



Changing to biofuel crops makes productive use of contaminated water

Ten years ago, Thai epidemiologists noticed unusual clusters of kidney disease among elderly people around the town of Mae Sot. Heavy metal poisoning was suspected. A research team, including scientists from the International Water Management Institute (IWMI), demonstrated that an irrigation system dissecting an area rich in minerals was contaminating local rice. Thanks to their efforts, farmers received compensation and training so that they could switch to growing inedible crops valuable for biofuels.



Photo Credit: Timothy Syrota/IWMI

Farmers in the affected area are increasingly using irrigation water to grow non-edible biofuel crops.

Diet detectives

Millions of people eat rice in Thailand every day without a thought that it could make them sick. However, heavy metals entering the soil can become concentrated in crops, potentially affecting human health. This appeared to be the case ten years ago at Mae Sot in northern Thailand, where abnormally high numbers of elderly patients were found to be suffering from kidney malfunction.

Heavy metal contamination was suspected because in the mid-1990s high levels of zinc had been discovered in the area by the Department of Agriculture (DoA) of the Royal Thai Government. A research team, including IWMI scientists and local partners was asked to investigate further. A study site was chosen known to be downstream of a naturally occurring zinc and cadmium rich anomaly on the border between Thailand and Myanmar. Mae Dtow creek, which fed a cascading irrigation system, was dissecting the geological deposit as it carried water to irrigate rice crops. "Downstream of the anomaly we found elevated levels of cadmium in the soil that were much, much higher than you would find as background levels," says Dr. Andrew Noble, former Regional Director for the Southeast and Central Asia region of IWMI, and one of the leaders of the research team. "Similarly, in the rice crops there were levels that were many orders of magnitude higher than the norm."

The scientists, suspected that the Mae Dtow creek was simply scouring out the cadmium and zinc as it passed through the anomaly, then distributing material through the irrigation system. IWMI trained staff at the DoA and Land Development Department (LDD), and provided support to the Ministry of

Environment in surveying, sampling and laboratory techniques. Teams drawn from these various organizations then mapped more than 100 hectares of irrigated rice paddy.

Water-borne contamination

The joint IWMI-LDD research team used the information on the irrigation network to select where best to sample rice grains and soil for detailed analyses. Over 80% of the 1,067 fields sampled produced rice grains with Cd concentrations greater than the limits recommended by the joint Food and Agriculture Organization of the United Nations (FAO)/World Health Programme (WHO) Food Standards Programme.

Fuel not food

Following an initial series of meetings with IWMI scientists, the Thai Ministry of Environment through the Pollution Control Department presented the findings at an open forum in Bangkok. As a result of the publicity generated, the government accepted the need to take swift and decisive measures to prevent further human health risks.

IWMI recommended that production of agricultural products for human consumption be stopped in all areas receiving water from the Mae Dtow Creek, through the cascading irrigation system. "We suggested they take the Mae Sot area out of rice production completely and look at alternative livelihood options," says Dr. Noble. "We recommended they grow sugarcane and produce bioethanol, which is the primary strategy they took. We also suggested growing soil-stabilizing plants, rubber and cut flowers."

In total, around 2,000 households were affected across an area of up to 1,000 hectares. The government paid significant compensation to the people who had become ill from cadmium contamination and also to farmers who had to give up rice farming. They also instigated retraining programmes for farmers. Loans from Agence Française de Développement, a local mining company and the government were used to build an ethanol plant, and many farmers now produce sugarcane for conversion into biofuel.

Donors and partners

United States Department of Agriculture
Land Development Department, Royal Government of Thailand

For more information

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