

2. WWF, *The Living Planet Report 2014* (eds McLellan *et al.*), World Wildlife Fund, Gland, Switzerland, 2014.
3. Dynesius, M. and Nilsson, C., *Science*, 1994, **266**, 753.
4. Grumbine, R. E. and Pandit, M. K., *Science*, 2013, **339**, 36–37.
5. Nilsson, C. *et al.*, *Science*, 2005, **308**, 405–408.
6. Baran, E. and Myschowoda, C., *Aquat. Ecosyst. Health Manage.*, 2009, **12**, 227–234.
7. Dugan, P. J. *et al.*, *Ambio*, 2010, **39**, 344–348.
8. Orr, S. *et al.*, *Global Environ. Change*, 2012, **22**, 925–932.
9. Zhong, Y. and Power, G., *River Res. Appl.*, 1996, **12**, 81–98.
10. Park, Y.-S. *et al.*, *Conserv. Biol.*, 2003, **17**, 1748–1758.
11. Joshi, K. D. *et al.*, *Curr. Sci.*, 2014, **107**, 478–488.
12. Raghavan, R., *J. Threat. Taxa*, 2011, **3**(5), 1788–1791.
13. Raghavan, R. *et al.*, *Rev. Fish. Biol. Fish.*, 2013, **23**, 547–554.
14. Smith-Vaniz, W. F. and Carpenter, K. E., *Fish Fish.* (in press); doi:10.1111/faf.12099.
15. Kottelat, M. and Freyhof, J., *Handbook of European Freshwater Fishes*, Kottelat, Cornol, Switzerland and Freyhof, Berlin, Germany, 2007.
16. Talwar, P. K. and Jhingran, A. G., *Inland Fishes of India and Adjacent Countries*, Oxford and IBH Publishing, New Delhi, 1991.
17. Nelson, J. S., *Fishes of the World*, Wiley, New York, 2006.
18. Froese, R. and Pauly, D. (eds), *FishBase, 2010* (version 10/2011); <http://www.fishbase.org>
19. Eschmeyer, W. N. (ed.), *Catalog of Fishes*; <http://research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp> (accessed on 24 August 2014).
20. Ng, H. H. and Kottelat, M., *Zool. J. Linn. Soc.*, 2008, **153**, 725–732.
21. Kottelat, M., *J. South Asian Nat. Hist.*, 1996, **2**, 61–62.
22. Kottelat, M., *J. South Asian Nat. Hist.*, 1998, **3**, 117–119.
23. Kottelat, M., *Raffles Bull. Zool. Suppl.*, 2013, **27**, 1–663.
24. Pethiyagoda, R., *Freshwater Fishes of Sri Lanka*, Wildlife Heritage Trust of Sri Lanka, Colombo, Sri Lanka, 1991.
25. Chaudhry, S., IUCN Red List of Threatened Species, 2010; <http://www.iucnredlist.org/details/166123/0>
26. Kottelat, M., *Raffles Bull. Zool. Suppl.*, 2012, **26**, 1–199.
27. Pethiyagoda, R. *et al.*, *Ichthyol. Explor. Freshwaters*, 2012, **23**, 69–95.

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Pervasive incursion of extremism in academic fields

Arun Bapat

Using extremism to defend or oppose any issue has been practised in almost all social, political and to some extent in administrative areas since some years. But the recent trend shows that it has made incursion (intrusion?) in the scientific field as well. The National Green Tribunal (NGT) is a semi-judicial autonomous organization initiated to protect the environment, forest, greenery, etc. The NGT has given the following verdict on 21 February 2015. The order is: ‘NAGPUR: In a major setback to the Ministry of Environment, Forests and Climate Change (MoEFCC), the principal bench of National Green Tribunal (NGT) at Delhi, on Friday, stayed felling of trees for all linear projects like roads, canal, power lines passing through forests in the country even if they have been granted Stage 1 clearance. The five-judge principal bench of NGT headed by Justice Swatanter Kumar passed an order on a petition filed by Nagpur-based wildlife biologist Milind Pariwakam through his lawyer Ritwick Dutta and stayed felling of trees across the country, along such projects as national highways, power lines, irrigation canals, railways and the

ones carried out by the Government construction agency Central Public Works Department (CPWD).

The order will have a bearing on four-laning of NH7 between Mansar and Khawasa that entails large-scale felling and the case about which is being heard by Nagpur bench of Bombay High Court. The MoEFCC, vide a letter issued to the state governments on 8 August 2014, and subsequently on 15 January 2015, had diluted the guidelines under the Forest Conservation Act (FCA), 1980, stating project proponents could start work on linear projects and fell trees even after getting Stage 1 clearance....’

An old similar case about land allotted for an airport at Navi Mumbai could be recollected. Out of the total 1200 acres of land earmarked for development of Navi Mumbai airport, about 10 acres of land was from wetland area. While granting environmental clearance, the green clearance authority had observed that an area of the same size (10 acres) may be developed as wetland. It is known that wetland and mangroves cannot grow in stationary water. It needs fluctuating water near sea and preferably estuarine

region. Subsequently, the suggestion was removed.

If the above verdict is accepted, it would stop roadway, railways canals and electrical lines. At present, there are some dams which are completed or have reached completion stage. If water from the reservoir and electricity from the power house are to be carried to some locations, this would not be permitted. If an underdeveloped nation like India needs progress, such bans would definitely have a negative impact on development. There has been a recent trend in scientific extremism which says without any reason, logic or science that ‘cutting of trees reduces the amount of rainfall...’. Based on this there is yet another case from Nashik, Maharashtra, where the next Kumbh Mela is to be held during August–September 2015. The local authorities wanted to make roads and space for the yatis. For this, cutting of about 500 trees was required. The local court and the High Court have not permitted this tree cutting. As a result, during the Kumbh Mela, concentration and movement of a large population on a limited area could possibly lead to stampede.

The country has seen stampedes during Kumbh Mela since 1951 at Allahabad, Hardwar, Ujjain and Nashik^{1,2}. In addition, there have been numerous stampedes at religious gatherings. If unfortunately such a contingency occurs during the forthcoming event at Nashik, it would lead to a 'blame game' amongst various administrative authorities.

Is it scientifically correct to say that cutting of trees reduces rainfall? It needs to be examined holistically. The main sources of rain in India are the monsoons, which usually last for about four months from June to September. There are some theories of monsoon such as dynamic theory and jet stream theory. During the last decades some climatologists have been advocating the possible effect of El Niño. Despite some variations in these theories, it is a fact that the main reason for the formation of monsoon water-bearing clouds is excess amount of solar heat during April–June. The sea water gets hot and vapour is produced. During the hot subtropical summers, the massive land mass of the Indian Peninsula heats up at a different rates than the surrounding seas, resulting in a pressure gradient from south to north. This causes flow of moisture-laden winds from sea to land. On reaching the land these winds rise due to the geographical relief, cooling adiabatically and leading to orographic rains.

The main source of rain is sea water. There is apparently no contribution of trees in generation, formation, transportation and precipitation of rain. Hence to consider that cutting of trees adversely affects the rate of rainfall is not correct. No rain, less rain, deficient rain or untimely rain could lead to drought. There were droughts during the Mughal and British periods as well. The great Bengal famine during 1769–1773 had caused death of about 10 million people³. During these periods there was a large number of trees and sufficient greenery. This clearly shows that there is no correlation between tree cutting and rainfall. However, it is fact that the trees hold a lot of moisture.

If we want progress and development, canals, roads, rail and electrical lines are required. For these linear projects, it is necessary to cut some trees. The NGT could have said that if trees are cut, the project authority should plant double the number of cut trees or the trees may be transplanted. But putting a total ban would stop progress.

Yet another extremist incursion is the so-called reservoir-induced seismicity (RIS). This term was coined immediately after the occurrence of the medium-sized Koyna earthquake of magnitude 6.5 on 10 December 1967. An American scientist wrote a paper with catchy title 'Build a dam and create earthquake'^{4,5}. Subsequently, RIS could not provide a suitable explanation for the event; thus it was renamed as reservoir triggered seismicity (RTS). As the new name was also deficient, the latest name is reservoir associated seismicity (RAS). During the last 15 years, the Koyna has undergone 'lake tapping'. This experiment clearly shows that there is no seepage of water underground. Because of the RIS, a big protest was launched to oppose the Narmada and Tehri dams. The protest delayed completion of the Narmada project by more than a decade. At present, there is opposition to the commissioning of Kudamkulam Atomic Project, arguing that a tsunami could hit and destroy the plant. Similarly, the Jaitapur Atomic Project in Konkan area is being opposed on the grounds that an earthquake and tsunami could destroy the plant. The highest magnitude of earthquake in this region would be 6.5 and the acceleration due to this has been accounted for the design. The project is at an elevation of 27 m amsl. As such both the objections are totally misplaced.

Another example is from the telecom field. A few years ago, there were sponsored news, interviews and press releases stating affirmatively that radiation from the mobile telephone towers is hazardous to human health. The radiation could adversely affect pregnant women, cause cancer, adversely affect the brain, etc. In some advertisements it was also advised that for protection from radiation suitable protective shields are available. The signal strength on mobile (cell) phones is in milliwatts. The intensity would be inversely proportional to square of distance. As such, it is difficult to prove the adverse effects of mobile tower radiation.

The latest intrusion of extremism is in seismology. An American scientist claims to have developed an early warning system (EWS)⁶, which gives 5 sec warning of the earthquake. The time-period of 5 sec is not sufficient for any person to move out of house. Further, the EWS is not capable of giving even 1 sec warning in the epicentral area. The system is somewhat useful in alerting fast trains

moving far away (more than 100 km) from the earthquake epicentre. This has been found useful at long distance, but does not save a single life at the epicentre⁷.

An example from the agricultural field would be illustrative. During early 2014, there was a hailstorm in Nashik district, Maharashtra. Immediately after the hailstorms there were stories and news reports about loss of entire crops of onion and grapes in the entire district. The duration of the hailstorm was between 10 sec and 30 min, and the size of the hail particle in Nashik area was between 3 and 6 mm diameter. To assess the agricultural damage due to hailstorm, the area covered by one hailstorm needs to be noted. Normally one hailstorm affects an area of about half sq. km to one sq. km. The hailstorm never covers the entire district. Considering these scientific parameters, it would not be prudent to say that the entire crops of onion and grapes have been destroyed. This is an act of extremism. There would be definitely damage to crop during hailstorm. But it cannot be spread over a very large district.

It is felt that the pendulum of extremism has reached its limit and some efforts are needed to break its momentum and restrict the sweep of its swing within reasonable limits. The engineers, scientists, environmentalists and judiciary may exercise logical constraints on their findings, observations, inferences and results so that the objective of harmonious development could be achieved by avoiding any extremism.

1. Saksena, N. S., *1954 Kumbh Stampede: Law and Order in India*, Abhinav Publications, 1987, p. 164.
2. Maclean, K., *Pilgrimage and Power: The Kumbh Mela in Allahabad, 1765–1954*, Oxford University Press, New York, 2008.
3. Shaw, R. and Nguyen, H. (eds), *Droughts in Asian Monsoon Region*, Emerald Group Publishing, Binky, UK, 2011.
4. Guha, S. K., *Induced Earthquakes*, Kluwer, Dordrecht, 2000.
5. Gupta, H. K., *Bull. Seismol. Soc. Am.*, 1983, **73**(2), 679–682.
6. Allen, R., *Nature*, 2013, **502**, 29–31.
7. Bapat, A., Explorer, Society for Scientific Exploration (SSE), San Francisco, Fall 2014 issue, 2014, pp. 13–14.

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