Development

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Disease hazards of irrigation schemes

The construction of river dams in north-east Thailand led to better navigational conditions, the generation of adequate amounts of electricity, improved water supplies for domestic and agricultural use, the expansion of fishing, and higher incomes. However, people in the area, particularly those where irrigation schemes were established, suffered increasing incidences of parasitic diseases, most notably opisthorchiasis. By involving the communities directly in a control programme it has proved possible to diminish this drawback to a significant extent.

In 1957, several governments established the Committee of Coordination of Investigations of the Lower Mekong Basin as an autonomous agency under the auspices of the United Nations Economic and Social Commission for Asia and the Pacific. A water resource development programme that was implemented under this arrangement had, as its overall objective, the socioeconomic development of rural communities in the Basin. Within the framework of this programme, the Government of Thailand undertook a major scheme in the north-east of the country. The construction of the Ubolratana Dam as part of the Nam Pong Project in Khon Kaen Province was completed in 1966. This dam, rock-filled and with an impervious earth core, is 32 metres high and 6 metres wide and has a crest length of 808 metres. It stands on the Nam Pong River, a tributary of the Mekong. There are three hydroelectric generators, producing 65 megawatts an hour annually and supplying all the provinces of north-east and central Thailand. The dam serves for water storage, flood control and water supply to irrigated areas downstream. The lake created by the dam has a surface area of 410 square kilometres; it is well stocked with fish and thus provides high-protein food for the inhabitants of the area. Improved inland navigation and recreational facilities are additional benefits. A second dam was constructed 35 kilometres downstream at Nong Wai during the period 1964–70; it provides irrigation for about 5214 families.
Agricultural development

In 1985 the Nam Pong Project, with the Nong Wai Dam, irrigated 14 000 hectares inhabited by 30 000 people in 45 villages. This community consists mostly of rice farmers and their families; over 70% of the farmers own the land they work. A considerable part of the rice crop is sold, the rest being stored for domestic consumption. Other crops, including vegetables, jute, cassava, tobacco and fruits, are also planted. Green vegetables are grown throughout the year for consumption by the villagers and for sale in local markets. Cattle, buffaloes, pigs and poultry are reared. Approximately 80% of farm income is derived from field crops, the balance coming from livestock and poultry. The average family income in the irrigated area is US$ 1503 per annum, three times that in non-irrigated areas.

Resettlement

The inundated area of the Nam Pong Project was originally low ground used for rice cultivation. When the construction of the dam commenced in 1962, the 30 000 inhabitants moved out in four distinct groups, two of which joined resettlement schemes arranged by the government. A third group settled on the shore of the lake to earn their living from fishing, a new occupation, and the fourth group dispersed to other areas of the country.

Non Sang Resettlement is about six kilometres north of the lake, occupying 6500 hectares on foothills along the east side of the Pu-Kao mountain range, adjacent to a thinly-forested area where malaria is endemic. There are about 600 families totalling 3000 people. Each family was provided with 0.32 hectare for household purposes and 2.4 hectares for agricultural use. In general the social conditions are poor, water is inadequate, and incomes are lower than those in the other communities.

Ban Kok Soong Resettlement is about ten kilometres east of the lake and occupies 5500 hectares. There are 2300 families and the population is 13 000. Each family was provided with 0.32 hectare for household purposes and fruit trees, and 2.1 hectares for agriculture. There are public services, including a school, an agricultural cooperative, a small Buddhist monastery, a health service subcentre, a central water supply, and many small ponds from which water for domestic use can be obtained. The government has provided considerable help so that the settlers can acquire skills and experience in their new occupations. Domestic water supplies were installed with the assistance of the New Zealand Government.

The land is fertile and the inhabitants earn their living by growing cash crops, including sugar-cane, cassava, jute and vegetables, selling fruits, and raising livestock, and silk production is now being promoted. Some villagers earn additional income as agricultural labourers in the irrigated areas. The villagers in this settlement have incomes similar to those of people living in the irrigated areas.

A few years after dispersing, the fourth group returned to reside along the shoreline.
of the reservoir. They came primarily as temporary dwellers, living in small huts with thatched roofs and earning their living by fishing. Later, in accordance with government policy for the socioeconomic development of these communities, fish-rearing was promoted. This resulted in considerably improved incomes and the establishment of permanent settlements on the lakeshore. In 1982 there were 1810 families residing in 66 villages around Nam Pong Lake. The average family income from fishing was US$ 800 per annum. In addition to fishing, the villagers were growing cash crops including maize, soya beans, jute and vegetables, and were rearing buffaloes and cattle. The total annual income per family was about US$ 1050.

**Vectorborne diseases**

The construction of the dams resulted in changes in the fauna, some of which have had adverse effects on human health. There has been a rapid proliferation of mosquitoes that transmit malaria or dengue haemorrhagic fever, of certain snails and fish that spread liver-fluke infection, eosinophilic meningo-encephalitis, schistosomiasis, cercarial dermatitis, and gnathostomiasis, and of dogs, cats and rats, which serve as reservoirs for several pathogens.

In 1967–69 a survey was made of the health status and parasitic infection of people in the resettled, irrigated and traditional areas. Helminthiasis was the most prevalent infection: 52.0% to 80.6% of the people were infected with one or more kinds of helminth. Liver-fluke infection was the major health problem, with a prevalence of 27.5% to 69.6%. The overall malaria slide-positive rate was 1.2% and high prevalence was found in a traditional village near the mountains (1). Studies in different villages (2, 3) revealed the significance of opisthorchiasis in the irrigated area. People here suffered a higher rate of liver-fluke infection than those elsewhere; furthermore, it was demonstrated that the prevalence of infection increased with the length of time for which irrigation had been installed and that children in villages that had been receiving irrigation for fewer than five years were less infected than those in villages where irrigation had been available for longer periods.

Another investigation revealed that people who had been evacuated but who subsequently returned to settle on the lakeshore and took up fishing were especially vulnerable to vectorborne diseases, particularly snail-borne ones. The same study showed, however, that the lakeshore dwellers were less likely to suffer from liver-fluke infection than were the traditional villagers.

Thus the study in Nam Pong showed an increasing incidence of opisthorchiasis in irrigated areas where people gained most in economic terms from agricultural development.

**Management of liver-fluke infection**

In 1980, praziquantel was shown to be effective against opisthorchiasis, and in 1982 a pilot project on the control of liver-fluke infection was launched by the Faculty of Tropical Medicine of Mahidol University.
An integrated approach was adopted, involving annual treatment of positive cases, improved environmental sanitation, and innovative health education. The control of vectors such as snails and fish was considered impracticable and too expensive, and the people could usually obtain fish from elsewhere in the region without difficulty. A strenuous effort was made to convince the residents that it was necessary to abstain from eating raw fish. Once the people realized this, programmes of sanitation improvement and health education were organized and operated by the villagers themselves. The village loudspeaker system proved to be an effective tool for public health education. School health education programmes on the control of parasitic infections were introduced. A "demonstration corner" was also effective in depicting the parasitic cycle, using specimens collected in the village itself by students. The schools were eventually declared to be free of liver flukes and were used as models for other villages. After three years, not only was opisthorchiasis under control but other aspects of primary health care had been improved; thus better drinking-water supplies were available, toilet facilities were more widespread, and an essential drugs programme was established.

References


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**Said at the First World Health Assembly**

*A sense of proportion*

*I believe that the World Health Organization may... derive some benefit from the publications of the earlier organizations. May I suggest in this connexion that it will be well to have a sense of proportion. The multiplicity of publications, conferences and congresses is, in my opinion, something of a present-day disease. If only for strictly financial reasons they should be considered in proportion to their usefulness and to the success it is hoped may be derived from them.*

—Dr P. Vollenweider, Switzerland
Seventh Plenary Meeting, 28 June 1948.