Table 2. Exergy (defined as $E = iC = C^2/P$) of CAS, MPS and RAS in China, Germany and Russia

	Exergy = impact * citations		
Statistical unit	*E* 1996–2006	*E* 1997–2007	*E* 1998–2008
CAS	1.90E + 06	2.73E + 06	4.10E + 06
MPS	2.28E + 07	2.52E + 07	2.90E + 07
RAS	1.63E + 06	1.80E + 06	2.04E + 06
China	6.41E + 06	9.07E + 06	1.41E + 07
Germany	8.65E + 07	9.64E + 07	1.26E + 08
Russia	4.09E + 06	4.54E + 06	5.17E + 06
CAS/China	2.97E – 01	3.01E – 01	2.90E + 01
MPS/Germany	2.64E – 01	2.61E – 01	2.30E – 01
RAS/Russia	3.97E – 01	3.96E – 01	3.95E – 01

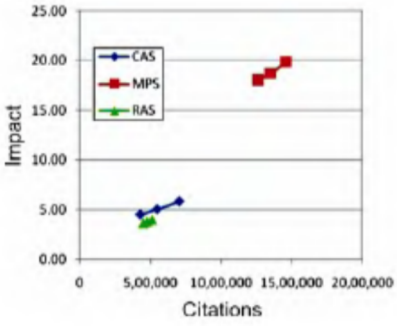

Figure 1. An impact–citations–exergy projection of performance of three national academies.

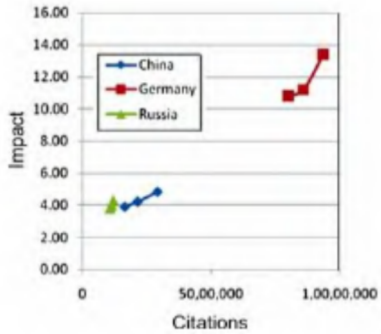

Figure 2. An impact–citations–exergy projection of performance of the respective countries.

is to use the following distinction: papers as output, citations as outcome and citations/papers as impact. The datasets shown in tables 1 and 2 of Ye[1] can be re-arranged as shown in Table 1. An energy like term (we call it exergy, defined as $E = iC = C^2/P$) is computed for CAS, MPS and RAS in China, Germany and Russia respectively and displayed in Table 2. In exergy terms (a measure that combines quality and quantity), CAS accounts for approximately 30% of China's research output, while MPS and RAS account for approximately 25% and 40% of the output of their respective countries. The variation from year to year can be easily and gainfully projected in what we call iCE (impact–citations–exergy) map and Figures 1 and 2 show this for the national academies and for their respective countries. The trajectories that emerge give a visual picture of the way science activity evolves.

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Setback to *Bt* brinjal will have long-term effect on Indian science and technology

February 9, 2010 was indeed a sad day for Indian biotechnology. The Union Minister of State for Environment and Forests took a far reaching decision to clamp the moratorium on the commercialization of the first genetically engineered vegetable crop *Bt* brinjal. It was not based on any compelling scientific evidence but based on the nationwide protests by anti-biotechnology activists, environmental and developmental NGOs and certain farmer groups. It was astonishing to see how the minister was able to collate, review, analyse and develop decision options within 48 h to announce his unfortunate decision a day before promised. By his own assertion, the buck stopped with him and the decision was only his and nobody else's. It seems he took a single-handed decision without bothering to consult other ministries and organs of the government that share a jurisdiction on the development of modern biotechnology. It should be obvious that the minister had arrived at his decision long before he concluded the last of public consultations in Bangalore on 6 February 2010. It seems that he just went through the motions of consultation to fulfill the formality. It is equally perplexing that the Union Ministers of Agriculture and Science and Technology have both strongly differed from the environment minister in his decision. The former minister of science and technology said that decisions affecting science and technology are best left to scientific experts without resorting to such public consultations which will only turn out to be a public farce.

Irrespective of the fate of *Bt* brinjal, the moratorium on GM food crops will have a telling effect on the future of modern biotechnology in India. Scientific organizations, their funding, collaborations, education and training, and private investment in technology development will all take a beating and set the clock backwards by decades. The minister succumbed to the shouting brigades of the anti-biotech lobby. This anti-biotech

lobby is not going to be satisfied with just a moratorium on *Bt* brinjal. They are baying for complete banning of GM crops and in fact are demanding complete stoppage of research and teaching in modern biotechnology. In the name of 'democratization of science' they want a sea at the decision making table to decide on research priorities and funding. If sometime in future another politician succumbs to this demand, then, there is no telling what will happen to the future of Indian science and technology.

Another strange thing in this anti-GM campaign is that almost everybody in the country seems to have an opinion (mostly negative) on GM crops except the scientific community. The power of political mobilization is such that faded or fading film stars, film directors, poets, writers, journalists, politicians, and some college teachers and students cheer-lead by a couple of 'had-been' scientists have created an impression that the entire citizenry of the country is against GM crops. It is really disheartening that the Indian science community, save for a couple of exceptions, has been largely missing in action in this debate as if it is none of their business. However, there are murmurs by some affected plant scientists who have woken up from their slumber after the minister's decision. It is really too late and too little. If the Indian scientific community does not realize how affairs of science are going to be controlled, then they will have only themselves to blame. Indian science and technology now stands completely politicized and unless the scientists (at least some of them) are willing to play the same game, there is a good chance that Indian science will be controlled by street level activists and shouting brigades motivated by ideology and politics. The *Bt* brinjal episode must serve as a real wake up call.

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El Niño and malaria transmission in northeast India

Akhtar[1] has presented empirical evidence for malaria outbreak in Thar desert due to high rainfall associated with the El Niño Southern Oscillation event that occurred in 1994. Based on the data for 1982–94, he observed positive correlation between rainfall conditions (total rainfall and number of rainy days) and incidence of malaria in 1983, 1990 and 1994, and suggested that annual rainfall of 500 mm or above may be taken as an indicator in forecasting malaria outbreak in Thar desert region of western Rajasthan.

In contrast to desert conditions, northeast India (22–29°N, 89–97°E) is a tropical wetland ecosystem, and malaria is by far a major public health concern that only 3.96% of the population accounts for >10–12% of *Plasmodium falciparum* cases, and 20% deaths of those recorded in India annually[2]. The annual rainfall associated with southwest monsoons in the northeast is one of the heaviest in the world. The rainy season in this part of the country is an extended one spanning over 6 months of the year (April–September). However, the extent of annual rainfall is reportedly variable between years and places across its landscape. The fauna and flora is rich, and more than 40% of the total land area is covered with evergreen tropical rain forest.

Here, we present empirical evidence that in the wetland ecosystem nothing can be ascribed to meteorological factors that relate to inter-annual variation in malaria transmission intensities at the local level (Figures 1 and 2). For data based on the Sonapur Primary Health Centre of Kamrup district (a typical

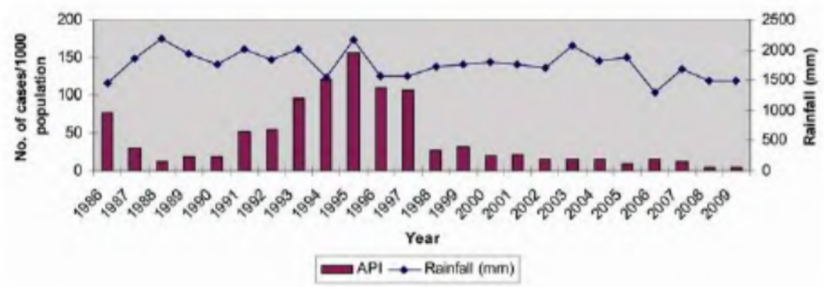

Figure 1. Rainfall and malaria transmission in the Sonapur Primary Health Centre (Dimoria block), Kamrup district, Assam, India (source: State Health Services of Assam).

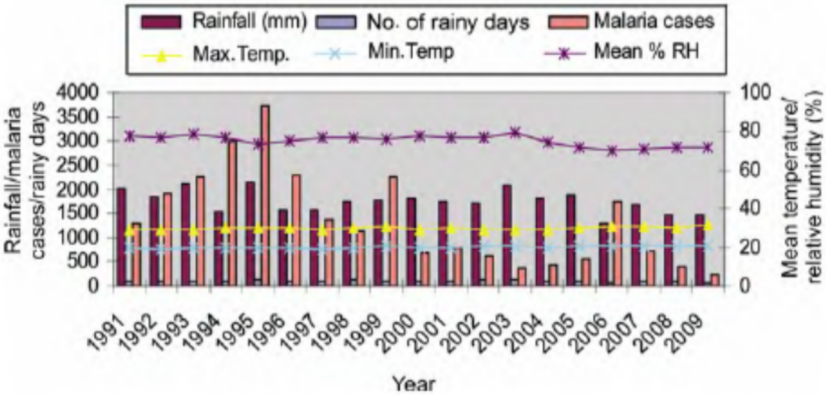

Figure 2. Mean annual rainfall, number of rainy days, mean annual maximum and minimum temperature (°C), annual mean relative humidity (%) and malaria cases in the Sonapur Primary Health Centre (Dimoria block), Kamrup district, Assam, India for data based on passive surveillance.