river, has progressively decreased the water flow to the Park. The command area of the Panchana dam requires water for irrigation, leaving no water for the KNP. Water released from the dam suffers high transit losses due to long distance and sandy terrain of river course between Panchana and the KNP. Therefore, the State Government has decided not to release water from the Panchana dam, except when the dam overflows. Total stoppage of water from the Gambhir river is likely to make the Bharatpur wetland drier and cause a negative impact upon the life of flora and fauna present there.

The Rajasthan Government has proposed a dedicated pipeline scheme for bringing water from the Chambal river. Only time will tell the truth regarding the proposed pipeline. The Centrally Empowered Committee has also recommended the highest degree of protection to the KNP, as it is a valuable national and international heritage and Ramsar site. So the release of water from the Panchana dam to the KNP is absolutely necessary for its survival. The various alternatives being considered will not serve any purpose in rejuvenating and maintaining the wetland ecosystem of the Park. The lack of coordination and non-cooperation from local people can result in an irreversible ecological equation, thus converting the bird sanctuary into a desert in the near future.

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Ancient gold-mining activity

The communication by Nagabhushanam *et al.*[1] has not revealed any new dates regarding the ancient gold-mining activity in the Hutti Goldfield, except by extending it up to the 7th century AD.

India is one of the World's earliest sources of mineral treasure. On the basis of archaeological and other evidences, the first discovery of gold-bearing reefs in the Deccan region was during the Neolithic period, i.e. between the end of the 3rd millennium BC and the first-half of the first millennium BC – broadly coinciding with the Vedic period, i.e. 5000–2500 BC. I have been studying India's ancient mining heritage since the past several decades[2–4]. I do not agree with the statement of the authors about the absence of historical records pertaining to the episodes of ancient mining activity in Karnataka.

The pre- and the post-Mauryan period (500 BC to AD 1200) was the 'golden period' of mining in ancient India. The most important evidence is the occurrence of rock edicts[5] in different parts of the country (a total 23 with five in Karnataka), which were installed by Emperor Asoka (268–233 BC) close to the mines of gold, lead, zinc, silver, copper and diamond worked during that period. The edict at Muski is located right in the Hutti Goldfield, where several ancient mines are sited and gold is still being mined at present. Some historians believe the name 'Swarna Nagari' (gold town) or 'Suvarnagiri' (gold hill), mentioned in the Brahmagiri edicts (Chitradurga District) is ascribed to Muski – the site of a forgotten ancient Neolithic town, which could have been Asoka's capital in the Deccan[6]. However, one exception noticed is the conspicuous absence of Asokan edict in the region of the Kolar Goldfields.

Certainly, gold was mined in the pre-Christian era. A reference to the Indian gold is also made in the *Bible*, which records that around 970 BC, King Solomon obtained large quantities of gold from 'Ophir', which was in fact India[7].

It is admitted that the present dating techniques prove or disprove the historic time-scale and, are hence relevant in basing our observations/conclusions on the ancient mining heritage in our country.

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Response:

Raghu Nandan has mentioned that we have not revealed any new dates regarding the ancient gold-mining activity in the Hutti Goldfield, except by extending it up to the 7th century AD. We wish to clarify that though some ^{14}C dates have been available from Kolar and Hutti mines, it does not mean further studies need not be carried out at other mines. With the scientific objective of exploring the time period of mining activity at Uti, radiocarbon dating was carried out on the wood log found by one of the authors[1]. Only after ^{14}C dating of the wood log of the Uti mine, the contemporaneity of

ancient mining activity both at Kolar and Uti mines could be established. In fact, the last statement by Raghu Nandan about proving/disproving the chronology itself supports our effort.

Though Raghu Nandan notes 'I do not agree with the statement of the authors about the absence of historical records pertaining to the episodes of ancient mining activity in Karnataka', this general statement needs to be supported by dates in the context of historical episodes of a particular mine. We have already cited in the text about the antiquity of gold mines in Karnataka; identification of 300 ancient workings in Hutti–Muski schist belt; epoch of copper ore mining belonging to the Satavahana period, etc. However, we also acknowledge the work carried out by Raghu Nandan and Mishra for establishing historical periods of various mining activities in India.

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Social forestry with timber trees: a role for village lakes, streams and rivers

Streams and rivers play a key role in the rural ecology and economy by maintaining the water-table, as sources of electricity and water, and as a means of transport. Similarly, the village lakes play a key role in the rural ecology and economy by maintaining the water-table and as a source of water (irrigation). About 9.5% of India's land area is covered by water bodies, whereby the cumulative length of the main rivers of India is over 10,000 km, while the cumulative length of their tributaries and streams may be of similar or greater length[1]. As the streams and rivers flow through dense forests and through agricultural area, one may ask if the latter is an area where trees may be planted as a form of social forestry, along the lakes, streams and rivers, in analogy to the custom of planting trees along the highways and village roads.

In countries such as India, social forestry has been advocated and promoted in many regions to strengthen the rural ecology and economy, reduce the pressure on forests, increase the tree cover and also increase agricultural production[2–4]. There are several factors that affect the success of social forestry for rural development, among which the soil conditions, water-table, cattle grazing, and labour-intensive tree planting are critical factors for success. It is generally accepted that increasing the number of bunds (checkdams) and tanks (artificial lakes) will improve the water table, as has been shown in many regions of India. It is generally accepted that alternative sources of energy for the villages and stall-feeding of cattle will reduce the pressure on forests. This may be essential for increasing the tree cover and ensuring the success of social forestry. By increasing the number of village tanks and supporting the villages with renewable energy and electricity, social forestry would be strengthened considerably.

Some informal projects of this nature have been initiated before and after the first monsoon rains along some lakes near Bangalore, a few tributaries of the Cauvery and at Lake Nilshi near Lonavala (Maharashtra). In this case seeds of pongamia (bio-diesel), and mahogany and hone (furniture) have been planted in a few locations. It was noticed with interest that some farmers were already doing this near some rivers (eucalyptus). This could be done equally well with teak, sheesham, rosewood, deodar and other timber trees. In view of the good water-table in these areas, these trees would grow well and their seeds are distributed by the water and wind along the borders of the lakes, streams and rivers, thereby maintaining adequate density and diversity of timber trees. As these trees may be harvested only after 25–30 years, this may be considered as a long-term plan which would be beneficial for the ecology and economy of the villages. Given the importance of initiative, participation, responsibility and sense of ownership by the villages, the importance of joint forest management cannot be overemphasized[3,4]. This would be compatible with other forms of social forestry[5] and agro-forestry. In the monsoon season when streams and rivers are in spate, this may protect the river banks from erosion, which would be an additional advantage for the nearby villages in the long term.

While it may be non-trivial at the present time to make realistic estimates of the economic value of this concept for the whole of India (timber and furniture), some back-of-the-envelope calculations do suggest that the contribution to the rural economy and ecology would be significant. Given the importance of increasing the forest cover, strengthening the rural ecology and economy, and increasing agricultural production, the role of planting timber trees along the village lakes, streams and rivers may be significant. Importantly, this would strengthen the rural ecology and economy, enhance their experience of well-being, and may be extended to other countries in Asia.

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