THE PRESENT STATUS OF FISHERIES RESOURCES OF GUMLA DISTRICT - AT A GLANCE

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Fisheries and aquaculture are the fastest growing sector and it has huge potential in economic development, food and nutritional security and livelihood opportunities. This sector provides excellent opportunity for income generation particularly in economically backward areas. Gumla district where the 69% of the population are scheduled tribe and people are primarily associated with agriculture as well as fisheries activities; aquaculture can be an ideal option for upliftment of their economic activity. Therefore, it is very important to study the water resources and their potential, prevailing fisheries activity for sustainable exploitation of the resources as well as upliftment of the economic and social status of the fish farmers of the district. Therefore, information on available fisheries resources in the district were collected from the record of Department of Fisheries, Gumla and also from its official website. For the study of physico-chemical parameters of water and soil, two ponds of Palkot block were selected and samples collected from the selected ponds were analysed in the laboratory of the College of Fisheries Science, Gumla. Present study highlights the status and potential of fishery resources and the on-going fisheries activity to formulate strategies for further improvement.

INTRODUCTION

The state Jharkhand also known as "Land of Forests" where 26.2% of the population belongs to the Scheduled Tribes, carved out from the southern part of Bihar. The state makes its own identity on 15 November 2000 by separating from Bihar. The state is endowed with 29.61% forest area and 40% mineral resources of the country. According to the report of Jharkhand Government (2021), the state ranks first in coal reserves and 32% of India's coal reserves are found here. The state is not only endowed with immense mineral resources, but also with vast water resources in the form of tanks (79009.28 ha), reservoirs (129990 ha), check dams, rivers (1800 km) and coal pits (98880 ha) etc. Fishing is an important economic activity for additional employment and income generation (Mallik and Das, 2019). Around 80-85% people in the state consume fish and fish products. The fish production of the state was 223 thousand metric tonnes (2019-20) which is almost 16 times more than the production of 2001-2002 (DAHDF Annual Report, 2012-13). The state was also awarded the Best Fisheries State in "11th Global Agriculture Leadership Summit and Leadership Awards 2018" (Indian Council of Food and Agriculture, Global Summit, 2018). Out of the total 24 districts of the state, the district “Gumla” is a tribal dominated district. There are total 12 blocks in the district. Blessed with the beauty of nature, Gumla district is covered with dense

forests, hills and rivers. It is located in the south-west part of Jharkhand state. Various legends are prevalent regarding its name. The most popular one is attributed to its word 'Gumla' in Mundari language, which is related to the rice processing (paddy-thresher) occupation of the local tribes. The second story 'Gau-Mela' is related to cattle fair. A weekly cattle fair used to be held on every Tuesday in Gumla town. In rural areas, Nagpuri and Sadri people still call it 'Goumila'. Gumla district, which is spread over 5327 square kilometers, has 69% of the population of Scheduled Tribes. People here are associated with agriculture as well as fisheries.

Water, being the primary prerequisite for fishes, its physical chemical properties are responsible for healthy aquatic environment for aquatic life. The success of aquaculture primarily depends on maintenance of favorable environment for desired fish food organism. The growth and abundance of various aquatic flora and fauna are greatly dependent upon the availability of essential nutrients in the water body in adequate and balanced quantity (Mahajan and Billor, 2014). The quality of water can be assessed by studying its physical, chemical and biological aspects. Environmental pollutants originating from anthropogenic sources have the potential to affect aquatic ecosystems in a synergistic manner (Tiwari, 2015). Temperature plays an important role in determining the seasonal productivity of a water body (Goldman & Wetzel, 1963; Verma & Srivastava, 2016). Primary productivity is the first fundamental stage of ecosystem function and provides chemical energy and organic matter to consuming organisms (Verma and Srivastava, 2016). The productivity of an ecosystem also depends on the fertility of the soil (Mahajan and Billor, 2014). Therefore, it is very important to study soil and water quality of water resources so that management measures can be adopted in a holistic way to get sustainable fish production.

In this context, a study was conducted to study the fisheries resources available in the district, to analyze the water and soil quality and to estimate the primary productivity of the pond.

MATERIALS AND METHODS

The study was conducted in Gumla district. To study the available fisheries resources of the district, information were collected from the reports and official website of the Fisheries Department, Gumla. To analysis water and soil quality and to estimate primary productivity of pond used for fisheries purposes, Palkot block was selected because this block has better fish production than other blocks of the district. Physico-chemical parameters of water quality such as temperature, transparency, total dissolved solids (TDS), pH, dissolved oxygen, free carbon dioxide, total alkalinity and total hardness were analysed. Under the biological parameter, primary productivity mainly daily concentration of phytoplankton and zooplankton were studied. Similarly, soil structure, water holding capacity, organic carbon, total nitrogen, phosphorus and potassium were studied to analyse soil quality. A total of two ponds were selected from Palkot block for sample collection i.e., Beritoli community pond and Tapkara pond. Beritoli community pond, was used by the local

community for fish culture as well as for various other purposes like bathing, washing of clothes and utensils, bathing of cattle etc. Primarily extensive fish farming method was practiced without adding any artificial food and fertilizer and after a culture period of 6 to 8 months the fishes were harvested. Tapkara pond was well maintained pond and ideal pond for good fish production. Water and soil samples were collected from four different locations of each selected pond. Water temperature, transparency and pH were tested in the pond itself and water samples for other parameters (total dissolved solids, dissolved oxygen, free carbon dioxide, total alkalinity and total hardness) were collected and brought to the college laboratory. Similarly, soil samples were also collected from the selected location and brought to the college laboratory. For studying the soil sample, it was first dried in shade and stored in powder form. Physico-chemical and biological parameters of the collected soil and water samples were analysed using APHA (2005).

RESULT AND DISCUSSION

To study the available fisheries resources in the Gumla district, information were collected from the reports of Department of Fisheries, Gumla and also from its official website. It was observed that about 297 hectares' land of the district is surrounded by water bodies, which includes Government tanks (655 acres), private tanks (3645 acres), Dobha (78 acres) and dams (18300 acres). Three major rivers i.e., South Koel, North Koel and Shankh River flows through the district which has several streams/tributaries. Only one government fish seed hatchery is available in this district. Apart from this, there are 5 main fish seed farms located in Bishunpur, Sisai, Ghaghra, Bharno and Gumla blocks. The major reservoirs of the district are Tapkara, Panisani, Koyanjali, Katari, Majhtoli, Shahitoli, Ghangriduba, Chadheya, Budhikona, Jurmu, Paras, Dhansing and Narma. The district is known for fish seed production. About 30 fishermen cooperative societies with total 5560 number of fishermen are existed. Women are also actively involved in fish culture. Some women engaged in fish culture by forming groups, while some are involved in fish selling. The fish farmers around the reservoir are trying to improve their standard of living by adopting cage culture and pen culture technique in the reservoir. Fish farmers are given benefits by the Department of Fisheries, Gumla under many schemes by the government. They are getting fish seed and time to time training by the Department of Fisheries, Gumla in the field of fisheries. Apart from this, training is also given to fish farmers by the College of Fisheries Science. College was formed under Birsa Agricultural University in the year 2017, which was temporarily started in Ranchi Veterinary College and in the year 2021 shifted to Gumla district. Women fish farmers were trained here under the tribal sub-scheme on value addition from freshwater fish, in which they learned preparation of pickles, cutlets and momos from fish, as well as they sell the prepared fish products in the market. During the training they were also involved in marketing of prepared fish products so that they can understand the demand of fish products among the customers.

Detailed study of water and soil quality was done as per the procedure mentioned in the methodology and the results obtained are shown in Table 1 and Table 2.

Table 1: Physico-chemical and biological quality of water

Sl. No.	Physico-chemical and biological parameters of water	Beritoli community pond	Tapkara pond
1.	Transparency (cm)	25	22
2.	Temperature (°C)	26.1	27.8
3.	TDS (mg/L)	244	260
4.	pH	7.4	7.9
5.	Dissolved oxygen (mg/L)	6.1	7.3
6.	Free Carbon dioxide (mg/L)	3	2.8
7.	Total alkalinity (mg/L)	122.54	156.36
8.	Total hardness (mg/L)	98.61	123.29
9.	Primary Productivity (mg C^{-3} d^{-1})	1200	1853

Table 2: Physico-chemical quality of soil

Sl. No.	Physico-chemical parameters of soil	Beritoli community pond	Tapkara pond
1.	Soil texture	Clay	Clay-loam
2.	Water holding capacity (%)	73	75
3.	Organic Carbon (%)	0.5	0.6
4.	Total Nitrogen (mg/100 g of soil)	53	67
5.	Phosphorus (mg/100 g of soil)	6	8
6.	Potassium (mg/100 g of soil)	23	29

According to the result obtained in this study, the water temperature was 26.1-27.8 °C which is good for fish culture. Khan *et al*. (2018) have also reported that in view of good water quality management, the water temperature of 27.5-31.1 °C is good for fish culture. According to FAO (2006), fish production is good when the water temperature range is within 27.6–30 °C. It is very important to have warm water for fish culture, but excessively warm water reduces the amount of dissolved oxygen and fishes die under the stress. Similarly, if the water is too cold, then the fishes reduce their feed uptake, due to which their growth is restricted, so it is necessary to maintain optimum temperature in the pond for getting good fish production. In this study the pH value found was 7.4-7.9. According to Boyd (1998), pH 7.5-8.5 is considered ideal for fish culture. A pH value below 6.5 causes a number of problems in many fishes (Lloyd, 1992). The obtained value of dissolved oxygen was 6.1-7.3 mg/L which is suitable for fish culture. According to Ayyappan *et al.* (2011) dissolved oxygen value of 5 mg/L or more is necessary for normal growth and reproduction of fish. This is also confirmed by the results of the study by Gupta and Gupta (2006). According to them, the value of dissolved oxygen in the pond should be more than 5 mg/L for fish culture. Similarly, the obtained values of other studied parameters (TDS, free carbon

dioxide, total alkalinity, total hardness and primary productivity) were also found suitable for fish culture. There was no significant variation found in the physico-chemical parameters of water and soil of the selected ponds. The presence of phytoplankton and zooplankton viz., Microcystis, Spirulina, Navicula, Pediastrum, Sphaerocystis, Spirogyra, Cyclotella, Ocillatoria, Ceratium, Closterium, Cyclops, Diaptomus, Brachionus, Dhaphnia, Moina, Keratella etc., were also noticed in the ponds, which plays an important role in increasing the productivity of fishes. These are the natural diet of fishes. In zooplankton, mainly Cyclops, were the dominant group.

CONCLUSION

From the study it can be concluded that the Gumla district has sufficient water resources for fisheries purpose. The physico-chemical parameters of water and soil of the selected ponds were found suitable for fish culture. The presence of phytoplankton and zooplankton indicates the availability of natural food for the fishes in the pond. However, more emphasis is required for understanding the socio-economic problems of farmer, promoting the adoption of modern aquaculture system, upgrading the infrastructure facilities and management policies for sustainable development of aquaculture sector in the district. To increase the aquaculture production of the district further, there is a need to explore underutilized water bodies.

ACKNOWLEDGEMENTS

The authors would like to thank Dr. Onkar Nath Singh, Vice-Chancellor of Birsa Agricultural University, Ranchi and College of Fisheries Science, Gumla for providing physical facilities, financial support and cooperation.

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