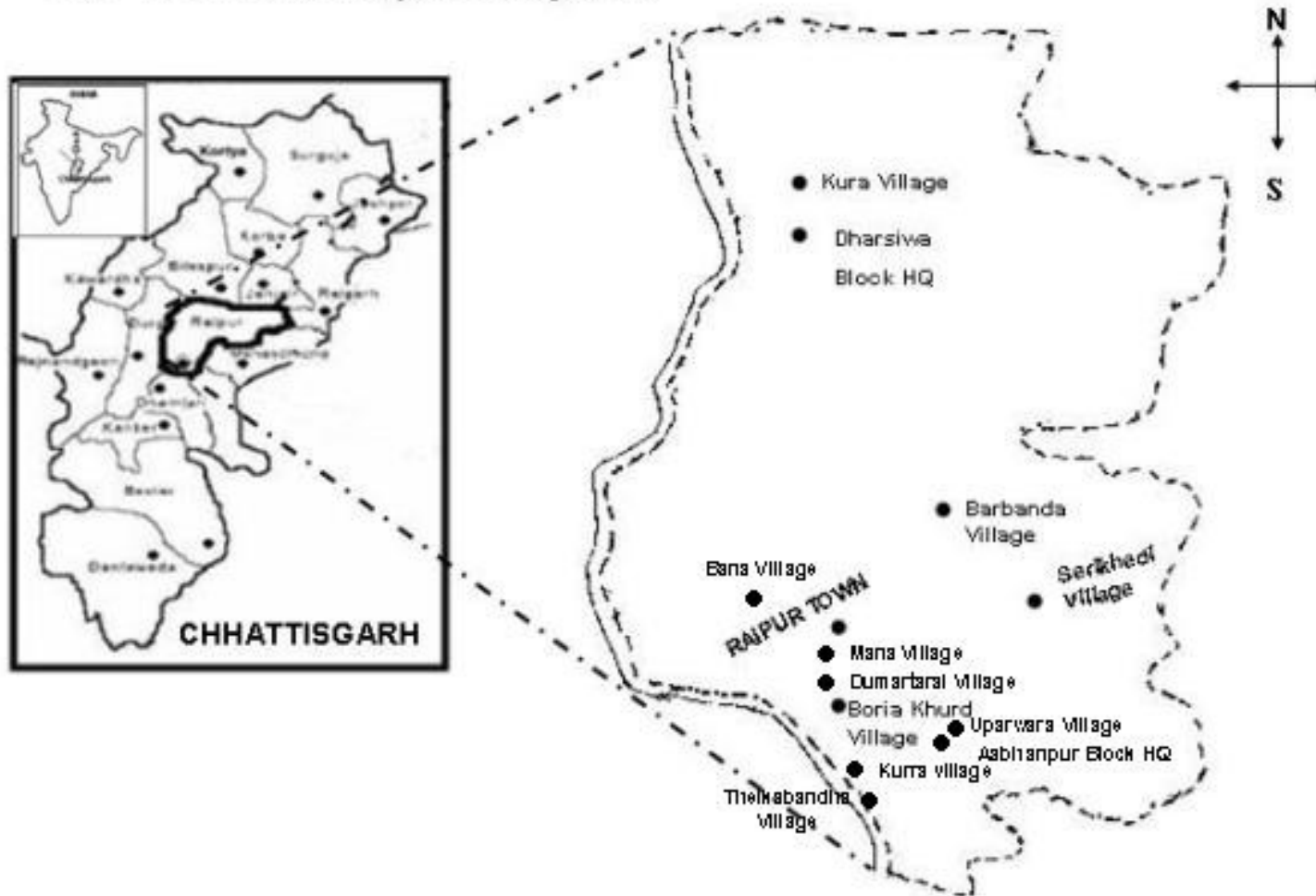


Table 1: Types of Ponds/Tanks, Management, Ownership and Leasing Authority Structure of the Selected Water bodies.

| S. No. | Name of tank | Type of tank | Source of water | Availability of water | Major uses of water in order of priority | Local Institutions involved in water uses | Ownership | Leasing authority | Lease rent (Rs./ HWSA) | Restriction/ Conditions to use water for fish culture |
|------------|---|-------------------------------------|-----------------|-----------------------|--|--|-------------------|--------------------|------------------------|--|
| (A) | Village Ponds/Tanks Leased in by FCS | | | | | | | | | |
| | Boriya Khurd (Boriya Khurd FCS) | Perennial irrigation tank (65 ha.) | Canalfed | Adequate, year round | Irrigation, domestic use, fish culture | FCS, WUAs, Panchayat | SDWRD | Janpad Panchyat | 240.00 | Feed and manure can't be used by FCS, other users can't be excluded to use water |
| | Bundha Tank (Serikhedi FCS) | Perennial irrigation tank (200 ha.) | Canalfed | Adequate, year round | Irrigation, domestic use, fish culture | FCS, WUAs, Panchayat | SDWRD | District Panchayat | 243.00 | Feed and manure can't be used by FCS, other users can't be excluded to use water |
| | Raipuriha Pond (Serikhedi FCS) | Perennial (0.60 ha.) | Rainfed | Upto Feb.- March | Domestic and fish culture | Village Panchayat | Village Panchayat | Village Panchayat | 2000.00 | No restriction to use fish feed |
| | Kura Ponds (Kura FCS) | Perennial (8)* (1.15 ha.) | Canalfed | Throughout the year | Irrigation, domestic use, fish culture | Krishi Samiti of Panchayat, Panchayat, FCS | Village Panchayat | Village Panchayat | 252.00 | No restriction to use fish feed |
| | Kura Ponds (Kura FCS) | Seasonal (9)* (1.15 ha.) | Canalfed | Upto Feb.-March | Irrigation, domestic use, fish culture | Krishi Samiti of Panchayat, Panchayat, FCS | Village Panchayat | Village Panchayat | 252.00 | No restriction to use fish feed |
| | Barbanda Tank-1 (Barbanda FCS) | Perennial (2.88 ha.) | Canalfed | Upto Feb.-March | Irrigation, fish culture, domestic use | Panchayat | Panchayat | Village panchayat | 857.00 | Restriction on feed and manure |
| | Barbanda Tank-2 (Barbanda FCS) | Perennial (2.30 ha.) | Canalfed | Upto Feb-March | Irrigation, fish culture, domestic use | Panchayat, Krishi Samiti | Panchayat | Village Panchayat | 857.00 | Restriction on feed and manure |
| | Barbanda Tank-3 (Barbanda FCS) | Perennial (17 ha.) | Canalfed | Upto Feb.-March | Irrigation, fish culture, domestic use | Panchayat | Panchayat | Janpad Panchayat | 857.00 | Restriction on feed and manure |
| | Matwa Talab (Barbanda FCS) | Perennial (0.40 ha.) | Rainfed | Upto December | Domestic use, fish culture, Irrigation, | Village Panchayat, FCS | Village Panchayat | Village Panchayat | 2600.00 | Limited restrictions |
| | Dev Talab (Barbanda FCS) | Perennial (0.90 ha.) | Canalfed | Adequate | Domestic use, fish culture, Irrigation | Village Panchayat, FCS | Village Panchayat | Village Panchayat | 2600.00 | Limited restriction |

Contd..

| S. No. | Name of tank | Type of tank | Source of water | Availability of water | Major uses of water in order of priority | Local Institutions involved in water uses | Ownership | Leasing authority | Lease rent (Rs./HWSA) | Restriction/ Conditions to use water for fish culture |
|--|--|---------------------|-----------------|-----------------------|--|---|----------------------------------|-------------------|-----------------------|---|
| (B) Village Owned Ponds Leased in by IF | | | | | | | | | | |
| | Boriya Khurd Pond (Boriya khurd village) | Rainfed (0.60 ha.) | Tubewell | Upto March | Domestic use and fish culture | Panchayat | Panchayat & individual fishermen | Panchayat | 10000.00 | No restriction on fish feed and manure application |
| | Chhapar Pond (Barbanda village) | Rainfed (3.50 ha.) | Canal | Upto December | Irrigation, fisheries and domestic use | Panchayat, Krishi Samitee, FCS | Panchayat | Panchayat | 4928.00 | No restriction |
| | Jogi Bandh (Barbanda village) | Seasonal (0.40 ha) | Canal, Rain | Upto December | Fish culture, irrigation and domestic | Panchayat Krishi Samitee | Panchayat | Panchayat | 2600.00 | No restriction |
| | Ledara pond (Barbanda village) | Perennial (4.50 ha) | Canal, Rain | Upto Feb.March | Fish culture, irrigation and domestic | Panchayat Krishi Samitee | Panchayat | Panchayat | 2600.00 | No restriction |
| (C) Village tanks leased in by SHGs | | | | | | | | | | |
| | Mana Pond | Seasonal (1.256 ha) | Rainfed | Upto December | Domestic use, fish culture | SHG and Village Panchayat | Village Panchayat | Village Panchayat | 2229.00 | No restriction |
| | Bana Pond | Seasonal (0.75 ha) | Rainfed | Upto December | Domestic use, fish culture | SHG and Village Panchayat | Village Panchayat | Village Panchayat | 2000.00 | No restriction |
| | Dumartarai Pond | Seasonal (1.00 ha) | Rainfed | Upto December | Domestic use, fish culture | SHG and Village Panchayat | Village Panchayat | Village Panchayat | 3000.00 | No restriction |
| | Kurra Pond | Seasonal (0.802 ha) | Rainfed | Upto December | Domestic use, fish culture | SHG and Village Panchayat | Village Panchayat | Village Panchayat | 2369.00 | No restriction |
| | Uparwara Pond-1 | Seasonal (1.051 ha) | Rainfed | Upto December | Domestic use, fish culture | SHG and Village Panchayat | Village Panchayat | Village Panchayat | 2379.00 | No restriction |
| | Uparwara Pond-2 | Seasonal (0.80 ha) | Rainfed | Upto December | Domestic use, fish culture | SHG and Village Panchayat | Village Panchayat | Village Panchayat | 2000.00 | No restriction |
| | Thekbandh Pond | Seasonal (1.40 ha) | Rainfed | Upto December | Domestic use, fish culture | SHG and Village Panchayat | Village Panchayat | Village Panchayat | 2143.00 | No restriction |

* Kura FCS leased in 29 ponds (12 perennial and 17 seasonal) out of these 8 perennial and 9 seasonal (2 seasonal ponds are use for nursery hatching) were used for fish production.

Note: Figures in brackets indicate water spread area of respective tanks.

HWSA = Water Spread Area in hectare.

4. Conceptual Framework

To analyse the strength and weakness of cooperative governance structures primarily adopted in the state of Chhattisgarh for sustainable use of tanks/ponds for fish culture, an institutional framework was applied. Institutional framework was also used to understand the performance of SHGs. We have basically applied the institutional framework³ developed in a number of analytical models (Marothia and Phillips 1985, Oakerson 1986,1992, Ostrom 1992, Tang 1992, Townsend and Pooley 1995). The attributes of the conceptual framework for institutional analysis developed in these models have also been used in Indian conditions to understand the efficiency of alternative governance in managing common pool resources (Arnold and Stewart 1991 Marothia 1993, 2002,2004b,2006,2007). These models essentially have four attributes namely, physical and technical attributes of a resource, characteristics of resource users community, external and internal institutional arrangements patterns of interaction and outcome which may affect freshwater aquaculture management in case of the present study. The institutional framework used herein has assessed physical and technical attribute of tanks/ponds, characteristics of fishermen community in relation to other stakeholders using common water bodies, external and internal institutional arrangements, impact and outcome (in terms of fish catch, input use pattern, disposable pattern and distributive gains). Each component of the conceptual framework has sub-sets attributes. Each set of attribute is related to the others. For example, characteristics of resource (attributes of ponds and tanks) and resource users (Fishermen characteristics) and arrangements, alternative property regimes, distribution of authority system collectively affect external and internal institutional arrangements, interaction patterns and outcomes and impacts. To this end we discuss comparative performance of FCSs, SHGs and IFs within their categories

5. A Profile of FCSs and Attributes of fisherman households: Salient features and management structure of the selected fish cooperative societies is shown in table 2. The basic objective of all the FCSs is to enhance livelihood and generate year round employment. In terms of social structure of members, membership criteria, management system, and external institutional support all the four FCSs have more or less similar pattern. All the members of the society belong to fishermen community with domination of sub-castes according to their population in a particular village. Members from sub-caste dominates, based on their numbers in a particular FCS, in the management or executive committee. Some time small hidden groups are formed on the basis of these sub-castes to dominate the decisions of FCS. The president, vice-president, secretary and executive members were elected by the members. All FCSs are male dominated. The details regarding membership fees, working capital, assets, lease period and rents are given in table 2. The lease rents for common rural ponds are many times higher than irrigation tanks, this due to the fact that in irrigation tanks application of fish feed, manure and medicine is prohibited.(refer also table 1 for related features of FCSs)

General characteristics of fisherman households (FHs) are given in table 3. All members of FCSs belong to fisheries community (locally known as *dhimers or kewats or nishads*) and their main source of livelihood is freshwater aquaculture. Agriculture and wage earnings are the other sources of FHs income. Majority of the FHs are illiterate and fall under the age group of 18-50 years. A large proportion of economically active/adult fishermen population is engaged in freshwater activities in the target areas of FCSs. Most of the fisheries activities are carried out by male members of FHs.

Table 2: Common Features of Fish Cooperative Societies

| S.N. | Particulars | Features of FCSs |
|------|---|--|
| 1. | Name of the society | Primary Matsya Sahakari Samiti Maryadit, |
| 2. | Primary objectives of the society | To enhance livelihood through fish culture and generate the employment. |
| 3. | Leasing Authority | Janpad/village panchayat under three tier panchayat institutions systems. |
| 4. | No. of members | 12-70 |
| 5. | Social structure of members | Fishermen community(Kewat,Dhimar, Nishad) * |
| 6. | Current membership fees | Rs. 51.00 |
| 7. | Membership criteria | Member should belong to fishermen community, above 18 years, after the death of member, membership transferred to one of the family members. |
| 8. | Working capital (Rs.) (a)Members share capital (b) Borrowed capital (i) From members and money lenders (for purchase of seed etc.) (ii) From district central cooperative Bank (c) Saving account deposit (DCCB) | 1548.00 11588.00 39214.00 (for purchase of net, boat, rope, repair of tanks etc.) 10884.00 |
| | Total | 52350.00 |
| 9. | Assets (a) Boat (b) Net (c) Others (Rope) | 1 to 4 nos. 2 to 3 nos. 21.67kg. |
| 10. | Management committee set-up (a) President/ treasurer (b) Vice-president (c) Secretary (d) Executive members | 1 1 1 4 |
| 11. | No. of ponds/tank taken on lease for fish culture (range) | 1-9 |
| 12. | Duration of lease (year) | 5 |
| 13. | Average lease rent per year/ha. (Rs.) with 10% increase every year on the basic lease amount | 397.67 |

* Sub castes of fisherman community in Chhattisgarh. Kewat sub-caste dominates the fishing profession

Table 3: General Characteristics of Fishermen Households in FCSs

| S.No. | Particulars | Average |
|-------|---|--|
| 1. | Number of fishermen household per village | 77.50 |
| 2. | Number of fishermen household in FCS | 26.25 |
| 3. | Occupation (%) | 100 |
| | a. Main : Fisheries | |
| | b. Supplementary | 34.92(4.20) |
| | i. Agriculture * | 72.38 |
| | ii. Wage earner | |
| 4. | Yearly income per member/year (Rs.) | 9761 |
| | a. Farm income (%) | 31.17 |
| | b. Income from (%) agricultural wages (%) | 33.57 |
| | c. Other income (%) | 28.69 |
| | d. Fisheries | 44.27 |
| 5. | Educational background (%) | |
| | a. Illiterate | 80.25 |
| | b. Upto 5th class (upto primary level) | 17.89 |
| | c. 5-8 th class (upto middle) | 9.63 |
| | d. 8-12th class (upto H.S.S.C) | 6.06 |
| 6. | Age (% of Total members) | |
| | a. Above 18-30 years | 39.14 |
| | b. 30-50 years | 53.59 |
| | c. 50-70 | 12.08 |
| 7. | Fishermen population (in village) | 561 |
| | a. Male (%) | 58.29 |
| | b. Female (%) | 41.71 |
| 8. | Family size | 8.00 |
| | (i) Male | 2.50 |
| | (ii) Female | 2.00 |
| | (iii) Children | 3.50 |
| 9. | Number of economically active members per village | 264 |
| | (a) Male (%) | 81.62 |
| | (b) Female (%) | 18.38 |
| 10. | % of Adult family member working full time per village (Male) | 27.96 |
| 11. | Active fishermen/women (Nos./family) | 1.50 |
| 12. | Male dominated fisheries activities with allocation of time (days or hours) | 1. Pond preparation – 1 day. 2. Stocking – 3 days. 3. Manuring – 3 days. 4. Netting & selling 74 days |
| 13. | Female dominated activities with allocation to time (days or hours) | 1. Pond preparation – 1 day 2. Stocking – 3 days. 3. Manuring – 2 days 4. Netting and selling – 19 days |
| 14. | % of License holder for selling fish seeds | 5.55 |

* Cultivable land under command area of tanks/ponds (in ha.)

1-adult=2 children

However, in case of a few FCS female of fisherman households also involved in stocking, netting and marketing activities. A few members of FCSs have leased in village ponds on individual basis from village panchayat. We will discuss this aspect further in the section on performance of IFs utilizing individual ponds for fish culture.

6. Decision making Mechanism & Outcomes

A general framework of decision making mechanism adopted by FCSs and its effects on pattern of collective interactions is presented in table 4. Since the decision making mechanisms across the four FCSs are more or less same as they are all registered FCSs and had to governed under a set of institutional arrangements. A synthesis of common decision parameters are presented table 4, which have been adopted by all FCS. The description of the governing parameters are presented in table 4 and these are self explanatory.

6.1. Performance of selected FCSs: Performance of FCS in relation to members implicit goal of enhancing livelihood and generating employment through fish culture is evaluated in terms of fish yield per ha water spread area, net income, and man days employment /member/year. The other parameters of performance evaluation include pattern of distribution of benefits, and mechanism to sale out the fish produced (table 5). Although the pattern of distribution of benefits varies across the four FCS in terms of wages paid to members, fund kept aside for next year investment and asset creation, but general pattern emerged from all for FCs in presented herein. The disposal pattern of fish produced across the FCSs centered around to members non members ,retailers and whole sellers with visible price differentiation at different levels. For members and non members of the same village prices are generally not too different(see table 5.).

6.2. Performance of IFs

Village common ponds have been leased out by village panchayat to individual fisherman belongs to fishermen community. These individual fishermen are also member of the FCSs working in the respective villages. The lease rents of all these ponds are several times higher than other water bodies existing in these villages. Since there is no restriction on use of feed, manures, medicine, and higher prices fixed by individual fishermen and assured availability of minimum required water; the yield levels, net income and employment generated from these ponds are much higher than collectively managed tanks by FCS in these villages. Even in lower fish producing ponds employment opportunities generated were higher in comparison to a few FCS working in the area (see table 6).

Table 4: Decision-making Arrangement and Patterns of Interaction FCS

| Particulars | Fish Cooperative |
|--|---|
| A. Decision Making Arrangements | |
| 1. Legal and administrative relation with state | Registered fisheries cooperative society under the Cooperative act and managed under three tier panchayat institution system |
| 2. Harvesting period of fish in a year | Through out the year, maximum during March to June |
| 3. Days of intermediate fishing catches | Twice a week |
| 4. Harvesting method | Collective operations |
| 5. Reasons of harvesting fish | Growth of risk and need based |
| 6. Arrangement for inputs netting, marketing and distribution | Largely all members of fish cooperative society collectively make the net and decide the marketing of fish with support from State Department of fisheries. |
| 7. Price fixation | At village level, village panchayat fixes the price according to market and at mandi level depends upon market forces – prices vary from day to day. |
| 8. Mode of sale of fish | Village level (members/villagers/village merchant) and mandi (wholesaler) |
| 9. Time and mode of payment | Spot payment in cash at cooperative office site/pond site. |
| 10. Ability to raise funds | <ol style="list-style-type: none"> 1. By selling fish, contribution of members, can take loan from bank/moneylenders. 2. Financial assistance from department of fisheries upto Rs. 25000 for 3 years (share capital 8% , lease rent 22% , purchase of seed and stocking 20% , nylon rope and boat 50%) |
| 11. Ability of society to influence other panchayat/government activities | |
| Members of co-operative society requested to panchayat /Janpad Panchayat/Water Resource Department to maintain minimum water level for fish culture. Panchayat/Janpad Panchayat/Water Resource Department puts restriction on farmers using ponds water to maintain minimum level of water. | |
| 12. Technical assistance from external organization | |
| State Fisheries Department and FFDA assist in supply of fish seeds, rearing of fish and arrangement of net, boat and nylon rope | |
| 13. Competition and conflict over water use and conflict resolving mechanism | |
| Community village has long tradition to share ponds water without conflict. Panchayat ensures minimum level of water required for fish culture and coordinate between Krishi Samitee (responsible for maintaining irrigation water use) and FCS. With lease money panchayat repairs bunds of the ponds to stop outflow of fish. In case of water stress condition in rainfed ponds, FCS transfer fishes to perennial ponds. In case of irrigation tanks with multiple use. Due to protective nature of irrigation system and field to field method of irrigation there were some case of conflicts were observed among head, middle and tail end farmers during low rainfall years. Since SDWRD and panchayat ensures minimum level of water required for fish culture there is no conflict between fisherman community (FCS) and farmers. In case of decline of water level in the tank which may affect fish culture, FCS collectively forces to village and Janpad panchayat, and SDWRD to release additional water. With the additional release of water, fish growth period continuous upto month of June. The FCS can't use fish feed and manure in the tank, panchayat resolves conflicts if any, between domestic users of tank water and FCS. | |
| B. Pattern of interaction | |
| 1. Membership, legitimacy and outsiders | |
| Only fishermen are members of society, president, vice-president, secretary and executive members are elected by members. In some cases secretary honorarium to maintain records of | |

the society. Outsiders are not involved in any activities of co-operative societies. Extremely high stake and control of the member over FCS.

2. Reciprocal interactions

Collective action by the members of FCs through collective interaction

3. Rules of protection of fish and tank by members

Members watch against poaching and killing of fish. Societies in many cases announce cash award for providing information of poaching of fish. Offenders are fined by village panchayat. If the offender is from the members themselves, the executive body heavily punishes that member or excludes him from the fisheries co-operative. Every year 2-3 cases of poaching have occurred, FCS punished the offenders.

4. Use regulation of fishes

Members and non-members can buy fish for consumption. Member must participate in all activities of FCS, for netting members get wages (Rs.30-40/day).

Table 5: Outcomes of Governance Structures in FCS

| S. No. | Particulars | FCS |
|--------|---|--------|
| 1. | Economic gains/ha | |
| | i. Yield (qtl./ha) | 3.84 |
| | a. Rohu, Katla, Mrigal | 3.07 |
| | b. Local | 0.77 |
| | ii. Price Rs./qtl.) | |
| | a. Rohu, Katla, Mrigal | 2417 |
| | b. Local | 1008 |
| | (c) Gross return (Rs./ha) | 8196 |
| | (d) Total operating cost (Rs./ha) | 5695 |
| | (e) Net return (Rs./ha) | 2501 |
| | (f) Net income/kg (Rs.) | 6.51 |
| | (g) Input-output ratio | 1:1.44 |
| | (h) Employment generated for members (man-days) | 74 |
| 2. | Distributive gains | |
| | Pattern of distribution of benefits (per cent)* | |
| | (a) Wages paid to members | 38.96 |
| | (b) Share of benefits kept aside for next year expenditure on fish rearing | 36.17 |
| | (c) Remaining amount for creating assets (fishing boats/nets/community building, recreation, etc. | 24.46 |
| | (d) Sustainable development of fish and tank resources | 0.41 |
| 3. | Disposal pattern (% to total produce) | |
| | At village level | |
| | a. Member | 5.75 |
| | b. Non-Member | 30.92 |
| | c. Village merchant | 5.00 |
| | d. Whole seller | 32.50 |
| | e. Retailer | 25.83 |
| | f. Net price to the fishermen (Rs./kg.) | 20 |
| | g. Whole sellers purchase price (Rs./kg.) | 25 |
| | h. Whole sellers sale price (Rs./kg.) | 30 |
| | i. Retailers purchase price (Rs./kg.) | 30 |
| | j. Retailers sale price (Rs./kg.) | 35 |

*Based on net income

Table 6: Fish Culture in Panchayat Ponds

| S.No. | Particulars / Village | Panchayat owned |
|-------|--|-------------------------------|
| 2. | Leasing Authority | Panchayat |
| 3. | Leased in by | Fisherman * |
| 4. | Water spread area (ha.) | 2.23 |
| 5. | Leased rent (Rs./ha.) | 5032 |
| 6. | Source of water (tube well, rainfed/canal) | Tubewell***/ canalfed/rain |
| 7. | Production (in quintal/ha.) | 9.95 |
| 8. | Net Income per ha. | 10884.50 |
| 9. | Employment days (i) Male (ii) Female | 96.5 9.25 |
| 10. | Conflict with village community | Nil |

* Lessee belongs to fisherman community.

** Only in case of one pond.

6.3. Performance of SHGs

Self Help Groups (SHGs), as per the directives of Reserve Bank of India, started functioning in 1996 through Swarna Jayanti Gram Swarajgar Yojana (SGSY), Syam Sidha, and Swa Shakti to uplift the poor families during the period of three years from BPL to APL by providing them income generating assets through a mix of bank credit and government subsidy. SHGs have emerged in the state of Chhattisgarh during 1999-2000 under different schemes. At present Chhattisgarh state has more than 43,000 SHGs working in different sectors of livelihood based activities. Out of these groups 711 groups were formed in fisheries sector. However, a few of them (105 SHGs) cleared the first criterion to be entitled to receive bank loan and subsidy. For example in Raipur District 82 fisheries SHGs have been formed (Technical Report 2003-04. Directorate of Fisheries, GOCG), but only 12 SHGs have passed through first and second grading. Development process of SHGs is categorized into three period i.e. from 0 to 6 months, 6 to 18 months, and 18 to 36 months. In the initial period regular meetings, election of representatives, preparation of bye-laws, and regular savings are the main functions of SHGs. Inter-loaning and bank account also start in this period. With the completion of all these activities a particular SHG passes through first grading. After first grading SHGs are provided Rs.15000 as credit limit and Rs.10000 as revolving fund and receive training for capacity building. After second grading SHGs received bank loan and subsidy. For an interactive survey carried out for the present project, of the total 12 SHGs working in Raipur district, 6 fisheries SHGs were selected. Analysis of 6 SHGs (see table 7) reveals the following facts: (i) the size and composition of the groups is largely heterogeneous dominated by OBC, SC and ST (ii) number of members per

Table 7: Performance of Culture Fisheries SHGs

| S.No. | Particulars | SHGs |
|-------|---|--|
| 1. | Conditions for formation of SHGs | For composition of SHGs it is mandatory to have representatives members from ST and SC, women's and physically disabled person in proportion of 50%, 40% and 3%. Respectively . Minimum 80% beneficiaries must be from below poverty line (BPL). |
| 2. | No. of selected SHGs | 6 |
| 3. | No. of members per SHG | 14 |
| 4. | Size and social composition (%) | Large and heterogeneous |
| | a. OBC | 72.62 |
| | b. SC | 16.67 |
| | c. ST | 10.70 |
| 5. | Education | All members have Primary education |
| 6. | Main occupation | Agriculture and fisheries |
| 7. | Average size of land holding of SHG members (ha.) | 2.01 |
| 8. | Funding agencies | Commercial and Regional Rural Banks |
| 9. | Average Bank loan (Rs.) per SHGs | 150000.00 |
| 10. | Trained members (%) | 41.66 |
| 11. | Sources of income (%) | |
| | a. Farm | 73.74 |
| | b. Off-farm(wages) | 9.51 |
| | c. Fisheries | 16.74 |
| 12. | No. of ponds leased in | 7 |
| 13. | Duration of lease | 3 years |
| 14. | Lease rent per ha. WSA* per year | Rs.2800.00 |
| 15. | Leasing authority | Village panchayat |
| 16. | Average water spread area of ponds (ha.) | 1.08 |
| 17. | Type of ponds | Seasonal |
| 18. | Uses | Domestic use, fishing, cattle tending etc. |
| 19. | Restrictions to use fish feed and medicine | Nil. |
| 20. | Management committee | |
| | a. President | 1 |
| | b. Vice-president | 1 |
| | c. Secretary | 1 |
| | d. Treasurer | 1 |
| 21. | Cost of fish production per ha(Rs). | 23154.00 |
| 22. | Fish production (per ha in quintal) | 16.50 |
| 23. | Net income per ha.(Rs) | 42846.00 |
| 24. | Input- output Ratio | 1:2.85 |
| 25. | Employment(man days/ member /year) | 190 |
| | a. Agriculture (%) | 66.0 |
| | b. Fisheries | 22.0 |
| | c. Wages | 12.0 |

Contd....

| S.No. | Particulars | SHGs |
|-------|--|--|
| 26. | Decision making arrangement | Decision making process is by and large confined to executive committee. The main decision making issues include membership fees, purchase of inputs, fish seeds, marketing of fish and benefit sharing arrangements etc. |
| 27. | Per month collection/member | In the range of Rs.50 to Rs.110, average Rs.81.66, penalty on delay payment |
| 28. | Financial Assistance per SHG (Rs.) | |
| | (a) Revolving fund | 10000.00 |
| | (b) Cash credit limit | 15000.00 |
| | (c) Average bank loan | |
| | i. Total amount | 137500.00 |
| | ii. Subsidy (50% of total loan amount) | 68750.00 |
| | iii. Actual loan | 68750.00 |
| | iv. Upto date balance after 1 year | 56250.00 |
| | (d) Inter loan(Rs) | 48999.00 |
| | i. Agriculture (%) | 39.12 |
| | ii. Business (%) | 23.47 |
| | iii. Home needs (%) | 37.41 |
| | iv. Total | 100.00 |
| | v. Recovery of inter loan (%) | 52.72 |
| | vi. Over dues (%) | 47.28 |
| 29. | Conflicts among members and mechanism to resolve | Conflicts among the members breeds just after receiving financial assistance from the banks. Inter -loaning amount was distributed among the executive and other members but not all the members. Similarly profit was not distributed equally among the members. For inter loan the rate of interest is very high. Conflicts remain unresolved. |

SHG is around 14. (iii) largely Banks are promoting agency (iv) main occupation of more than 85% members is agriculture, (v) members per month collection is in the tune of Rs.82 and members meet every month to discuss various issues related to fisheries activities, (vi) inter loaning among members is largely for agriculture, business and home needs, and recovery is almost in the tune of 53%. (vii) the cumulative saving is about Rs 22000. (viii) fisheries contributes nearly 14% against 76% agriculture share in the total income per SHG. However fisheries generate 22% mandays employment for the group against 66% in the crop sector. (ix) the average water spread area available to fisheries SHGs is 1.08 ha (ranging in between 0.75ha to 1.40ha). (x) the overall fish production per SHG was 16.50 quintals per ha. (xi) cost and net return per ha, per SHG was in the tune of Rs.4033.37 and Rs.26345.65 respectively. (xii) SHGs sold fish @Rs 40 per Kg. (xiii) average lease rent per ha water spread area was RS.2800 (lease rent varies between Rs.1600 to Rs.3000 per ha water spread area. (xiv) there is no restriction on application of fish feed and manure in the leased ponds. (xv) panchayat is the leasing authority (xvi) SHGs got these ponds on lease because FCS, FG, and IF are not existing in the villages where SHGs formed. (xvii) management committee is constituted of president, vice –president, secretary and treasurer. (xviii) inter -caste conflicts are visible, domination of a few members in decision making and participation in capacity

building training. (xviii) non payment /timely of loan.(xix) poor monitoring by funding agencies.(xx) benefit sharing among the members is not equally distributed and in many cases only shared by office bearers. (xxi) continuous watch of ponds by members to restricted poaching.(xxii) members have to purchase fish at market rates.(xiii) no conflict with other members of the village.

It is adequately clear from the above analysis that with adequate water availability ,and application of feed, manure and proper and timely use of medicine to prevent fish motility, higher yield, income and employment can be achieved (see yield, income and employment levels of tanks leased by Boriya Khurd common pond). It is also clearly evident in case of the IFs leased in ponds. Further, higher performance can also be achieve even in case of rainfed ponds without imposing restriction to use growth promoting inputs as seen in case of Mandir, Marar, and Mandal. The performance of SHGs is still lower than many IFs who had leased in panchayat owned or privately owned ponds in terms of yield, income and employment generation capability due to inter castes conflict among members and pursuing self motive agenda of non fisheries development.

7. Conclusions and future policy issues

Common pool resources of land, water, forest, wildlife and fisheries constitute and important component of community assets in Chhattisgarh and significantly contribute towards the poor peoples livelihoods despite the decline in their areas and productivity. Community water bodies have been/are the blood vessels of Chhattisgarh rural life. These water bodies in the form of village ponds, irrigation and multipurpose tanks are extensively distributed in all the villages of the state and are multipurpose and multifunctional in nature with inherent interdependencies. Fisheries in inland fresh water (ponds and tanks) dates back to time immemorial in Chhattisgarh and it has been an important source of livelihood for large number of people. Common pool ponds/tanks are being administered and controlled under different institutional hierarchy or property rights regimes (State Department of Water Resource Development, Panchayats, Soil and Water Conservation Wing of State Development of Agriculture, State Department of Fisheries, Panchayat Raj Institutions, and private ownership). Responding to the survival issue of millions of fishermen community, the government of Chhattisgarh has recently designed pro poor policy for freshwater aquaculture development. Under the new freshwater aquaculture policy culture fisheries in common pool water bodies have been managed under cooperative governance structures. In the state of Chhattisgarh freshwater aquaculture has been managed under cooperative governance structure. Lease of ponds/tanks are being assigned on priority basis to registered fish cooperative societies (FCS), fishermen group (FG) and individual fishermen (IF).It is important to mention here that in case if FCSs are not existing in a particular village or do not bid for village ponds/tanks, *only then* these water bodies can be leased out to fishermen groups or individual fisherman or SHGs by respective panchayats. A large number of ponds and tanks are used for fish culture by the fish cooperative societies in the state. All the FCSs listed under general categories have members from fisheries community (locally known as kewat, dhimar, and nishad). Scheduled tribe and castes FCS s are also by and large have members from same caste i.e. in scheduled tribe FCSs all members belong to homogeneous tribal castes. Similarly all members of scheduled caste FCSs are from scheduled castes. This categorization of FCSs clearly indicates that all the three

types of FCSs have homogeneous group of fishermen within them selves. There are also socio-political reasons behind adopting homogeneous group/caste based formation of FCSs in the State Fisheries Policy of Chhattisgarh. However, SHGs are in some cases are formed by heterogeneous members belong to different castes. In view of these facts, this study was carried out to understand the performance of fisheries cooperative societies (FCSs), individual fisherman (IF), and self help groups (SHGs) in culture fish farming in village ponds and tanks, which are being administered and controlled by different agencies in the state of Chhattisgarh . The issues related to management of tanks and ponds are complex due to different categories and characteristics of these common water bodies, scale, size, location, and coverage and multiple agencies involved in governing the water resources.

From the point of view of culture fisheries management in common water bodies, this study provides some meaningful findings. Extent of water availability, multiple use(non excluding component) and restriction on application of feed, manure and medicine are the two most important factors which affect the FCSs performance. Further, higher performance can also be achieve even in case of rainfed ponds without imposing restriction to use growth promoting inputs as seen in case of individually leased in ponds. The Performance of SHGs is still lower than many IFs who had leased in panchayat owned or privately owned ponds in terms of yield, income and employment generation capability due to inter castes conflict among members and pursuing self motive agenda of non fisheries development.

In the villages of Chhattisgarh, community ponds and irrigation tanks have traditionally been allotted by local panchayats for different uses like tending cattle, washing cloths and baths, irrigation, fish culture, social rituals (funeral, worship, etc.), These water bodies were managed through collective Labour work. There are invariably one or two temple or sacred ponds in most of the villages. In almost every village ponds were separately allotted for women groups. It can be still seen in many villages. A few ponds are exclusively used for SC community under the social caste hierarchy. Taking a leaf from the traditional allocation arrangements of ponds, a few ponds may be left out for domestic uses and social rituals in a village and rest of the ponds can be exclusively used for culture fisheries without any restrictions on application of growth promoting inputs to achieve potential yield. Fortunately, in every village minimum 7 to 10 community ponds are still existing . Close-in ponds can be reserve for common use and more distant ponds for fish culture. Such simple political and administrative decision can substantially reduce the inter community conflicts. Similarly irrigation ponds /tanks can be exclusively used for irrigation and fish culture, if some ponds can be kept aside for catering the needs of villagers. Further, a feasible solution can be worked out between FCSs and SDWRD for de-silting the tanks, as one of the major concerns of the SDWRD is increasing silt load and reducing water intake capacity of a tank due to use of fish feed and manure. Such institutional arrangements can increase fish yield and the total productivity of common water bodies by many folds beside minimizing social conflicts. It has been observed in the study area that FCSs have tendency to leased in all the common ponds/irrigation tanks within eight Km periphery(a norm prescribed in Leasing Policy) in a particular village to strategically eliminate FGs and IFs chance to leased in these common water resources. Further, in some case all the leased out ponds/tanks have not been used for fish culture. For example, all the 29 ponds leased in by Kura FCS are not being used for fish culture. In case of village pond leased in by individual fisherman it has been also observed that the lessee is either

office bearer of a local FCS or member of any sub-caste of fisherman community. Except in SHGs the lessee has to be from fisherman community to leased in panchayat owned ponds. In view of these suggestions Fishery Policy of the state need to be change in consultation with SDWRD, State of Department of Agriculture, State Department of Rural Development and Panchayat and Fisheries organizations to enhance the total welfare of poors in India's one of the most unfavourable states.

Acknowledgements

This paper is based on the IWMI – TATA Water Policy Programme Project on Performance Evaluation of Culture Fisheries under Alternative Property Rights Regimes in Chhattisgarh. The author thanks A.K.Gauraha, P.K.Verma, S.B.Kaiwartya, A.K.Verma, Gangadeen Sahu, and Smt.S.V.Nair of DANRE for their assistance. The author is also grateful to President and members of all the five Fisheries Cooperative Societies and P.P.Singh, M.P.Gupta, R.K. Shukla, and N.Verma of State Department of Fisheries, Government of Chhattisgarh (GOC) and other staff for sharing information on various aspects of fisheries governance. The author benefited substantially from the comments and suggestion of Tushaar Shah, Christopher A.Scott, R.Sakthivadivel and K.V.Raju. The valuable comments and suggestions made by R.Sakthivadivel are inclusive in the paper.

Notes

¹ It is important to recognize that the governance can be shared among states, communities and private interests groups in various ways. In other words, distributed governance is the extended version of the standard regimes of property rights (state, common and private property, open access). Distributed management system involves a share of authority among different groups/agencies at different decision making levels. (Townsend and Pooley 1995). Distributed governance involves the external institutional arrangements (rights based management, co-management and contracted management) among government and local communities or resource users as well as internal institutional arrangements (self organizing institutions, communal management and cooperative management) within local community institutions or resource users (see also Marothia 2002)

² Three alternative internal governance structures are closely associated with concept of fisheries cooperative management, namely, self organizing institution, cooperative management and communal management (see Townsend and Pooley 1995 for details on external and internal distributed governance structures in fisheries management).

³ Institutional arrangements or working rules order relationship among resource users with in society or groups and design incentive structures in human exchange, whether social, economic political (North 1990). The institutional arrangement define who can control the resource and how the technologies are applied. Institutional arrangements or working rules define extent of property rights regime over resources, in this case fisheries and related resources (for detail interpretation of institutional perspective on natural resource management see Marothia 1993, 2006,2007).

References

- Arnold, J.E.M. and W.C. Stewart (1991), Common Property Resource Management in India, Tropical Forestry Paper No.24, Department of Plant Sciences, Oxford Forestry Institute, University of Oxford, Oxford, U.K.
- Government of Chhattisgarh (GOC) (2002-03), New Fisheries Policy, State Department of Fisheries, GOC, 2002-03.
- Government of Chhattisgarh (GOC) (2003-04), Annual Technical and Administrative Report of Fisheries, State Department of Fisheries, GOC, 2003-04.
- Marothia, D.K. (1992a), "Village Irrigation Tanks :Institutional Design for Sustainable Resource Use", *Agriculture Situation in India* (47):479-484
- Marothia, D.K. (1992 b), "Village Ponds and Aquaculture Development: Issues of Inequality in common Property Regimes", contributory paper, Third conference of the International Association for the Study of Common Property, Washington, D.C., U.S.A., September 18-20.
- Marothia, D.K. (1993), "Property Regimes and Institutional Arrangements: concepts and their Relevance in Managing the Village Commons", *Indian Journal of Agricultural Economics*, 48(3):557-565.
- Marothia, D.K. (1995), "Village Ponds and Aquaculture Development: Is conflict Inevitable?", Paper presented to the National Workshop on Poultry, Fisheries and Food Processing Organized for the Members of Parliament at the National Academy of Agricultural Research Management, Hyderabad, July 4-7, 1995.
- Marothia, D.K. (1997a), "Institutional Arrangements in common Fish Ponds", in J.M.Kerr, D.K.Marothia, K.Singh, C.Ramasamy and W.R. Bentley (Eds.) *Natural Resource Economics: Theory and Application in India*, Oxford & IBH Pub. Co. New Delhi.pp
- Marothia , D . K..(1997b) , "Property Rights, Externalities ,and Pollution" in Agrawal, Anil (Editor) *The Challenge of Balance*, Centre for Science and Environment. New Delhi.pp
- Marothia, D.K. (2002), "Alternative Governance in Common Pool Resource", in D.K.Marothia (Ed.) (2002), *Institutionalizing Common Pool Resources*, Concept Publishing Company, New Delhi.pp
- Marothia, D.K.(2004a) "Restoration of Lake Ecosystem: An Environmental Economics Perspective", *International Journal of Ecology and Environmental Sciences* 30(3) : 197-207.
- Marothia, D.K. (2004b), "Institutional Structures for Governance of Freshwater Aquaculture: Lessons from Chhattisgarh" *Indian Journal of Agricultural Economics*, 59 (3) : 421-434.
- Marothia, D.K. (2004c), "Transforming Institutions for Sustainable Development of Natural Resources Programmes" *Agricultural Economics Research Review*, 17(conference No.):163-190.
- Marothia, D.K.(2006)."Managing Culture Fisheries in Multi-use Water Bodies:A Property Right Paradigm" in K.K.Vass,K.Mitra,V.R.Suresh,P.K.Katiha and N.P.Shrivastava (Editors),*River Fisheries in India-Issues and Current Status*,Inland Fisheries Society of India,Barrackpore,West Bengal.pp.227-240.
- Marothia, D.K.(2007).Fish Farming in Small Multi-use Water Bodies: Water Sharing Mechanism and its Implications, In Vass, K.K. , Sarangi,N. Mitra, K. Jena,J.K. Suresh, V.R. Shrivastava, N.P. and Katiha, P.K. (eds.). Water Management in *Fisheries and Aquaculture*, Inland Fisheries Society of India, Barrackpore, W.B.and Association of Aquaculturists,Bhubaneswar,Orissa. pp.151-159.
- Marothia D.K. and W.E. Phillips(1985) Analysis of Natural Resource Problems Using Synthesis of Neoclassical and Institutional Economics, *Asian Journal of Economics and Social Studies* 4:263-281

- North, D.C. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge, Cambridge University Press.
- Oakerson, R.J. (1986), "A Model for the Analysis of Common Property Problems", in National Academy of Sciences (1986), *Proceedings of the Conference on Common Property Resource Management*, Washington, D.C., U.S.A.
- Oakerson, R.J. (1992), "Analyzing the commons: A Framework", in D.W.Bromley (Ed.) (1992), *Making the Commons Work*, ICS Press, San Francisco, U.S.A.pp
- Ostrom, E. (1992), *Crafting Institutions for Self-Governing Irrigation Systems*, ICS Press, San Francisco, U.S.A.
- Tang, Shui Yan (1992), *Institutions and collective Action: Self-Governance in Irrigation*, ICS Press, San Francisco, U.S.A.
- Townsend, R.E. and S.G. Pooley (1995), *Distributed Governance in Fisheries* in Susan Hanna and Mohan Munasinghe (Eds.) *Property Rights and the Environment-social and Ecological Issues*. The Beijer International Institute of Ecological Economics and the World Bank, Washington, D.C.pp.
