through a hole drilled in the coconut shell. The hole was plugged with cotton and sealed with candle wax. The hard-shell of the coconut protects the *B.t.i.* during incubation, while the coconut milk containing amino acids and carbohydrates provides the essential nutrition for the growth and reproduction of bacteria. After the coconuts had fermented for two or three days, they were broken open and thrown into a mosquito larvae-infested pond. Along with their regular diet of algae, the mosquito larvae ate the bacteria. The *B.t.i.* killed the larvae by destroying their stomach lining. It has also been reported from several studies that *B.t.i.* is an environment-friendly, naturally occurring bacterium which is harmless to humans and livestock.

There are several procedures to control mosquitoes by chemical, mechanical, genetical or biological means. Biological control of mosquito larvae by the application of natural animal products is one of the important techniques, which is cheap, easy-to-use and environment friendly. The above model can effectively be used to control coastal malaria in India and other countries where coconuts are easily available. It involves minimum expertise and is highly cost effective.

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Farmers struggle for irrigation water in India's semi-arid region

Water is one among the greatest looming commodities of the 21st century. The conflict between the growing human population and the planet's unchanging supply of freshwater has already started and may get worse by the year[1]. Falling water tables are now common in India and also in China, Mexico, Thailand, USA, northern Africa, and the Middle East. Experts believe that water scarcity can become a security threat in the future[1]. Furthermore, there are 260 transboundary rivers worldwide posing potential conflicts over water and the use of water in one country can have an impact on another.

During January 2008, I visited Alawa village (population nearly 1000) in Jhalawar District, Rajasthan to study scarcity of irrigation water. Armed with diesel engines, farmers were seen aggressively pumping water from two check dams located in the Ahu River – a tributary of Kali Sindh, which originates in the northern slopes of the Vindhya in Madhya Pradesh. Check dams are small barriers built across the direction of water flow on shallow rivers to harvest water[2]. The water entrapped by the dam is primarily used for irrigation. Despite attempts over two decades by the farmers to persuade the local government to build check dams in the Ahu River, their efforts had failed. However, in 2006, the farmers convinced a local non-profit agency (Sadguru Foundation) on their desperate need for irrigation water. Subsequently, with the support of the Government of Rajasthan and matching funds from the Tata Trusts (Sir Ratan Tata Trust and Sir Dorabji Tata Trust), the foundation built two check dams, namely Alawa-I (length 179.55 m, height 2.97 m) and Alawa-II (length 249.35 m, height 2.47 m) at the cost of 75 and 82 lakh rupees respectively. As a result, the irrigation area around Alawa village increased by 500 acres, mainly due to the availability of 25 mcft of water stored by the two dams, ultimately benefiting 107 households (650 people). Farmers from neighbouring villages then started to compete for the same water source. I was astonished to witness farmers placing hoses for 3–6 km to transport water from the river (Figure 1 *a*). The intense competition for irrigation water resulted in draining even the last drop and some farmers even dug wells in the dried up Ahu River in pursuit of water (Figure 1 *b*). This shows the farmers' desperate need for irrigation water, especially in the semi-arid regions of Jhalawar District, which is one among the poorest and least developed districts in India.

Intrigued by the irrigation water saga, I participated in a village meeting of farmers to discuss options to solve the ongoing crisis. I was awestruck when the farmers came up with the following five major strategies to mitigate the water crisis: (i) source for low water consuming crops, (ii) set up regulations to restrict the use of water by farmers from adjoining villages, (iii) set up a committee to minimize irrigation water wastage, (iv) reduce the usage of private diesel engines and replace them with electrified lift irrigation system managed by the village cooperative, and (v) discuss with civil engineers how to increase the height of check dams to boost water storage. It showed how rural farmers could handle water crisis wisely using their invaluable knowledge of natural resources management in a scientific way. In fact, the farmers' strategic plan to deal with water crisis in Alawa village coincides with the recent comprehensive scientific assessment on water management in agriculture compiled by the International Water Management Institute, that calls for radical changes in the way the world produces food and manages the environment[3].

Later, I had a discussion with Sunita Chaudhary, the lead civil engineer who was involved in the construction of over 300 such check dams across western India. According to her, it would be possible to slightly increase the height of check dams without drowning nearby farms and damaging the river bank. She reiterated that numerous villages across western India face similar water shortages for irrigation, and building more check dams

Figure 1. ***a***, Competition for irrigation water in the Ahu River (Rajasthan, India), where farmers use diesel engines connected with hoses to transport water for long distances to irrigate farms. ***b***, Completely dried up check dam due to intense competition for irrigation water in Alawa village (Rajasthan, India), with a newly dug well in the midst of Ahu River (Photographs: G. Agoramoorthy).

with the support of the Government, NGOs and private corporations is the best way to ease future irrigation water conflicts in rural areas.

India requires 210 million tonnes of grain to feed its people, but produced only 200 million tonnes last year. Understanding this grim situation, India's Prime Minister promised during the 60th Independence Day speech on 15 August 2007, that the government will commit 25,000 crore rupees to launch a special programme for rural agriculture – good news for farmers[4]. 'We will see a boost in foodgrain production in all parts of the country, particularly in regions untouched by the first green revolution', assured the Prime Minister. So it is time to point the way to the apparent agriculture promised land where farmers continue to struggle for irrigation water, which lies in the remote drylands of western India.

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