

## Environmentalism and case-study science

Some unfortunate statements were made by Thatte and Pandit<sup>1</sup> recently, with regard to environmental activists. I quote: 'Now only the very naive believe that all this opposition is driven purely by a love for the environment ... the scientific community needs to be aware of the existence of trans-scientific dimensions of opposition to ILR' (interlinking of rivers).

While this wording is dense and round-about, it points to a state of mind that has been around for at least three decades, and which permeates Government thinking. Most of us who do research in ecology or wildlife biology, and are involved with conservation issues, have had it flung at us at periodic intervals. I personally encountered it as far back as in 1976, when colleagues objected to timber-felling by a tea company within a wildlife sanctuary. More followed when we objected to two dams on ecological grounds within the Kalakad-Mundanthurai Tiger Reserve. I had dubious characters from the Government visit me in the dead of night, to ask me who was paying me to object to these developments for the national good. (In this case better sense prevailed, and these dams were dropped.) For the most part though, any objection to any large development project is muted because of the fear that pending proposals or research permissions might get rejected. Whether this actually happens or not is moot.

The reason that this sort of finger-pointing works is because we have fallen prey to case-study science. I define case-study science as reaching conclusions and making recommendations based on a very small sample size, even  $n = 1$ . These samples usually also get wide press publicity, but no analysis is presented in peer-reviewed journals.

Even well-known academics have fallen into the case-study science trap. I illustrate this below with an example from the proposed Tribal Bill.

I quote: 'There are three main streams of thought regarding this issue. Some experts say that tribal communities have lived in forests for centuries, and granting them the formal right over forest land is just undoing a historical injustice. On the other extreme, some conservationists say that certain species of animals (such as the tiger) cannot co-exist with humans, and there is a need to reserve at least some parts of forests to conserve these species. They also say that increased

human habitation in forests will cause depletion of forest cover, resulting in significant ecological costs. A third view is that traditional forest-dwellers help in preserving forests, and giving them land rights would actually help in ecological conservation ... *However, there does not appear to be any clear evidence to conclusively support any of these views.*'<sup>2</sup>

In response to the first point, there should be historical data to substantiate it, rather than a blanket statement being quoted by the proponents of the Bill. How many tribal communities? What was the nature of this injustice? Was it only the Forest Act that caused this injustice or did these injustices involve other factors? Where tribals owned land, were they still exploited by locals? Many other issues that are amenable to data collection and analysis occur to me, but by and large the support for this viewpoint remains subjective<sup>3</sup>.

In response to the second point, there is definitely enough research that has been done to demonstrate it scientifically. It has to be compiled by professionals, and not by a Government-appointed committee consisting almost entirely of non-scientists, where all the major opinions were known even before the committee met for the first time. This was the case with the Tiger Task Force. Outcome: to save the tigers, hand over the forests to the tribals!

The third issue raised is case-study science at its best. Actual numbers can be collected to demonstrate how common this protection by tribals is. Also conveniently ignored in the debate is the concept of population density or rate of increase. Sustainable use a decade ago may no longer be so, because of the increased population pressure.

Many of these drawbacks have been recognized<sup>4</sup> but data are still missing.

The tendency is, of course, far more widespread than this. Somebody visits a grass plantation in Haryana and this becomes the model for community participatory management all over India<sup>5</sup>. A species of *Eucalyptus* being shown as harmful in a pocket in Karnataka<sup>6</sup> has led to whipping-up of hysteria against the genus as a whole all over the country. A specific instance of water conservation in Rajasthan<sup>7</sup> is now touted as an all-India model. Blanket prescriptions concerning a bird species that is threatened in Maha-

rashtra have led to it being even more threatened in the Andamans<sup>8</sup>.

I conclude with the original point raised by Thatte and Pandit<sup>1</sup>. This is with regards to opposition to the ILR. I have two brief points to make. First, at least one economic analysis shows that the costs of pumping water uphill will make the project unviable<sup>9</sup>. Secondly, plant and animal species that are deleterious to both environment and human well-being may be transmitted along these channels<sup>10</sup>. Surely, it is not unreasonable to have the necessary studies done by independent bodies, before lakhs of crores of rupees are spent.

The debate on whether projects or laws are environmentally damaging, or whether environmental projects themselves cause unintended consequences, needs to be buttressed with data, and not just opinions on the pages of social-science journals. We need to go beyond case-study science.

1. Thatte, C. D. and Pandit, C., *Curr. Sci.*, 2006, **91**, 260–261.
2. Sanyal, K., STs (Recognition of forest rights) Bill, India together legislative brief, 15 April 2006, <http://www.india-together.org/2006/apr/law-forest.htm>
3. Sarin, M., *Econ. Political Wkly*, 21 May 2005.
4. Madhusudhan, M. D., *Econ. Political Wkly*, 19 November 2005.
5. <http://www.rainwaterharvesting.org/Rural/Sukhomajri.htm>
6. Shiva, V. and Bandyopadhyay, J., *Ecologist*, 1983, **13**, 184–187.
7. <http://www.tarunbharatsangh.org/about/abouttbs.htm>
8. A report of exploitation at Vengurla led to the placing of the edible nest swiftlet on Schedule I of the Wildlife Act, banning the use of its 'products'. However, the entire conservation strategy for it involves farming for nests – see Sankaran, R., *Biol. Conserv.*, 2001, **97**, 305–318.
9. Pelkey, N., *The Hindu Survey of the Environment*, 2003.
10. For instance, North Indian carp is known to have affected inland fisheries adversely in the south.

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*Response*

Organized opposition to infrastructure projects in India does not seem to suffer from shortage of funds. Therefore, it is a valid question to ask whether environmental activism, at least some of it, is driven by non-environmental considerations. Still, if Rauf Ali thinks all this is only a 'state of mind', then it can be easily cured by disclosing who pays for obstructing infrastructure projects in India. Why is that such a closely guarded secret?

Just as Ali is anguished that, in the context of saving tigers, the opinion of 'a group of non-scientists' has prevailed, likewise we too felt aggrieved that the group which met in Bangalore and went

public with some theories about ILR, did not include a single water-resources engineer.

Ali's comment that '... at least one economic analysis shows that the costs of pumping the water uphill will make the project unviable', is based on a paper N. Pelkey, a professor of environmental sciences and information technology in Pennsylvania. He is not a known authority on strategic planning for food, water and energy security for India, wrote his paper before the feasibility reports were made public, thus perhaps without reading them.

But Ali seems to think that such a paper by a foreigner from whatever discipline is sufficient to trash 25 years of work by

a team of more than a hundred Indian water-resources engineers in the NWDA, CWC and other specialized institutions of the Government of India – say 2500 engineer-years of work. In that case, since food and energy security has strong strategic implications, whenever India plans major infrastructure projects, one can find papers, and rather easily, that will seek to trash the projects.

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## Nannofossil assemblage in Kutch

Jyotsana Rai's<sup>1</sup> report on the occurrence of nannofossils of Albian age from a plant bed of the Bhuj Formation is interesting and significant. It is an accidental but important discovery. She has rightly stressed its importance on the age and environment of deposition of the Bhuj Formation. However, conclusions drawn by her on these two aspects raise controversies and need to be discussed. I had reviewed this paper. Considering the limitations of the study, I suggested modifications in order to avoid contradictions with the existing field data and proven facts. However, it appears that my comments and suggestions were not taken into account while revising the manuscript. For the benefit of the researchers I feel it is necessary to explain here the anomalies created by rash conclusions drawn on limited data.

Two important conclusions drawn are: (i) The nannofossil assemblage indicates early Middle Albian age of the Bhuj Formation (referred as Bhuj 'Member' in the text by Rai); (ii) The presence of nannofossils confirms the marine environment of the Bhuj Formation supporting 'an uninterrupted marine succession from at least Late Bajocian to early Middle Albian in Kutch basin'.

The following points need to be noted for discussion:

1. Occurrence of nannofossils is limited, only one sample out of two collected from a shale bed in the Bhuj Formation yielded nannofossils.

2. Middle Albian age of the Bhuj Formation has been determined on the basis of one sample only from the Lower Member of the Bhuj Formation in Central Mainland, which is equivalent to the Neocomian Ghuner Member in Western Mainland, which occurs below the Aptian Ukra Member of the formation.
3. The sample comes from a fossiliferous horizon, which is rich in well-preserved terrestrial plant fossils. The excellent state of preservation of the leaves speaks of provenance proximity and thereby the environment.
4. Association of terrestrial plant fossils and marine nannofossils together in a bed is baffling and needs to be explained.
5. The horizon from where the nannofossil-bearing sample was collected is overlain by an intensely bioturbated zone which is devoid of nannofossils as also the barren shales below it.
6. The sandstone-dominated Bhuj Formation, which is interpreted as marine deposit, is barren of fossil fauna but rich in fossil flora occurring in shale beds.

*Age of Bhuj Formation:* In the type area around Bhuj the formation is 400 m (+) thick and divided informally into two members, lower and upper<sup>2,3</sup>. The formation thickens enormously towards the west and in Gadhuli-Ghuner area attains a thickness of over 900 m. In this area the formation comprises three members –

Ghuner, Ukra and Upper in ascending order. The palyno-assemblage indicates Neocomian and Albian to (?)Santonian ages for the Ghuner and Upper members respectively, whereas the ammonite index and absolute dating determined the Aptian age of the Ukra Member. The Neocomian age of the Ghuner Member is also supported by the ammonite index<sup>4</sup>. The Ghuner and Upper members have the same lithofacies association, distinguished only by the local occurrence of Ukra Member between them. As the green, glauconitic shales and marl beds of Ukra Member pinch out, it is difficult to distinguish the two members. Both merge into one formation that continues eastward in the rest of the Mainland as the Bhuj Formation<sup>2</sup>. This formation comprises more than half of the total thickness of the Mesozoic succession. Detailed mapping by tracing of the marker-defined litho-units (see figure 10 in Biswas<sup>3</sup>) established that the Lower Member of the Bhuj Formation of the type area changes laterally into the facies of the Ghuner Member as the formation thickens westward. Several dark grey, carbonaceous shales with well-preserved fossil-leaf impressions and carbonized plant remains, occur at different levels within the formation. The megafloora and palynomorph (the formation is rich in microflora also) indicate Neocomian age for the Bhuj Formation<sup>5</sup> (mainly Lower Member in the type area), which agrees with the stratigraphic position explained above. The reported occurrence of the