



## **Domestic Roofwater Harvesting Research Programme**



RWH Research Note 3

# **RAIN WATER JAR PROGRAMME IN NORTH EAST THAILAND**

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### Other DTU publications on this subject

In 1979, the Royal Thai government declared the policy of water resources development for rural areas. The focus was more decentralised with co-ordination and planning responsibilities given to the district and managed by local authorities with user community participation. There were three small scale technologies that were introduced. Jar and tank construction for drinking water, shallow wells for domestic water and small weirs for agriculture.

The visit, which was undertaken from 20th to 26th June 2001 was to study the Thai Jar and tank project which was particularly targeted for household drinking water .

## Present status of the programme

The Thai jar programme is very much in practice at present. There are two types of Thai rainwater harvesting systems. The individual household jars and more community oriented tanks. Both are surface structures with jars varying in its capacity from 1.2 to 2,0 m<sup>3</sup> and tanks from 7.5m<sup>3</sup> to 10m<sup>3</sup>. Both these structures are widely seen in most rural areas in N-E Thailand, though jars are more commonly used. Jars and small capacity ferrocement tanks are in use in few urban households, According to what is visible from number of field visits, the distribution of Thai jars can be well over few millions. It is hard to find a house in rural areas that does not have a jar. Most houses that have tanks also have at least one jar. These households who have both tanks and jars

prefer to use the tank water for drinking and cooking and jar water for other domestic uses.

At present construction of jars are wholly done by small scale private manufactures. As no statistics are maintained, it is difficult to say the number of small scale manufactures in jar business. However, an indication given by one jar manufacturer, was that there are four such manufactures along the 50km stretch towards north of Khon Kaen. Well made jars are a common sight in front of most jar manufactures. One manufacturer in Nongbuadeedneem, said that he makes 4-6 jars (2m<sup>3</sup> capacity) per day with three workers in his factory. The selling cost of these jars is Bhat 650 (about \$15). Cost of production is about 250-300 Bhat. He uses two bags of cement and two wheel barrow~ loads of "rock dust" and one wheel

## barrow load of sand per jar.

Construction appears to be very simple. There are 8 segments of 10cm high curved cement blocks placed in 9 circular rows per jar, These cement blocks are placed on the concrete base and worked upwards towards the top flat area. The cement blocks are bound together with clay and once the "block skeleton" is made it is plastered with clay from out side. The cement mortar is applied on the clay plaster, The top flat part of the jar is shaped with "half moon" shaped wooden planks stuck together with clay. A jar can be cured in one day without any addition of water or laying plastic for curing purposes. Once the jar is fully dried, the cement blocks are removed first and the wooden planks are removed later. The jars I observed in this factory did not have any wire reinforcement. The manufacturer gives a five-year guarantee

against leaks for each jar .One important observation with this manufacturer is that cost of a jar is same irrespective to the capacity of the jar. In rural Thailand it is difficult to find the reason for such costing. By the way this jar manufacturer is a full time paddy farmer who does jar making as a part time business. His working hours on jar making is from 5.00am to about 9.00am. Rest of the time he works in the field.

## **Cost of water in Khon Kaen**

There are two water authorities who are supplying water to households in Khon Kaen. The Provincial water authority (PWA) which supplies household water through piped supplies and private water suppliers who supply bottle water for drinking purposes. The piped water supplies cover all major

cities in Khon Kaen and rural households to a considerable extent. PWA water cost Bhat 9/m<sup>3</sup> of water and private water bottle companies charge Bhat 15/10 liters of drinking water. An average rural household pays between Bhat 20- 50 per month for pipe water delivered by PWA.

## Construction problems

During my visit to rainwater users there were no significant construction problems reported. However, in one household, where they moved two rain water jars about 100 meters, burst after filling with water. The occupants of the house believe that one jar would have cracked while moving and it burst as a result of water pressure. The other jar too burst as a result of the impact. Besides this isolated incidence, the other problems

as observed were, lack of taps in some jars to take water and lack of jar covers. Incidentally, covers for jars are not made at the same place as the jar. As a result some take the trouble in buying galvanised covers which costs about Bhat 70-100, but there are others who use jars without covers. This was mostly evident in jars found in schools.

However, if one considers the "jar" as a rainwater harvesting unit, then there are other problems such as absence of effective first flush systems and total absence of any kind of filters. Water usually flows directly from over hanging down pipes into the jars and in some instances through improvised gutters, which are not suitable for rain water collection.

## **Management problems**



As stated before, most schools have totally neglected managing their rainwater jars. As a result one could observe large number of jars idling without being used. Some of these jars have become ideal breeding grounds for mosquitoes. Even the ferro cement tank in number of schools appear to have been neglected. Water flows directly from the roofs to the tanks. It appears that there is hardly any maintenance of roof surfaces before rain storms. Some of the tanks did not have any taps and in most instances the end cap of the first flush systems were closed. In one instance, in the tanks constructed at the "king cobra club" the first flush and the end cap was placed higher so that occupants can't reach it in the event of sudden rain storms. Mosquito breeding appears to be a common problem with rainwater jars. However, people do not think that rain water jars

are the primary cause of mosquitoes. During my visit I observed number of "traditional earthen clay jars" full of mosquito larvae. In Bantoom village the Provincial health authorities have advised rainwater users to cover the mouth of the jars with netting to prevent entry of mosquitoes. However, one could observe large mosquito populations in the vicinity of these jars, suggesting that mosquitoes could be breeding in collected rain water .

## Quality of rain water

Almost all people who collect rainwater use it exclusively for drinking and cooking. People prefer rainwater to other water due to its taste. As stated earlier Thai people in this part of the country have been using rainwater traditionally for domestic use

including drinking. As such quality of collected water is not a concern for these people. However, judging by the status of collection systems, nothing good can be said about the quality of water. Water quality tests conducted during the early part of the programme under IDRC assistance, indicate bacteriological contamination of rain jars. However, the research also shows that contamination of other sources are far greater than rain water jars. For instance, traditional earthen jars and shallow ground water have indicated higher concentration of contamination than roof run off. Incidence of mosquito breeding has been highlighted as an issue in research work conducted by Khon Kaen university during the early stages of the programme. It is very much evident even now, specially among community rainwater harvesting centres (i.e. schools and

temples). There were slogans seen against the dangers and eradication of dengue fever written in local languages. But people do not appear to relate rainwater collection to spread of dengue. Though most jars used by households had galvanised covers, they were not mosquito proof and the practices of fetching water can facilitate entrance of mosquitoes. The most concerned situation with regards to vector breeding can be seen in schools, where most of the rainwater jars were neglected.

Research on quality of rainwater was conducted exclusively by KKU during the early days of the programme. Professor Wanpen Wirojanagud had pioneered number of studies. However, it is unfortunate that non of these studies have continued and no work is being done on quality of water at present. I have collected two papers

written by Professor Wanpen on water quality. These papers give an idea as to the status of collected rainwater, sources of contamination and certain measures adopted to minimise contamination.

## Water use

The paper entitled "*Bacteriological quality of rain jar water in rural Northeast Thailand*" by Prof.: Wanpen clearly identify the use of rain water for drinking and ground water from tube wells and shallow wells for other domestic purposes. According to a large scale survey conducted in two rural villages, 72% and 94% of users in the two villages use rain jar water for drinking. In the village of Ban Daengnoi, 66% of the domestic water is also from rain jars (Wanpen et al 1993).

Observations from my short visit to Northeast Thailand, on water use at household level does not differ from this pattern. Water use for drinking at household level is always through a secondary container. However, I personally observed children drinking straight from rainwater tanks, which could be contaminated due to the condition of the collection system.

## **Acceptance of rainwater in Northeast Thailand**

John Gould and Erik Nissen-Petersen in their book on "*Rainwater Catchment Systems for domestic water supply*", highlights reasons for the popularity of rainwater in Northeast Thailand. However, I would like to complement some of their finding from my visit. According to my observations,

following are some of the reasons for acceptance of rainwater in Northeast Thailand.

1. Traditional use of rainwater for drinking.
2. Availability and use of traditional earthen vessels for rainwater collection for domestic use.
3. Unpalatability of ground water due to very high salinity. Hardness of water is 5-6 times more than the prescribed WHO standard. (estimated at 1200 -2000ppm as against <300ppm is the optimum level)
4. Cheap cost of rain water jars and its portability.

This situation is mostly applicable to rural areas in Northeast Thailand. In the urban areas drinking water is mainly supplied by private water companies. It is believed that some 20 years ago

there were only two water companies, one of which is the popular "Corolis water company". Today, there are approximately 80 water companies selling water to urbanities. With the Thai economy picking up after the recent Asian economic crisis and with the new policies of the present Thai Premiere, more rural people will be in a position to afford bottle water. If this trend continues, private water bottle companies may venture into the rural areas as well. Hence, it would be interesting to review the rainwater jar programme again, in say, five years time to understand the water use pattern of rural Northeast Thai people.

## **Multiple sources of water**

Most rural Thai people use at least two water



sources. Rain water from jars and tanks and shallow ground water from tube wells. However, during my visit I also observed some villages having PWA water connections. Which could mean that these households can have up to three water sources. However, what is generally observed is only two sources, of which the ground water is always used for non drinking purposes.

## **Involvement of NGOs**

Development NGOs have taken a keen interest in water resources development in rural Thailand. The Population and Community Development Association (PDA) is one such NGO which has been very active in promoting rain water harvesting in rural Northeast Thailand. PDA has 16 centres distributed all over Thailand. According to its

Director, it has so far constructed some 16000, 11m<sup>3</sup> water tanks. A set of three 11m<sup>3</sup> tanks cost Bhat 40,000 for PDA but the government is supposed to be charging Bhat 70,000 for the same. The PDA system is that the recipient has to pay back in 3 years, in equal instalments with no interest charged. According to PDA estimates, a 11m<sup>3</sup> rainwater tank can be used by a family of five for drinking and cooking, with bathing and washing during the wet months, for a period of one full year. However, this can only be achieved with good water management practices. PDA has staff strength of 600 and it closely works with KKU and other government agencies.

## **Research on Rainwater harvesting and institutional involvement**

Unfortunately there is no research taking place on rainwater harvesting in Northeast Thailand. According to KKU, the reason for inactivity in this area is due to lack of any supportive project that takes a critical view on rainwater harvesting. Also the university itself has shifted their focus to other areas which obviously take priority over rainwater harvesting. For the same reason, there is hardly anybody, except for Mr Paiboon and Professor Wanpen who has the experience and knowledge on the Thai jar and tank programme. Professor Wanpen is the present Associate Dean for research at KKU, hence she is a very busy person to meet. This leaves only Mr Paiboon, who is a water specialist, a practical engineer and a technician, capable of contributing to work on water at rural and urban level.

Mr Paiboon can be contacted through Professor

## Wanpen's e-mail



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