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Endangered farming

Fallacy Of Groundwater Drawal For More Boro Paddy

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AN interesting, if somewhat dangerous thesis on arsenic, groundwater and poverty is doing the rounds in West Bengal ~ that only 20 per cent to 25 per cent villages of the state are at risk of arsenic contamination. The remaining can freely draw the copiously available groundwater using 5HP pumps and grow more boro paddy. These discussions have gained currency in the course of the grandiose plans to achieve an eastern India green revolution and ameliorate the boro farmers poverty.

No argument deserves closer scrutiny than this worrisome one because it threatens to destroy West Bengal's fragile farmland conditions, already under serious arsenic and other assaults. For one, the data on which this risky argument is being based must be assessed for its reliability; more so when an international agency that relates itself with food approves this thesis (Ananda Bazar Patrika, August 30, 2012). Farmers of West Bengal have always been lifting groundwater and growing boro paddy without restriction. Why then are they poor? How can the question of poverty alleviation be addressed without looking at the bigger picture, in which problems of poverty mitigation do not at all look so simple, reducible and linear?

To consider the argument carefully: first, it has been reported that there is no dearth of groundwater in West Bengal. Thousands of farmers have been excavating deeper and deeper to place their small pump-sets to withdraw groundwater for at least a decade and have definitely been experiencing lower groundwater levels. The point is that the shortage hits one when water is drawn by many and all at a time. That is when one experiences the quick drop in groundwater level. The level restores itself over a time period, depending on the drawdown. In 2009, around the same time that the field research was completed, the World Bank informed the Government of West Bengal that it would get an allocated fund of Rs 2,520 crore for minor irrigation projects only if underground water was not used (Ananda Bazar Patrika, April 25, 2009). A NASA satellite image has also shown rapid reduction of groundwater storage in India, West Bengal included.

Second, the report in question restricts the number of villages at risk of arsenic contamination from groundwater to 3,417 out of "more than 37,000 villages" in West Bengal. This, the field research findings say, cannot be more than between 20 per cent and 25 per cent of the total number of villages in West Bengal. According to Dr Dipankar Chakraborti, Director (Research), School of Environmental Studies, who carried out the survey quoted in the field research and who has investigated the matter further since, the figures were from a preliminary survey of 1.4 lakh tubewells out of about 2.2 million in the state and had assumed the permissible limit to be 50 microgram/ litre (Status of groundwater arsenic contamination in the state of West Bengal, India: A 20-year study report ~ D Chakraborti, UK Chawdhury, B Biswas, MM Rahman, AB Goswami, B Das, B Nayak, A Pal, MK Sengupta, S Ahamed, A Hossain, G Basu, T Roychowdhury, D Das. Molecular Nutrition & Food Research, 2009, 53, 542-551).

The World Health Organization sets the guideline value at 10 microgram/litre, which is also recently adopted by the Bureau of Indian Standards (BIS). Using 10 microgram/litre as permissible limit will bring about 50 per cent of the villages in arsenic affected areas of West Bengal at risk. Dr Chakraborti says even this value may be too conservative unless more detailed and comprehensive studies are carried out and temporal variation is considered. After all, in 1982, only two villages were detected to be at risk of arsenic contamination. It has been reported from Bangladesh that irrigation pumping plays a role in the mobilization of arsenic to groundwater. (Harvey, C. F.; Swartz, C. H.; Badruzzman, A. B. M.; Keon Blute, N.; Yu, W.; Ali, M. A.; Jay, J.; Beckie, R.; Niedan, V.; Brabander, D.; Oates, P. M.; Ashfaque, K. N.; Islam, S.; Hemond, H. F.; Ahmed, M. F. ~ Arsenic mobility and groundwater extraction in Bangladesh. *Science* 2002, 298, 1602-1606).

Also as reports confirm, many tubewells that were safe earlier are now contaminated. What is safe today may not remain safe in future. One of the first few lessons in pollution control includes the need for precautionary approach. In the case of arsenic, there is no dearth of data that would prompt one to adopt a precautionary approach, at least vis-à-vis West Bengal. Even the revised European Union Water Framework Directive, for example, has advised such a precautionary approach, which guides the implementers of the directive as they go about their task of providing safe water to their people.

Third, the findings in question did not bring fluoride pollution into consideration. Fluorosis is the most prevalent groundwater-related disease in India, which is the most severely affected country worldwide. A total of 20 out of 28 Indian states have varying degrees of groundwater fluoride contamination. The total population of the 201 districts in India with known fluoride contamination and potentially at risk is 411.1 million. At present about 62 million people in 20 states in India, including 14 million children are fluoride affected (Chakraborti et al., *Clinical Toxicology*, 2009, 47, 292-295, Chakraborti et al., *Clinical Toxicology*, 2009, 47, 355-356). In West Bengal alone, more than one block each in six districts (Bankura, Birbhum, Purulia, Uttar Dinajpur, Dakshin Dinajpur, Malda) are fluoride affected and many are suffering from fluorosis (Fluoride Task Force, Government of West Bengal, 2012).

Fourth, suddenly, as a follow-up of the field research at the International Water Management Institute, it is being recommended that farmers increase boro cultivation using groundwater that they can freely tap. In 2007, a research carried out at the Centre for Studies in Social Sciences on boro paddy cultivation in West Bengal ~ findings published in the *Economic and Political Weekly* (June 30, 2007, pp. 2534-2542) ~ said that a large number of farmers of West Bengal growing boro paddy are becoming ecologically handicapped.

Paddy, by nature, prefers to keep its root system oversaturated by water and almost devoid of oxygen, which is in contrast to the soil's natural environment of well-drained to moderately well-drained conditions, with a reasonable supply of air and water. This soil environment is preferred by the majority of crops and a large number of aerobic microbial population. Continuous boro cultivation has turned vast tracts of moderately well-drained irrigated land to imperfectly drained and, thereafter, to poorly drained lands. After a length of time, the soil ecosystem is irreversibly damaged.

After nearly a decade of negative experience, the agriculture department has rightly taken recourse to replace boro cultivation by other crops. Maize cultivation, which is replacing paddy, is gaining ground in West Bengal. Considerable amount of work has also been done to establish the arsenic burden in cooked rice from the arsenic affected areas in West Bengal. It was observed by a 2009 study by the School of Environmental Studies at Jadavpur University that 47.3 per cent of the samples contributed more than WHO recommended MTDI (maximum tolerable daily intake) of two microgram per day per kilogram of body weight.

The study further commented that boro rice could be a major source of arsenic exposure for arsenic contaminated rural areas of West Bengal (Arsenic Burden from Cooked Rice in the Populations of Arsenic Affected and Non affected Areas and Kolkata City in West Bengal, India. A Pal, UK Chowdhury, D Mondol, B Das, B Nayak, A Ghosh, S Maity, D Chakraborti. *Environmental Science and Technology*, 2009, 43, pp. 3349-3355).

West Bengal's rural population is not poor across the board. What needs to be asked is whether it is boro

paddy growing the farmers who are getting poorer. Finding alternative cropping pattern is not easy for the boro farmer. This is the area that needs support of field research, political decisions, regulatory and functional support, rural financial institutions and market creation and facilitation.

What does one know about the people that are the targeted beneficiaries to be brought out of the shackles of poverty? How well informed is one about their ecosystems, their livelihood, that one seeks to change or improve? Policy-makers tend to arrive at simple, one-dimensional answers while situations most invariably are complex, non-linear and indeterminate. The truth is that this is a pluralistic world where both man's vision of nature and the relationship between nature and society are undergoing a radical change. Poverty is not easily alleviated; it is certainly not alleviated by half-baked ideas.

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