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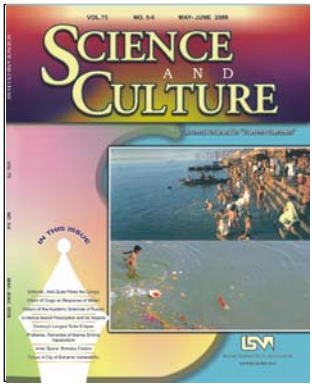
EDITORIAL

AND QUIET FLOWS THE GANGA



The river Ganga, or Ganges in its anglicized spelling, has recently been declared by the Government of India as our National River. The tag, however, does not make much difference to many Indians to whom the Ganga represents more than just a river—it is a respected and sacred symbol of nature that is needed in every aspect of their lives. Most Westerners, used to associating a river with trade or beauty, may be unable to appreciate the existential connection that many Indians enjoy with the Ganga, but I recently came across an account by Bella Bathurst in the book *The Weekenders: Adventures in Calcutta* that seemed to capture the essence of this relationship: "without it [the Ganges], nothing exists; no birth, no death, no regeneration, no God".

Throughout history, rivers have witnessed the growth of civilizations, the settlement of people along their banks and the flourishing of society, the most famous instance being the ancient Mesopotamian capital of Babylon that prospered in the fertile plains between the Tigris and Euphrates rivers in modern Iraq. Conversely, with the change of a river's course, old trading centres necessarily decline followed by the throbbing lifestyles of local inhabitants. Closer home, the change in course of the river Saraswati in the eighth century caused the port of Tamralipta (now Tamluk) to vanish. Ganga is known to have changed its course seven times during the last four or five centuries, and with its evolution, has relegated Saptagram, the famous medieval capital of South-West Bengal, to the footnotes of history. Similarly, Gaur (in Malda) is said to have been ruined by the flooding of the river Koshi, one of the largest tributaries of the Ganga.

The Ganga originates in the snowfields of the Gangotri glacier in the Himalayas as the Bhagirathi River. After traversing a distance of about 250 km in the Himalayas, it enters the plains at Hardwar and continues on a 2,300 km journey through the plains of Uttar Pradesh, Bihar and West Bengal, finally converging with the Bay of Bengal. There are a lot of mythological stories associated with the Ganga. In one such telling, Ganga is considered to be the eldest daughter of the Lord of Snow, the mountain Himalaya. When Himalaya decided to send her to earth (*martya*) from the heaven, Ganga was furious and vowed to deluge the earth in the floods in rage. The god Shiva took up Ganga and held her in the coils of his hair until she was pacified and released her strand-by-strand as seven sacred streams of India. The belief is so deep rooted that even a profound scientist like Acharya Jagadish Chandra Bose wrote in a fictional account, "When asked the river 'from where art thou coming?', the answer inevitably is 'from the coils of hair of Mahadeva'." The spiritual and religious respect that Indians pay to the Ganga has only a weak comparison in the tributes that ancient Egyptians used to pay to the River Nile. The Egyptians believed that the Nile was the centre of the world and the place from it originated was 'the beginning of the world'; it was also the final frontier that the soul of a deceased had to cross before it could join the kingdom of the dead.

An estimated 20,00,000 Indians bathe ritualistically in the Ganga every day. The faith in the Ganga is so monumental that they believe that by just touching the river, sipping her water or even sprinkling of water on the body would make one pure in body and soul.

The Ganga was declared as the "National River" by the Prime Minister on November 4, 2008 as a tribute to the emotions of the Indians linked with this river. As mentioned by the Prime Minister this emotional link needs to be recognised to set up a model for river cleansing

through the new institutional mechanism. Critics say that the announcement is politically motivated to capture religious votes keeping in mind that the election is round the corner. A high power Ganga River Basin Authority (GRBA) was also formed headed by the Prime Minister for pollution abatement, sustainable use of water and flood management.

It may be recalled that the Central Ganga Authority was established in 1985 under the chairmanship of Rajiv Gandhi, the then Prime Minister of India, for similar actions under the Ganga Action Plan (GAP). Spending about one thousand crores of rupees in a decade, GAP was found to be a failure in lowering the pollution level significantly. With the approval of the National River Conservation Plan in July 1995, the Central Ganga Authority has been redesignated as the National River Conservation Directorate (NRCD). The NRCD coordinates the implementation of the schemes under the Ganga and other Action Plans. Although no blueprint of this new GRBA actions have been tabled so far, many fear this will be a repetition of the same story of inactions— just old wine in a new bottle.

The pollution of the Ganga is discussed more than other important issues related to its flow, like erosion of river banks, floods etc. This is because its pollution, due to both human and industrial wastes, is overtly exposed and its wretched condition repels the conscience of all. The sources of pollution of the Ganga, or of any river for that matter, are classified as point sources and non-point sources. Point sources are organised sources of pollution such as drains carrying municipal sewage, industrial effluents etc, where the pollution load is measurable. Non-point sources are non-measurable sources of pollution such as run-off from agricultural fields carrying pesticides and fertilizers, dumping of solid wastes, dead bodies, and animal carcasses, open defecation, dhobi ghats, cattle wallowing, etc. Pollution arising out of the non-point sources, which is about 5 to 10% of the total pollution, may be controlled to a large extent by public awareness and enforcement of strict rules. Control of pollution from point sources requires interception and diversion of the sewage to the sewage treatment plant to make the effluent suitable for use in agriculture and other purposes. Although the Ganga Action Plan focused mainly on the point sources of pollution in select cities, it did not succeed in reducing the pollution level of the river by much.

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Over a billion litres of waste flows into the Ganga every day, of which 75% is municipal waste and 25% is industrial waste. Pollution has reached such a stage in some places that the water is not only unsafe for bathing and other domestic chores, but is unusable even for irrigation purposes. As is known, the level of coliform present in water should be below 50 per 100 ml for drinking purposes, less than 500 for bathing and below 5000 for agricultural use—the present level of coliform in Ganga at Hardwar has reached 5500 per 100 ml.

In order to deal with pollution, one has to understand the river as a whole— to understand the flow of the river, its course, its hydrology, and the geological constitution of the river basins along the course of the river. It requires an integrated approach and not a piecemeal solution. The Ganga flows fiercely fast at the beginning and gradually slows down as it progresses through plains and marshes. As the river slows down in the flat plains and beyond, it deposits sediments, millions of cubic metres of gravel, sand and mud, filling up the river's main channel. About 4 mm of sand is deposited in the Ganga every year. A study carried out by the Geography department of Allahabad University funded by the UGC, reported that silting in Ganga is the main cause of its pollution. The head of the team of that study reported, "Till now, it was considered that industrial and human wastes had been polluting Ganga but the study revealed that had the river flown at its natural velocity, the pollutants would have been washed away." De-silting is also important to avoid flooding every year because silting affects the flow of water and also causes expansion of the bank (erosion of bankment) leading to frequent change of its course and causing floods in eastern Uttar Pradesh and Bihar.

The major problem with de-silting is not just the high cost but also the disposal of the sediments. The quality of silt of Ganga is more clayish that that of Yamuna and is not very suitable to be used as sand in civil construction.

Mr. Samarjit Kar, reputed science writer and one of the editors of Science and Culture, and I visited Kanpur

last month to attend an International Conference and decided to sneak out for a while to watch the infamous pollution of Ganga at Kanpur. Kanpur is famous for leather goods and the discharge from tanneries falling into the river Ganga is one of the major sources of pollution there. The only equipment that we had with us was an inexpensive digital camera. A note on our experience is presented in this issue under 'Focus' (page 199) with a photograph that we captured.

Incidentally, besides its academic excellence, IIT Kanpur is also famous for raising a voice of concern against building of unplanned dams which affects the flow of rivers thereby altering the amount of sediment that rivers carry to the coast, leading to an imbalance in marine ecology, destruction of fisheries and coastal erosion. Dams disrupt the migration of animals up- and downstream, an impact that has been linked to the extinction of several species of freshwater fish. While areas in the upstream of dams are flooded to create reservoirs, wetlands downstream can dry out and the fertility of floodplain soil can decline. A forum named "IITians for Holy Ganga" has been constituted by the alumni of IIT to preserve the heritage and ecology of the Ganga, and is a good example of participating in the restoration of the Ganga.

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We sincerely hope that our responsibility will not end with the declaration of 'National River' and formation of a high-power 'Ganga River Basin Authority' but with fulfilment of the promises made by the Prime Minister's Office that "there is a need to replace the current piecemeal efforts taken up in a fragmented manner in select cities with an integrated approach that sees the river as an ecological entity and addresses issues of quantity in terms of water flows along with issues of quality". Until then quiet flows the river, not having answered Bhupen Hazarika's enduring question: "O Ganga, Why do you flow with such silent equanimity?" ❐

S. C. Roy

Editor's note : *From this issue onwards, there will be a short thought-provoking piece on contemporary issues under "InnerSpace". The author 'incogRito' prefers to remain anonymous and we are committed to honouring the request. An engineer by profession, incogRito's writings have occasionally been published in various periodicals. We hope readers will appreciate the richness of the contents of the article as well as its literary value.*

Letters to the Editor

May 2, 2009

Dear Professor Roy

Many thanks for sending a copy of Science and Culture. I particularly enjoyed going through your editorial (Jan.-Feb. issue) and the important issues that you have raised. You are absolutely right that before we move ahead with any new technology, it is necessary to debate on the negative possibilities to ensure a real safeguard for the people and the society. At the same time, I personally feel that we should not delay too much on adapting any new technology. One very important issue is that of Nuclear Power; of course it has many ill effects (like the famous Chernobyl accident). Whether one should have more nuclear plants is still being debated in the US. My view is this that one should imbibe the technology but have very strict safety rules and be very very careful about the nuclear waste. This is also true for coal based power. The same is true for all other technologies including nanotechnology. Even the IT industry produces tremendously large quantities of toxic waste.....

Yours Sincerely,

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17-03-2009

Respected Professor Roy,

I am writing to let you know that me and Dr. Loskutova have finally received the issues of 'Science and Culture' that you most kindly sent us. I've been very impressed by your journal and I do very much hope that my paper, which I delivered at the conference in IIT Kanpur, could be accepted for publication. Please let me know if you are indeed going to publish it. If you are interested in developing our contacts, my colleagues and me could write more papers on history of science in Russia for your journal.

Yours most sincerely,

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