

Scientific writing

I chanced upon the editorial on 'Scientific Writing and English'¹, while browsing the *Current Science* website. It has touched a deep chord in my heart and I am so glad that someone feels just the way I do. I teach subjects related to the environment, to postgraduate students at the TERI School of Advanced Studies, a Deemed to be University in Delhi.

I have come down heavily on my students for precisely the things you mention, primary among which is simply the need to say what they wish to say. This requirement is confounded with verbosity they pick up from our newspapers, TV and the general Indian tendency to use ten words where one would do.

It would gladden you to hear that I make them, at least once a month, write on a topic related to their curriculum in the class without prior notice. I ask them to restrict themselves to half a page and then go through the exercise of reading aloud each write-up, pointing out the errors and then getting them to rewrite it within five or ten minutes. This has opened a

few eyes, and I hope, will serve some purpose.

I have also worked as a copy editor for some publishing houses and am more than aware of the abysmal level of English now in use, particularly at the research level. I do not see any way out – as a nation we do not pay attention to detail and neither do we care for quality. I know that half the research papers we submit to international journals are returned just because they are incomprehensible and probably have the reviewers wondering what we understand of the subject!

One possible solution is to improve the quality of textbooks we use right from the primary level: the quality of printing, editing, diagrams and figures, and even the facts are more often than not, poor. I do not blame a child for not paying any attention to standards, if the book he/she studies from has spelling mistakes, grammatical errors, figures and drawings in which houses/humans/objects are sketched without any attention to proportion or perspective. This concern and exposure

to quality has to come from childhood, if it is to have any impact later. If the NCERT cannot rely upon its authors to do this, then the books must be edited by competent people. The same applies to college-level books as well. I studied from books written by foreign authors and gradually imbibed their language; in the context of scientific writing, one must know how to say certain things a certain way. Today, texts written by careless authors (to whom, perhaps the royalties are more significant) are used by most students – what else can one expect?

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Tsunami of 26 December 2004

The Indian coast was affected five times due to tsunamis during the last 122 years (1883–2004), while the frequency of tsunamis in the Pacific Ocean is five per year. Maybe due to their lesser frequency (once in 24 years), not much attention has been paid to tsunamis in India.

Will it be possible to identify the areas that are vulnerable if a tsunami strikes the coast? In the absence of earlier studies, I feel that a study carried out by Shetye *et al.*¹ in the context of sea-level rise due to greenhouse effect may be useful in this context. Figure 1 shows the displacement of shoreline on the east and west coasts of India, if the sea level rises by 1 m. Assuming 1 m sea level rise as a 1 m height tsunami, I believe that the results are valid to make a preliminary assessment of the vulnerable areas for tsunamis by correlating the 26 December 2004 tsunami with the death toll and damages at different areas. From Figure 1 it may be

inferred that the latitude belts, 10–12°N, 14–16°N and > 20°N on the east coast and 9–10°N and 21–24°N on west coast are most vulnerable to damages due to tsunamis, storm surges and sea level rise due to greenhouse effect. On the east coast, the peak coincides with Nagapattinam, which was the worst affected area by the tsunami. Since the slopes are less on the east coast compared with that on the west coast, there is more risk due to tsunamis as well as storm surges on the east coast. Storm surges are frequent on the east coast². A storm surge of 8 m height, which hit Paradeep, Orissa due to the supercyclone in October 1999, devastated Orissa³. The damage was estimated as Rs 5000 crores, which is close to damages due to the tsunami (Rs 5500 crores). From earlier reports², it has been observed that Nagapattinam was affected due to storm surges of a few metres height. Thus it may be pointed out that because of the

shallow nature and its geographical location, Nagapattinam will be affected due to a 1 m high tsunami, storm surge or sea level rise due to greenhouse effect, as shown in Figure 1. The next peak is near Machilipatnam, Andhra Pradesh (AP) where the maximum number of people were killed. Since it was a holy day (Kartika Pournami, full moon day), people who had gone to take a bath in the sea at Manginipudi beach (10 km away from Machilipatnam) lost their lives. The tsunami energy was dissipated by the time it arrived in the southern part of AP and northward from that point, the amplitudes decreased quickly. Hence Orissa, West Bengal and Bangladesh were not affected⁴. A tsunami of 1 m height could severely damage Bangladesh, as most of the land is only 1 m above sea level. On the West coast, the peak over Kerala, corresponds to Kollam and Alappuzha districts, which were affected by the tsunami. Shetye *et*

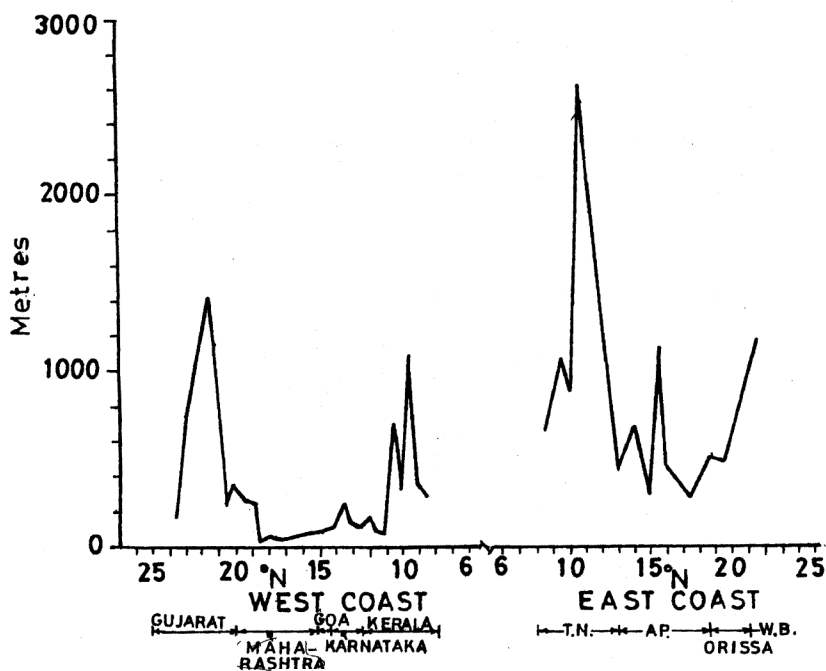


Figure 1. Displacement of shoreline for sea level rise of 1 m (source Shetye *et al.*¹).

*al.*¹ pointed out that 12–18°N is the safest on the west coast from the point of view of shoreline retreat. Though the tsunami hit the west coast also (of course with minor intensity), there was no loss of life in Karnataka, Goa and Maharashtra, which

are in the above belt. The peak on the west coast is located at 22°N close to Kandla, Gulf of Kachchh, where about 300 people were killed due to an 11.8 m height tsunami that hit this place on 27 November 1945.

Detailed bathymetry and topography digital maps at close intervals along the Indian coast are essential for tsunami and storm surge modelling. These maps will also help to estimate the possible areas of inundation due to the expected sea level rise due to greenhouse effect.

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Are *Bt* toxin engineered plants truly safe?

Transgenic insecticidal plants are gaining attention regarding grants for research from various national and international agencies. About thirty crop species could have been genetically engineered to express *Bacillus thuringiensis* (*Bt*) endotoxins – highly toxic to specific insect pest species¹. However, development of resistance is also reported to *Bt* toxins, e.g. *Plutella xylostella*². Besides resistance problem in insect species against *Bt* toxin engineered plants, serious safety issues are of great importance to man and environment because of production of toxin proteins and chances of developing human allergies.

A study reported by the US-based union of scientists under the title ‘Peril amidst the promise: Ecological risks of transgenic crops in a global market’ (1995) reported serious environmental risk due to commercialization of genetically engineered crops

that included (i) plants engineered to contain virus particles that might facilitate creation of new viruses, (ii) transgenic crops that may turn as weed, (iii) risks to other organisms that are not intended targets of new chemicals, (iv) risk to existence of beneficial fungi that make available nutrients for plant growth, and (v) threat to population of wild plants and traditional varieties being a source of genetic biodiversity. A US seed company (Pioneer Hi-bred) was forced to drop the development of soybean with Brazil mutagens spliced, because people with Brazil nut allergies adversely reacted to the new product. The genetically engineered food supplement L-tryptophan is believed to have been responsible for several human deaths and injuries in the US. Such fears may have led ‘Forum for Biotechnology and Food Security’ to urge the Indian Prime

Minister to quickly cancel the government decision of importing 1 million tons of soybean from the US.

Insects fed on transgenic plants disrupt cell membrane in their midgut. In the bacterium, δ -endotoxins are synthesized as large protein molecules and crystallized as parasporal inclusions. Further, toxin generates pores in cell membrane, disrupting cellular osmotic balance and causing cells to swell and lyse through a process termed ‘colloid-osmotic lysis’³. This is one of the important intriguing factors about physiological and biochemical reactions that may also occur in human and other organisms. Moreover, food choice of the insect is associated with a set of phytochemicals available in different families of plant species. Would changing the chemo-typical status of the plant body not invite secondary pest outbreaks