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EDITORIAL

ECOLOGY AND FISHERIES OF THE HOLY GANGA RIVER

India has passed through different stages of historical ages to the diversified culture of the ancient Indian societies. The present generation are taking inspiration from our ancient civilization, heritage and sculptures and improving their understanding based on the culture in addition to scientific findings. The civilization is an organization of social, cultural, and economic life involving political views which can promote the existence of humans on earth. The exploration of culture through scientific approaches generate experience which influences the national and social well-being. Science arbitrates culture, and technology asserted our future developments. However, there are differences in religion, languages, caste and creed but unity in diversity is the beauty of the Indian tradition and culture.

For centuries water and the nature and course of rivers have defined the rise and fall of civilizations. Ancient civilizations, like those of the Indus Valley (Harappan), Mesopotamia, Egypt and China emerged and flourished along important rivers—the Indus and Sarasvati, Tigris and Euphrates, Nile and the Yellow River, respectively. These rivers provided their human populations with the means to both survive and expand. Consequently, the rivers became an essential part of the sociocultural and economic fabric of the societies and penetrated deep into the psyche of the people living in the surrounding areas. Nowhere is this phenomenon more pronounced than in India, where the Ganga, Indus, Narmada, Kaveri, and other rivers represent the cultural identity transmitted through the ages and across generations.

The River Ganga is a symbol of faith, culture and sanity, and is the centre of social and religious tradition in the Indian sub-continent. These are amply reflected in such ancient Indian scriptures as: Vedas, Puranas, Mahabharata, Ramayana and several others. In fact, respect for Ganga is a part of Indian identity and the very symbol of Indian culture. The history of Ganga in nurturing culture and civilizations is appreciated through fostering native culture in its basin, shifting of the Indus-Sarasvati basin civilization into its fold, and promoting integration of cultures to develop Indian civilization. The Ganga alone drains an area of over a million square kilometers. Its extensive basin accounts for one-fourth of India's water resources and is home to more than 407 million Indians, or some one-third of India's population. The Ganges basin, with its fertile soil, is a significant contributor to the agricultural economies of both India and Bangladesh. The Ganga is the most sacred river for Hindus, who call it Ma Ganga (mother Ganga) possibly because it holds and nurtures billions of lives, including humans and other terrestrial, aquatic entities. The many symbolic meanings of the river across the Indian subcontinent are reflected by the inspiring quotes of Pandit Jawaharlal Nehru, the first Prime Minister of the Republic of India, in his book "Discovery of India" (Nehru, 1946):

"*The Ganga, especially, is the river of India, beloved of her people, round which are intertwined her memories, her hopes and fears, her songs of triumph, her victories and her defeats. She has been a symbol of India's age-long culture and civilization, ever changing, ever flowing, and yet ever the same Ganga.*

The Ganga to me is the symbol of India's memorable past which has been flowing into the present and continues to flow towards the ocean of the future."

The history of the Ganga in nurturing culture and civilizations can be viewed from three angles—the fostering of native culture in its basin, the shifting of the Indus-Sarasvati basin civilization into its fold, and the promoting of cultural integration to develop Indian civilization. The River systems have been the birthplace of civilizations all over the world.

The very special faith and respect for River Ganga in India are as old as the Indian culture itself, which is clearly evident from the descriptions in ancient Indian scriptures such as the Vedas, Puranas, Upnishad, Ramayana and Mahabharata. The Vedas were written earlier than Puranas, and the Rigveda is the oldest among all of the Vedas, composed roughly between 1700 and 1100 BC. The Indus and the Sarasvati were considered as major sacred rivers during the Early Vedic Age of the Rigveda. The Ganga is mentioned in the Nadistuti (Rigveda 10.75), which lists the rivers flowing from east to west. In RV 6.45.31, there is clear mention of the word Ganga, while RV 3.58.6 says that "your ancient home, your auspicious friendship, O Heroes, your wealth is on the banks of the Jahnavi."

The Harappa (or Indus Valley) civilization (<" 3000–1500 BC), one of the most primitive and progressive river valley civilizations of ancient times, was also the world's largest developmental culture in the Indian subcontinent. Therefore, riverine and hydrologic science become an integral part of our Indian culture. Being a riverine country, Indian rivers serve as a lifeline of several civilizations extending over several millennia. The river contributes in a large scale in irrigation, potable water, transportation, and electricity, as well as providesfood , other ecological services and livelihoods for a large number of people along the riparian communities. Even, the rivers are considered as sacred in Hindu mythology. There are 14 major rivers in India (Ganga, Brahmaputra, Brahmani, Cauvery, Godavari, Indus, Krishna, Mahanadi, Mahi, Narmada, Periyar, Sabarmati, Subarnarekha, Tapti) and their several tributaries covering 83% of the drainage basin area in India. The riverine and associated resources also provide fundamental ecological services, support the health of ecosystem and influence fish production for fisheries.

In Hinduism, the holy River Ganga is personalized as the Goddess Ganga, worshipped as the goddess of purification and forgiveness known as '*mokshadayini'*. The belief of bathing in the sacred Ganges can wash all sin and sorrows was followed from the ancestor's time in the Hindu religion. River Ganga's *avatar* theory is quite popular in Indian philosophical cultural, therefore, it is also a symbol of ideology from *Aryan culture* since its origin, even each ritual remains incomplete without her water or '*Ganga jal'*. After death, the rituals of cremation are performed at the bank of the Ganga and the ashes of deceased person was floated in the water are very common practices in Hindu religion. Millions of pilgrim visit every year to different holistic site along the Ganges and the Hindu devotees have faith towards the pilgrimage as '*tirthas'* around cities where religious, culture and history make their own footprint from one generation to next generation. Originating from Gangotri glacier in the Garhwal Himalaya under the name of Bhagirathi as the name was known after the ancient king Bhagirath, who brought her down from the heavens, the river is encompassing variations in altitude, climate, land, ecology, as well as the social and cultural life of the native people and finally meet into the Bay of Bengal. The magnitude and reputation of the rivers is exposed by the circumstances as early 3000 BC, the peoples of pre-Harappan civilization in the Indus–Sarasvati river basin cultivated and developed agricultural techniques and cropping methods in scientific manner. In recent decades, the river has experienced drastic changes due to rapid ecological degradation and increasing pollution level caused by natural and man-made hindrances in the river basin which causes noticeable decline in productivity. For Hindu devotees, a ritualistic dip in the holy Ganges is believed to be a purification of the soul, but as the pollution levels increase, the spiritual bath might be reconsidered for bathable. Besides traditional believes, millions of people directly or indirectly depend on the riverine fisheries and resources to sustain their daily livelihood and nutritional security. But, what the Ganges received from the society? An ever-growing population, inadequately planned urbanization, and industrialization have affected flow, volume, and quality of water in the river, resulting in a growing threat to Indian tradition, culture and aquatic biodiversity. The physico-chemical properties of river water are quite delightful and nature in hilly areas as it has own capacity for self-purification. However, the degradation is noticed after the river flow meets the plain and passes through several cities. Now it is high time to realize the significance of our ancient tradition with novel approaches of science for rejuvenation of our culture and initiation might be started with the restoration of the riverine ecology and biodiversity conservation of the sacred river.

The ICAR- Central Inland Fisheries Research Institute, a premier Institute in Inland Fisheries Sector reaches the landmark of 75th year of establishment and has made an outstanding contribution to the basic and strategic research on Inland open water fisheries of rivers, reservoirs, floodplain, wetlands, estuaries, lagoons and backwaters in India. The Institute has been awarded Sardar

Patel Outstanding ICAR Institution Award 2020 in the category of large Institute.

The institute was established as Central Inland Fisheries Research Station in Calcutta under the Ministry of Food and Agriculture, Govt. of India on 17th March 1947. The station was elevated to Central Inland Fisheries Research Institute in 1959 and shifted to Barrackpore, West Bengal as well as came under the Indian Council of Agricultural Research (ICAR), New Delhi in 1967. In the last 75 years of its existence, the institute has followed a growth curve of progress in inland and open-water fisheries. Wealth of information has been generated through different research activities on ecology and fisheries in the major river systems, reservoirs, wetlands and lagoons, innovation and adaptation in technologies, protocols and policy recommendations towards sustainable fisheries management and development in inland open water resources of the country. In recent past, to address the national need, the focus of Institute has been shifted towards natural resource management, sustainable production enhancement and ecosystem health. The ICAR-CIFRI, along with Regional Centers have been continuously monitoring and assessing the ecology, hydrobiology and fisheries including fish diversity, fish catch, fishers livelihood and river habitat and has created the repository of biology and ecological data on major river systems. The Institute has developed a vulnerability assessment framework to mitigate climate change impact on inland fisheries. The institute has been undertaking National fish ranching progammes towards conservation of indigenous fish stock and sustainable management of inland fisheries under the National Mission for Clean Ganga (NMCG) project at different locations in the river Ganga covering various states i.e. Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal. This has resulted in several ecological and conservation benefits. Considering and treating Ganga as the "Heritage of India" is the only way to preserve and protect the river for future generations. Recently Drone technology have been developed for the sampling of water bodies as a part of use of IOT in fisheries.

ICAR-CIFRI, the leading institute in India has made continuous efforts in upgrading the skills and knowledge of fishers, state government officials, students, researchers and other stakeholders through training and skill development programmes, awareness campaigns, field visits, and exhibitions through multidisciplinary interfaces. The Institute has planned to undertake several research in priority areas for conservation and sustainable utilization of the invaluable inland aquatic resources of the country which would push the inland open water fisheries and ecosystem health to a new height. ❐

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Dr. Das Developed Linkages with Worldfish, NACA, FAO, GIZ, SAARC, BOBP, IUCN, World Bank, RMIT University, Waterloo University, University of Manitova, University of Aberdeen, TWAS, MoEF &CC, Ministry of Jalshakti, DoF, NMCG, NFDB, CPCB, CWC, State Fisheries Departments. Guided 25 Ph.D. and 35 Masters students including 2 post Doc and 2 international students. Signed 11 MOU with the Govt. department, 3 MoU for commercial, 7 MoU for consultancy project. 2 MoU for research collaboration and 3 MOU for academic and research collaboration. More than 355 international publications having Citations–6751, h-index – 38, i10 index – 119.

Received Awards/Honours like Jawaharlal Nehru Award for outstanding post graduate research conferred by ICAR 1999; Lal Bahadur Shastri Young Scientist Award conferred by ICAR for the biennium 1999- 2000; Dr. Hiralal Chaudhuri Annual Awards 2001-2002; DBT Overseas Associateship 2005; Krushakbandhu Award by Orissa Krushak Samaj 2011; Dr. M.S. Swaminathan Award for Best Indian Fisheries Scientist by Professional Fisheries Graduates Forum 2011; Krushi Ratna Award from Orissa Krushak Samaj 2016; Eminent Zoologist of the Year Award by Zoological Society of India 2017; Krushak Gourav Award from Orissa Krushak Samaj 2017; Cashless Award for making ICAR-CIFRI a Cashless Office, ICAR, New Delhi, 2017; Ganesh Chandra Vidyarthi Award for Hindi Journal, Nilanjali**,** ICAR, New Delhi, 2018; Best annual Report Award of ICAR-CIFRI, ICAR, New Delhi, 2019; Sardar Patel Outstanding ICAR Institution Award-2020 under Large Institute Category, ICAR, New Delhi, 2020; Rafi Ahmed Kidwai Award for Outstanding Research in Agricultural Sciences under Animal & Fisheries Sciences Category, ICAR, New Delhi, 2020; Ganesh Chandra Vidyarthi Appreciation Award for Hindi Journal, Nilanjali, ICAR, New Delhi, 2020; Agri-Food Empowering India awards 2021; Special Felicitation for outstanding and exceptional contribution to the Nation by State Bank of India, 2022. He is a Fellow of the International Society for Environmental Protection (ISEP); Member, Executive Council, India Science Congress Association for the year 2020-2021; Member, The National Academy of Sciences, India.

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