

**A Critique of Loharinag-Pala, Pala-Maneri
and
Other Hydroelectric Projects on R. Bhagirathi**

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In single-minded pursuit of its agenda for economic advancement, for which cheap energy availability is a major requirement, the Government of India has been proposing and/or promoting a number of hydro-electric projects on various rivers of the Ganga valley including the Bhagirathi to tap their enormous hydro-power potential. In its desire to make India stand somewhere in the long queue of so-called “developed” nations, the GoI is willing to destroy the traditional Indian ethos of worshiping nature and living in harmony with it, slowly destroying any and all links that connect the vast Indian masses to this tradition, heritage and cultural ethos and at the same time erasing what is special, even unique, in the land that is India.

Besides the controversial Tehri Dam, which was ultimately cleared by the Apex Court in 2002 and was commissioned in 2005, a medium “run-of-the-river” hydro-electric scheme at Maneri-Bhali on R.Bhagirathi had become operational as early as the late seventies. Another five projects on various tributaries before they join at Devprayag, to be reverently called GANGAji are currently under construction, including the Pala-Maneri and Maneri-Bhali stage II on Bhagirathi. About twenty more medium schemes are at different stages of planning in the reaches upstream of Devprayag, Two of these are on the Bhagirathi proper. Loharinag-Pala, one of these, recently got a clearance from MoEF, GoI.

It is highly unfortunate that both the environmentalists who never tire of talking of the fragility and uniqueness of the Himalayan environment, as also the devout Hindus, who swear in the name of Gangaji, remained sleeping when Maneri-Bhali was built, and also the agitation against Tehri Dam proved to be miserably inadequate, ill-prepared and primarily concentrating

on the vested self-interests of a few. In the absence of support both from competent scientific/environmental professionals and the devout Hindu cultural ethos, even a towering leader like Sunder Lal Bahugunaji could not lead the Tehri movement to success. With his secular and socialist inclinations, Bahugunaji did not even think of taking help of the 1916 agreement between the Indian Governemnt (then under British control) and the Hindu community which, as a legal instrument, would have been able to stop Tehri Dam or to make substantial changes in its designs and plans. His scientific base and support could also not be called strong.

From the above, it is obvious that it is not enough to say we do not support these projects - it is necessary to be specific as to which of these projects and on what grounds. The grounds can be either (i) scientific and environmental or (ii) related to faith, culture and sentiments. If the grounds are scientific/environmental/legal, they have to be strong enough and be presented by competent professionals, to be able to defeat the project promoters. Such grounds shall also need to keep economic aspects in mind and could be rectified by appropriate design or site changes. If the grounds are related to faith, culture, tradition and sentiments, one has to be bold to strongly and openly state so. Of course one has to be “totally convinced” of his faith, culture and sentiments and be able to ensure that these do not involve any sort of primary violence (“Hinsa”) from his side, but a human who cannot stand (or fall) to defend his faith is no human, as a nation which cannot stand to defend it’s sovereignty is no nation.

Below are discussed the grounds related to (A) our Faith, Culture, Tradition and Sentiments and (B) those related to Environmental/Scientific considerations, due to which we oppose the proposed hydro-electric projects on Bhagirathi, particularly the Pala-Maneri and the Loharinag-Pala projects for which MoEF has granted environmental clearances and construction work has started. We may repeat again and again that the considerations of Group A (those related to faith, culture and sentiments) are the PRIMARY ones, those of Group B (scientific/environmental) only meaningless auxilliaries from our point of view.

A. Faith/Culture/Sentiments vis-à-vis Projects on the Bhagirathi

A-1: Gangaji, a very special river demanding special treatment

In Indian cultural ethos (essentially Hindu ethos since the Islamic/Parsi/Jewish/Christian ethos is in no way linked to the land and geography of India)

Gangaji is no ordinary river it is “Sur-Sari”, divine flow of energy, a living entity; “mother”, revered and worshipped by tens of crores of Hindus – all the Indians who accept and value their links with this land - over not just a few centuries but several millennia.

If crores of Hindus from all parts of the country, as far as Kerala, Tamilnadu, Saurashtra, Kashmir etc. flock to Hardwar, Allahabad, Varanasi, Gangasagar and other spots along Gangaji, it is not because Gangaji has built or irrigated their farmlands, or supplies their drinking water or electricity or even helps to drain away their wastes to the sea. NO! Gangaji is no ordinary river in our ethos to be related to these lowly tasks that other rivers and streams also perform. Gangaji is not Nile or Euphrates, or Thames, or Danube or Mississippi, or even Indus (Sindhu). No one ever craves to visit any of these rivers, their origin, their confluence or any spots on them, as crores of Hindus crave for Gangaji. They want to be near Gangaji even in death; at least have a few drops of Ganga Jal.

The water flowing in Gangaji is not ordinary water to a Hindu, it is “GANGAJAL”, not meant for mere drinking, domestic use, irrigation or pisciculture and hence not needing to meet any criteria or standards set by WHO or MoEF. It is a matter of the life and death of Hindu faith, culture, tradition, sentiments and ethos. One has to think of Kumbh Mela, the Kanwad tradition, the “Chhath” of Bihar and all the other cultural rituals on the banks of Gangaji.

The main problem of scientists, engineers, planners, economists the so-called “educated”, and of recent Indian Governments is that they wish to first treat and then make Gangaji like any other river. They want to apply all the common criteria, the same standards, the same objectives, the same EIA guidelines the same economic planning to Gangaji as to some nondescript stream. They consider Gangajal as any other surface water, inferior to treated tap-water or “Bisleri/Aqua Fina”. They have never considered it necessary to explore and understand the basis of the Indian faith and reverence for Gangaji. Their real aim and intention is to insult denounce and destroy all that is unique to India’s land, it’s culture and it’s people, to be counted as second rate cousins of the other nationalities of the world, far behind those of European origin. I would wish to be forth-right; to me the effort to equate or consider Gangaji to any other river is an attack by the modern scientific/economic culture on the traditional Indian culture, faith and ethos and has to be fought at that level. Let us be clear and straight forward:

- Gangaji is our cultural mother.
- Gangaji is from Gangotri to Ganga Sagar.
- We shall not let Gangaji be treated like an ordinary river and harnessed for irrigation city water-supply, hydro-electricity, pisciculture etc. or be fouled with waste discharges.
- A special code for reverently using Gangaji has to be evolved.

A 2. The unique, superior and very special quality of GANGAJAL

A significant and very important aspect of Hindu culture, faith and tradition is the belief, rather conviction, in the superior and unique quality of GANGAJAL. In a highly intelligent and intellectual group, that we believe our Rishis belonged to, this had to be based on long-time experience and observation and not be mere blind faith. Besides the high and unique spiritual and mental impacts of contacts with GANGAJAL, (which can only be felt or experienced, and not be measured in the laboratory), it is believed to have bactericidal, disease-curing, health-promoting, non-putrefying and purifying properties at levels much beyond any other waters known. While all educated and believing in modern science, would like to discard these as mere rubbish and blind-faith, they have no data or proof from a comprehensive scientific study, planned to satisfy their own criteria for such a study, to establish this. It is essentially the responsibility of the modern scientific community to conclusively prove it, if they think the centuries old faith in the unique quality of GANGAJAL to be baseless and mere blind faith. And it may be stressed that to-date there has been no such comprehensive, properly planned and conducted study. On the other hand there are a number of stray observations and short studies by scientists, all of which support the Hindu faith in the unique non-putrefying, bactericidal and health promoting properties of GANGAJAL. Some of these are listed below:

- Bactericidal properties of Gangajal at Varanasi and other locations observed by several Indian as also European biologists, argued to be due to presence of bacterio-phages.
- E.Coli-cidal properties of Gangajal at Kanpur observed by Shri Kashi Prasad in his IIT Kanpur M.Tech Thesis. This property was unchanged by autoclaving and hence could not be due to phages or any other living agent but was removed on filtration or ultra-centrifuge and hence seemed to be caused by ultra-fine silt or micro-nucleii present in the Jal.

- Unbelievably high BOD exertion (or removal) rate constants (several times of the values in other waters) in GANGAJI observed by Dr D.S. Bhargava in his IIT-Kanpur PhD. Thesis argued to be due to the presence of large amounts of “exo-cellular polymers” excreted by certain bacteria in endogenous phases (but could also be coming from extracts of some specific vegetal species present in Himalayan uplands).
- Bactericidal and purifying properties of Gangajal observed by NEERI in their study on “Self-Cleaning” properties of Gangaji in relation to Tehri Dam, found to be related to a unique mix of heavy and radioactive metals present in Gangajal. The study was toned down to keep within interests of the client and never brought into highlight in keeping with official objectives.
- Even the EIA study conducted by WAPCOS for the Loharinag-Pala Hydro-eclectic Project found fecal coliforms to be totally absent at all the six locations in Bhagirathi in both the Pre-monsoon (low flow) and Post-monsoon (high flow) samplings (see Tables 3.4a and 3.4b of the EIA report). How would one explain this total absence of fecal coliforms at all the six stations and in both samplings with so many pilgrims visiting, bathing and fouling Gangaji at Gangotri and the significant township and army establishment at Harsil upstream, if not due to the special coli-cidal properties in GANGAJAL? Well, WAPCOS was vain; RITES was wise enough not to test for coliforms or bacteria at all, and played safe. CPCB was forthright in their objective of equating Gangaji to other streams; so they probably sampled an incoming drain carrying septic tank overflow to find 377 MPN of fecal coliforms and 17000 of total coliforms at GANGOTRI. I would challenge them putting at stake all that I have, including my life, to prove these numbers for Gangaji at Gangotri following the standard river sampling and analytical techniques.

It is obvious that what science has done has biased, even fouled, our minds against everything that our sages said or believed. And poor Gangaji has been an easy prey.

Like the axiom in law to treat every one as not guilty unless proven to be guilty, there has to be an axiom in culture-related matters to accept, respect and protect all issues of faith and conviction of our age-old tradition, unless and until they are conclusively proven to be false or wrong. Let those who feel that Gangaji or Gangajal

have nothing special and can be treated and used for economic anthropocentric purposes like ordinary waters, carry out a comprehensive study to conclusively negate the cultural notions of special properties. And still they shall have no right to trounce on the cultural faith of the corers of believing, devout Hindus; they can only use the data to gradually dampen the faith.

B Scientific/Environmental Points Against Proposed Projects

B-1 Feasibility, safety and economic viability:

Obviously these three aspects of any project have to be fully ensured for any project right at the Feasibility study stage. The feasibility Reports for these two (Loharinag-Pala and Pala-Maneri) projects have not been available to us for any critical appraisal, but from the information quoted in the EIAs for the two projects, it is clear that adequate examination of these aspects was not done before deciding to proceed with the projects. This is briefly discussed below:

- **Hydraulic Feasibility:** River valley projects of this size are undertaken only after detailed data of hydraulic flows over a long enough period (at least 30 years, preferably 100 years) have been analyzed and not only frequency analysis but probabilities of various flows worked out. The EIA reports only mention 90% assured availability flows. It is not clear if this implies the assured flows available in 90% of the year examined, or on 90% of the days of a particular year. The EIA for Pala-Maneri project states that the average flow in the river is 170.18 m³/sec during April to November and 30.87 m³/sec during December to March giving an annual average flow of 124 m³/sec. However it is not stated whether these are for a particular year (if so, which year) and if they are averages over several years, how many and which years were taken for averaging. It may be appreciated that river flows a very from year to year and that for designing such a project, the flows available in a dry or low-flow year should be considered rather than the average flow of several years. For this desirably, 100 years and minimum 30 years data is considered necessary.

It is also interesting to note that while an up-stream project, viz., Loharinag-Pala has been designed for a nominal average available flow of 145m³/sec. the downstream

project Pala-Maneri considers the nominal average flow to be only 124m²/sec, though the intake has been designed to take 156m³/sec. Obviously the flow available at a downstream project cannot be less than that at an upstream station. It is nowhere clear as to where the flows were measured and over what period. The notion seems to be, that an average of around 120-150m³/sec is generally available and whatever becomes available shall be picked up and used. A thorough probability study of the flows likely to be available, does not appear to have been carried out. If really so, the feasibility cannot be stated to have been adequately established.

ii. Geological Safety: Himalayan geology, the presence of faults, the active Munsiri Thrust, the accumulation of debris and boulders due to frequent land-slides, the earthquake proneness, the presence of fossil-valleys and other highly sensitive and fragile features in the project areas have all been extensively studied and documented by various authors. All these are mentioned in the EIA reports and had probably been considered in examining the feasibility, since some technical measures to safeguard against them (e.g. slightly shifting the site, or providing steel lining in the pressure-shafts over highly vulnerable stretches) have been proposed. How adequate the proposed design measures would be in the Himalayan condition ?

iii. Economic Viability: While economic viability of a hydro-electric project is rarely in question, the escalation of costs of the projects due to the severe geologic conditions and the cost-intensive measures that shall need to be adopted (past experience with such projects in the Beas-Sutlej or Yamuna-Tons schemes shows this) coupled with the uncertain and receding glacial flows in R. Bhagirathi are feared to make the project economically unsound, unless very high sale-tariffs for the power generated are adopted – like in the case of Enron. This is bound to be counter-productive.

All-in-all one can only say that from all information available to us, the issues of hydraulic feasibility, geologic safety and economic viability, have not been adequately addressed or assured.

B-2 Environmental Impact Assessment:

B-2.1 The environmental impacts of a river valley project can be classified into three categories:

- (a) Environmental Impacts caused by the long-term changes brought about by the project in the riverine regime, including flows, water-spreads, velocities of flow, silt loads, bed-topography, bed-character, soil-moistures, drainage-routes, ground-water-tables, etc. which ultimately affect the aquatic and terrestrial ecology and even the land-use, cultivated crops and over-all environment. Such impacts may appear only slowly but continue for all times. Often they are cumulative and keep growing with time. Flood-balancing may not only deprive neighbouring areas of the fertile river silt, but may seriously affect some sensitive biological species, the life cycles of which are related to the normal water-level and water-table regimes as was found in the basin of R. Snowy (very similar to Bhagirathi) in Australia leading to the demolition of a major dam and major changes in the operation schedules of some hydro-electric stations, rendering them un-economical.
- (b) Environmental Impacts due to construction activities of various structures of the project including land-acquisition with it's accompanied land-use changes, displacement of people/activities, deforestation etc, procurement and transport of materials and equipment for construction, the actual construction of the main and appurtenant structures including roads, bridges, colonies etc. often even the impacts visible shortly after the project goes into operation/production are included in this category.
- (c) Impacts likely to be caused in case of an accidental breach or failure in the project structure generally termed a hazard and tackled under risk-analysis and disaster-management.

B-2.2 Rationally the group (a) viz., the long-term impacts caused by the changes brought about by the project in the riverine regime, should be the most critical and important when considering environmental clearance to a river valley project and the other two categories only subsidiary. Unfortunately, these changes are subtle and take a long time to become visible, as such they are generally ignored both by project planners as also by EIA consultants. The MoEF also has little understanding or experience of these, and it's bulky EIA Guidelines and formats are essentially designed for polluting industries and not for river-projects. In this particular case the two EIA consultants did not even care to clearly state the present (or pre-project) riverine regimes (viz., the cycles of the flow variations, water-spreads, water-depths,

velocities, silt-loads etc) or the post-project situation much less to try to assess the impacts of the changes brought about in various stretches in and around the projects. The EIAs only tend to state and believe that the impacts would be minimal even though almost the entire flows are proposed to be diverted away from long stretches of the river channel for long periods. Even the question of impacts on aquatic ecology including migratory fish, algae and benthic invertebrates are brushed aside as being minimal. It would be obvious that changes in water-depths and velocities (and silt-loads) over long periods of time is bound to cause very significant changes in the distribution of species of flora and fauna both in as well as along the river-channel.

B-2.3 A significant scientific problem shall be how to realistically estimate the likely ecological changes even after knowing the changes that the project is going to bring about in the riverine regime. For this the only rational methodology shall be to compare with the observations in several similar earlier projects in similar conditions. Learning from experience, or simulation modeling, is the only option when it comes to environmental predictions. Comparisons with other similar rivers such as the glacial-fed river Snowy in eastern Australia could have been logical. Fortunately now Maneri-Bhali, a much smaller but similar, project on Bhagirathi itself, is at least 30 years old and similar projects in Yamuna-Tons valley have been in operation for some 35 years. The actual impacts or changes caused by these projects could have been assessed in detail and used as basis for simulation modeling. Even the mega-project Tehri Dam on Bhagirathi itself has been now in operation for some 3 years and the actual changes it is bringing about in river water quality and aquatic and benthic ecology could have been measured by a comparison of samples from Gangotri, Maneri, Uttarkashi and down stream of Tehri as a base study for the EIA. None of this has been done, not even mentioned. This should be understandable once it is realized that the objective of the study was only to satisfy the formalities to obtain MoEF clearances and not any sincere or realistic assessment of likely impacts.

B-2.4 Ignoring all the above basic and critical flaws which make the two EIAs fundamentally inadequate, let us examine some specific impacts as assessed by the EIA consultants.

- (i) Loss of forests and terrestrial vegetation: While good field work has been done in enumerating the species, their counts, canopy-coverage and measurements seem to have been manipulated to yield low diversity indices and say that the natural

vegetation in the affected pockets is of poor quality and hence the impact shall be minimal. It is un-believable that the vegetation in these pockets on Bhagirathi is of poor quality and that out of the more than 20 tree species listed to be present in each pocket only four are of any economic value, and none of them is endangered, rare, endemic or sensitive. And what about shrubs, grasses etc., which have also been enumerated but not mentioned when talking of impacts. Most of the herbs of medicinal value are shrubs or grasses found in such pockets of sensitive vegetation and these have been totally ignored when assessing impact of projects.

- (ii) Impacts on Wildlife: It is just stated that all the wildlife has already fled-away or vanished. Is this not a serious indictment of the “development” processes that have been going on? If there is no wildlife all along Bhagirathi, where would wildlife be in India? Would not these projects, the blasting and tunneling in the Himalayas and the heavy transport vehicles and activity drive the wild-life away even from their present hide-outs?
- (iii) Migratory Fish Species: Many important fish species including the famous Hilsa are known to migrate to Himalayan uplands for spawning. When talking of any impact on these it is argued that since Maneri and Tehri have already disrupted such migration along Bhagirathi, the proposed projects shall not any further damage and may be allowed? How funny! Rather than assessing the damage caused by Maneri/Tehri and suggest correcting the mistake, only support further sealing up of Bhagirathi. How DISASTROUS in the long-term ecology? The importance given by the consultants to commercial fishing is un-ethical.
- (iv) Benthic Flora and Fauna: With serious changes in the seasonal water-spreads, flows and water depths in the river-streches both in the upstream submergence and in the downstream of the barrage/weir where the water has been diverted away the whole world would change for the benthic worms, insects, larvae, invertebrates, eggs and the entire life. Who knows what role all these play in the miraculous properties of Bhagirathi water, silt and ecology? Would it be O.K. to discard all this impact, calling it minimal as the EIA consultants have done?
- (v) Algal growth and algal blooms: Before discarding any risk of algal bloom due to low presence of nutrients in Bhagirathi water, the experience of the shallow parts of

Tehri Reservoir and of Maneri “Lake” should have been assessed and quoted. And if the proposed projects are only part of the chain of “development” projects, the likely increase in nutrients due to increasing townships and human activities should have been assessed before discarding the risk of algal blooms in the project pondages as also in the “Kuhl”-like river stretches downstream of the barrage/weir which may turn into series of pools and falls.

- (vi) Impact on Fossil Valleys: The likely impact on these ecologically important features have not been detailed. Although their presence in the region is accepted, neither they have been marked on the map, nor the likely impacts examined.
- (vii) Impacts of Quarrying for Raw materials: The Maneri-Pala project is estimated to consume 200,000m³ of sand and 400,000m³ of coarse aggregates while the Loharinag-Pala project shall consume more than double these amounts. Almost all of these, particularly all of the sand, shall be taken out from quarrying in the river-bed and the neighbouring slopes. The impacts of such manipulations at locations selected only on considerations of quality and quantity of materials available and their economics, have been just stated to be minimal without any effort at quantification or even a crude estimate. When even the proposed locations of the quarries have not been pointed out, where is the question of assessment of impact of blasting, other quarrying operations or the long-term consequences of the removal of these huge quantities of river-bed or side-slope material from it’s present locations.
- (viii) Impacts of transport and construction activities: Significant effort has been invested by the two EIA consultants in modeling and predicting the impacts on the ambient air-quality and noise due to the transport and construction activity. All this is in terms of noise decibel and SPM/RSPM/SO₂/NO_x as specified by MoEF. This would be relevant only in the usual industrial-urban situations, not in Bhagirathi valley, as this does not differentiate between the decibels due to the gushing waters, rustling of leaves and chirping of birds from the headache-causing decibels generated by heavy vehicles, earth-movers, crushers, concrete-mixers and other machinery. The consultants seem to have no ears to appreciate the tranquility, or the mucous membranes to enjoy the fragrance, of Bhagirathi valley.

- (ix) Social and cultural Impacts: Under these heads the EIA consultants have only considered the neighbouring populations and totally ignored the millions of the Indians proud of their natural heritage and hankering to just once in their life, visit and enjoy the tranquil, fragrant, beautiful, scintillating Bhagirathi valley which does not merely fills the mind with extreme joy (“Anand”), but lifts up the soul. The consultants may say this to be merely blind-faith. But is the impact on and deprivation of millions of devout believers to be ignored by an EIA or environmental clearance?

EPILOGUE: The construction of these projects on Bhagirathi would be disastrous to the cultural and environmental identity of India.