Case study 9
RWH in the barrios of Tegucigalpa

Introduction

This case study is drawn for a report produced by UNICEF in 1991. The Barrios of Tegucigalpa, Honduras, are the low-income urban settlements that have developed around the city as tens of thousands of people move, each year, to the city from rural areas. They come in search of better living conditions but often end up in these barrios, where public services and amenities are poor or non-existent. Health statistics show that the residents of the barrios are suffering from a number of water related diseases that could easily be avoided with provision of a reliable, clean water supply. Unfortunately, more than 150,000 residents have to find their own water.

Water vendors sell water at extortionate prices, some families having to spend 30 or 40% of their income on water alone. In 1987, UNICEF, SANAA (National

Water and Sewage Service) and UEBM (Unit for Marginal Barrios) started work on an integrated water supply project that would help the residents to direct their money into providing themselves with clean water. The programme studies several water supply options, including piped networks, groundwater wells, trucking of water and rainwater harvesting.

The report from which this Case Study is drawn studies the indigenous RWH systems in use in two barrios - Israel Norte and Villa Vueva. Although technically unsophisticated and lacking good health practice, the systems described here show what urban settlement have done to improve their own lot. Many of the systems make use of recycled or scavenged materials and some examples show high levels of initiative.

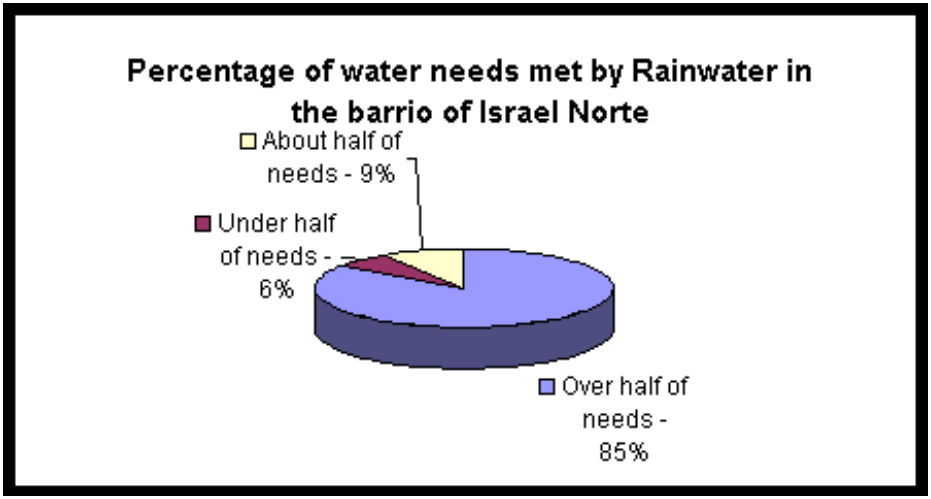

Figure 1 - Percentage of water needs met by rainwater in the barrio of Israel Norte
(Brand and Bradford, UNICEF 1991)

Water use

In the two barrios mentioned above, about 90% of the families collect rainwater. The quantity of rainwater collected varies from home to home. Figure 1 shows the percentage of needs met by rainwater in the barrio of Israel Norte.

Figure 2 shows the various uses of rainwater and the percentage of people who use the rainwater for a particular application.

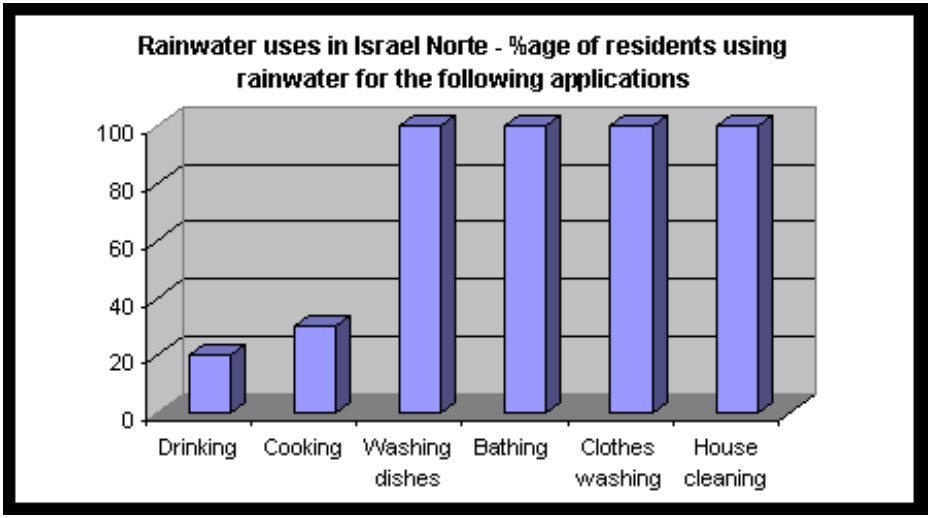

Figure 3 - percentage of residents using rainwater for given applications (Brand and Bradford, UNICEF 1991)

The deficit in drinking and cooking water is usually met by water which is purchased form vendors or from nearby standpipes in middle class residential areas. The rainwater is not seen as being a high-quality source of water.

Rainwater harvesting is popular as there is a direct saving for every litre of water saved. For a household with a $45m^2$ collection surface (the average roof area) the saving is over US$100 annually.

Technical detail

The RWCSs used in the barrios are rudimentary. The basic system usually has the following components:

Roof collection surface

The average roof area in the Villa Nueva barrio is $45m^2$, with typically half of this area being used for collecting water. The recommended roof area to provide adequate collection area for total rainwater harvesting is $100m^2$. The average rainfall in the area is 788mm, which is quite low and hence the large collection area requirement. The majority of the rainfall (as shown in Figure 3) falls

between April and November with two peaks, one in June and one in September.

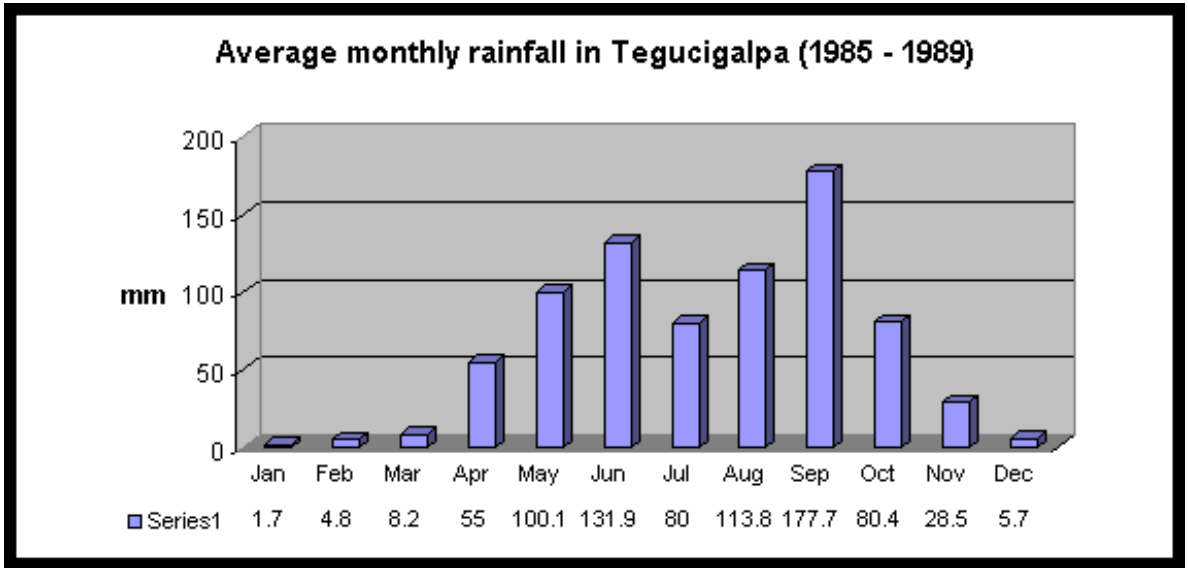

Figure 3 - Average monthly rainfall in Tegucigalpa (Brand and Bradford, UNICEF 1991)

Roofing material varies, but by far the most commonly used material is iron sheet. Other materials used are asbestos/cement sheets, clay tiles, *techon* (a locally produced asphalt treated pressed paper sheet) and a variety of discarded

plastics and sheet materials.

Gutters to collect the water from the roof

Again, a variety of materials have been used to make gutters. In the barrio of Villa Norte 75% of the gutters are made from sheet steel. The fabrication technique of steel gutters varies also some have been made from scraps of steel sheet or old, flattened steel drums. Pre-fabricated gutters are also seen - these are rolled to give a semi-circular trough, and are fitted with a neck to attach the downpipe (where fitted), which can be of PVC. The authors state that the cost of these gutters was US$36 for a 20 foot length (1991). There are a number of different methods for fixing the gutters, but where high quality gutters are used the quality of the bracket is usually better also, being formed of wood or bent reinforcing bar. Some gutters were poorly mounted with depressions which allows water to stand and corrode the steel. Gutters are typically fitted to one side of the building only.

PVC gutters are formed from 8" PVC pipe which has been cut in half. The cost of a 20 foot length of PVC pipe is US$38 which provides 2 lengths of guttering when split. The PVC guttering is preferred because it is cheaper and lighter. Many other

scavenged materials are used for guttering, including wood and asbestos sheeting.

Downpipe

In Israel Norte barrio, 90% of the systems have no downpipe. The water runs from the gutter directly into the storage vessel. The remainder used either plastic hose, PVC pipe or sheet metal to transport the water to a remote water storage container.

None of the systems studies were fitted with any kind of screen, filter or first flush mechanism.

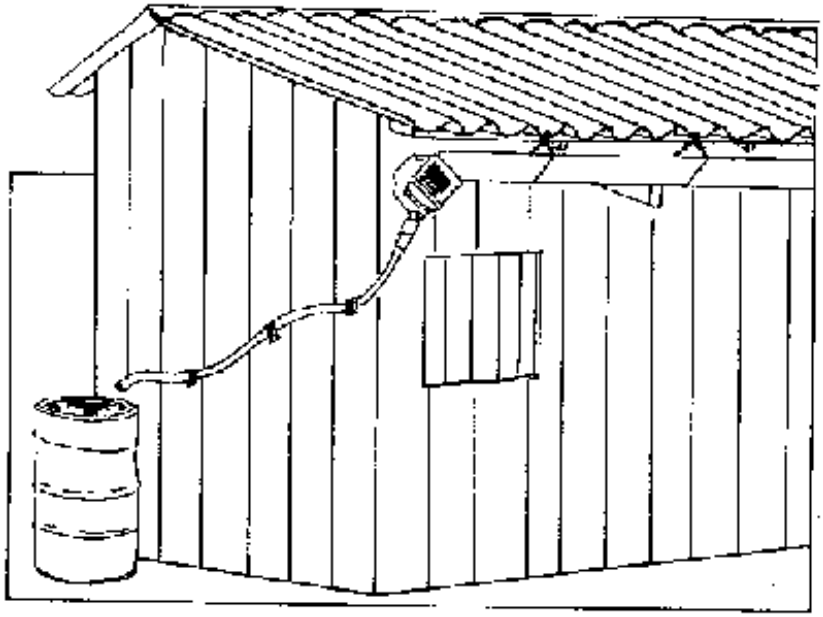

Figure 4 typical RWH system in a barrio of Tegucigalpa, Honduras (Brand and Bradford, UNICEF 1991)

Storage

Water storage facilities at the barrios are, again, basic. The majority are old 200

litre steel barrels. These are bought (the average price is US$13) or scavenged and most contained pesticides, chemicals or toxic materials so are not well-suited to water storage. The second most common type of storage is the *pila, a* concrete water tanks of about 500 litre capacity which has an integrated washing board (see Figure 5). These are built by local masons and cost approximately of US$25. The tanks can be sized to suit the needs and means of the user. Fifteen to 30 % of the residents of the barrios have these pilas.

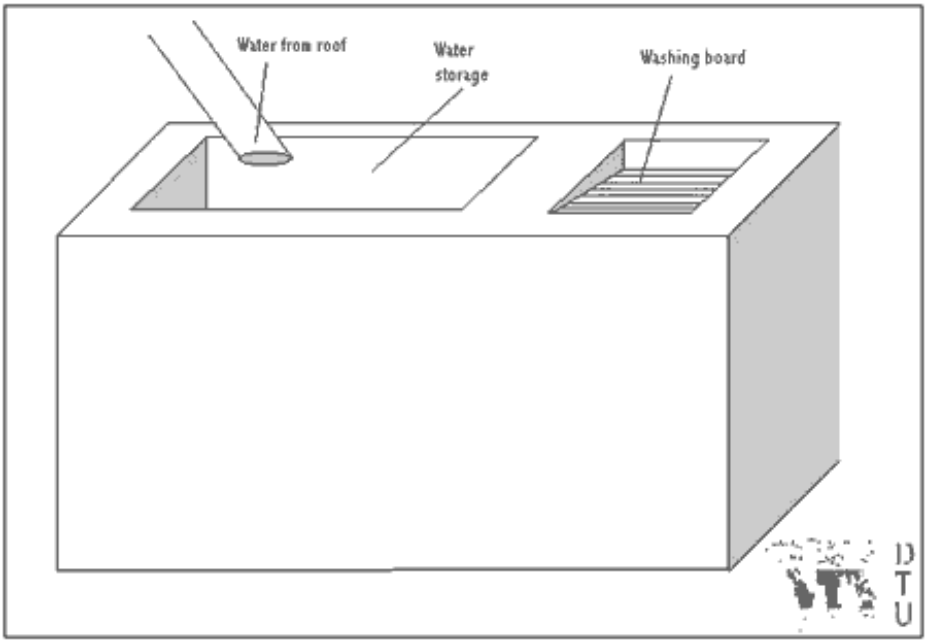

Figure 5 The brick and mortar *pila*, as found in the barrios of Tegucigalpa

Some people have also acquired plastic barrels which may have contained paint, oil or other substance. Only very few of the systems studied had a cover fitted.

Water quality and alternative sources of water

The study team sampled the stored rainwater to find the level of bacteriological

contamination present. It was found that where the water was used for drinking, 63% of the water samples taken contained E.Coli. Where the water was used for other domestic purposes only, 71% of the samples were contaminated. All sample were taken from the storage vessels.

The study team also sampled the alternative sources of water for the two barrios included in the study. Table 1 below shows the results.

Source	Number of Coliforms present (WHO guidelines recommend 0 coliforms in drinking water)
SANAA / UNICEF public taps	0 coliforms
Private water vedors sample taken from hose	Uncountable

Unprotected superficial cells	varies between 650 and uncountable
Store reportedly selling water bought from SANNA truck	0 coliforms

Table 1 Alternative water sources and their quality Villa Nueva barrio

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