Rainwater utilization in rural Fiji

by Lineke J.M. Mourits and Prem B. Kumar

Rain can provide truly pure water, fit for drinking and cooking. One programme in Fiji proved that a little government investment in new techniques can be a very good thing for the people in the driest area — and for the taxpayer.

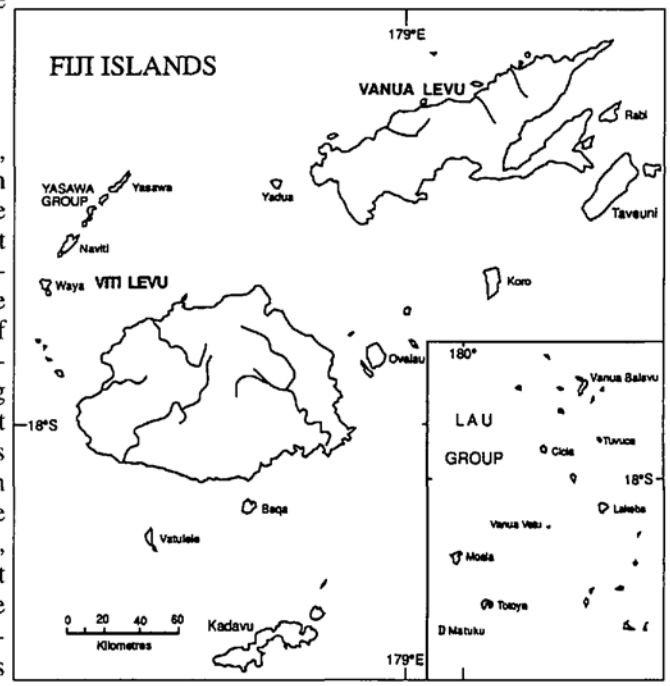
FIJI LIES IN the south-western waters of the Pacific Ocean. Fijians benefit from abundant rainfall, but there are great variations from area to area: in the mountainous areas of the two larger islands, some places receive over 5000mm per year; while some of the 300 or so smaller islands record annual rainfall levels of only 1500mm — or less.

Many of these drier islands suffer from periodic droughts; these can last for several months and, occasionally, stretch to over a year. The Public Works Department (PWD) is the government agency responsible for supplying water to all the islands. One element of this work is constructing rainwater catchment systems for rural areas; these, however, are normally only developed where no other sources are available.

The villagers do recognize that rain is a valuable source of water, but they tend to neglect rainwater systems where surface water or groundwater supplies are available. As dry periods lasting several months are not uncommon on the northern leeward sides of the larger islands, and on smaller outlying islands, the villagers — understandably — do not always perceive rainwater as a feasible water-supply option, and tend to concentrate on surface water and springs, although the quality of these sources often makes them unsuitable without treatment.

Purer by far

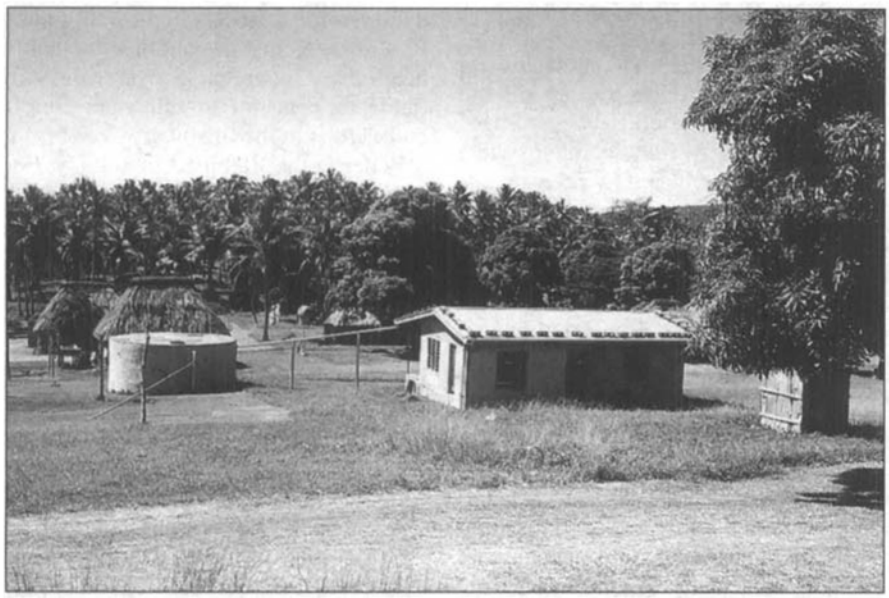
On the other hand, Fijian villagers on those islands where surface water is not available (for example, limestone islands) put a lot of effort into developing and maintaining rainwater catchment systems. In villages where more than one water source has been developed, the women almost always recognize that rainwater is relatively pure; this is reflected in how they use it — mainly for drinking and cooking. This generally high quality is confirmed by coliform tests on samples from various locations which show that rainwater catchment systems, when properly constructed and maintained, provide water which is either uncontaminated or only slightly contaminated. This is in sharp contrast to the standard village-tap supplies — from open water sources — which a small-island investigative study carried out by the Mineral Resources Department (MRD) found to be highly contaminated. The research findings attributed various outbreaks of water-related diseases to the use of these contaminated open water sources.



The communities

The people living in Fiji's rural areas are either indigenous Fijians, or Indo-Fijians. The Fijians depend on subsistence farming, which they supplement with earnings from selling copra, fishing, mat-weaving, and making and selling handicrafts; some villagers also work in Fiji's tourism industry, and in towns on the mainland. Many Indo-Fijians are either cane farmers (and, therefore, live in the driest parts of the country), or produce other cash crops such as rice and vegetables.

Most indigenous Fijians live in villages and maintain strong community ties strengthened by traditional systems. Major decisions are taken by the chief and heads of several clans — often exclusively male — who make up the village committee. But women's groups are active in several villages. They work together to educate other women about better hygiene practices and, in a number of cases, the women — in partnership with local health authorities — have installed pour-



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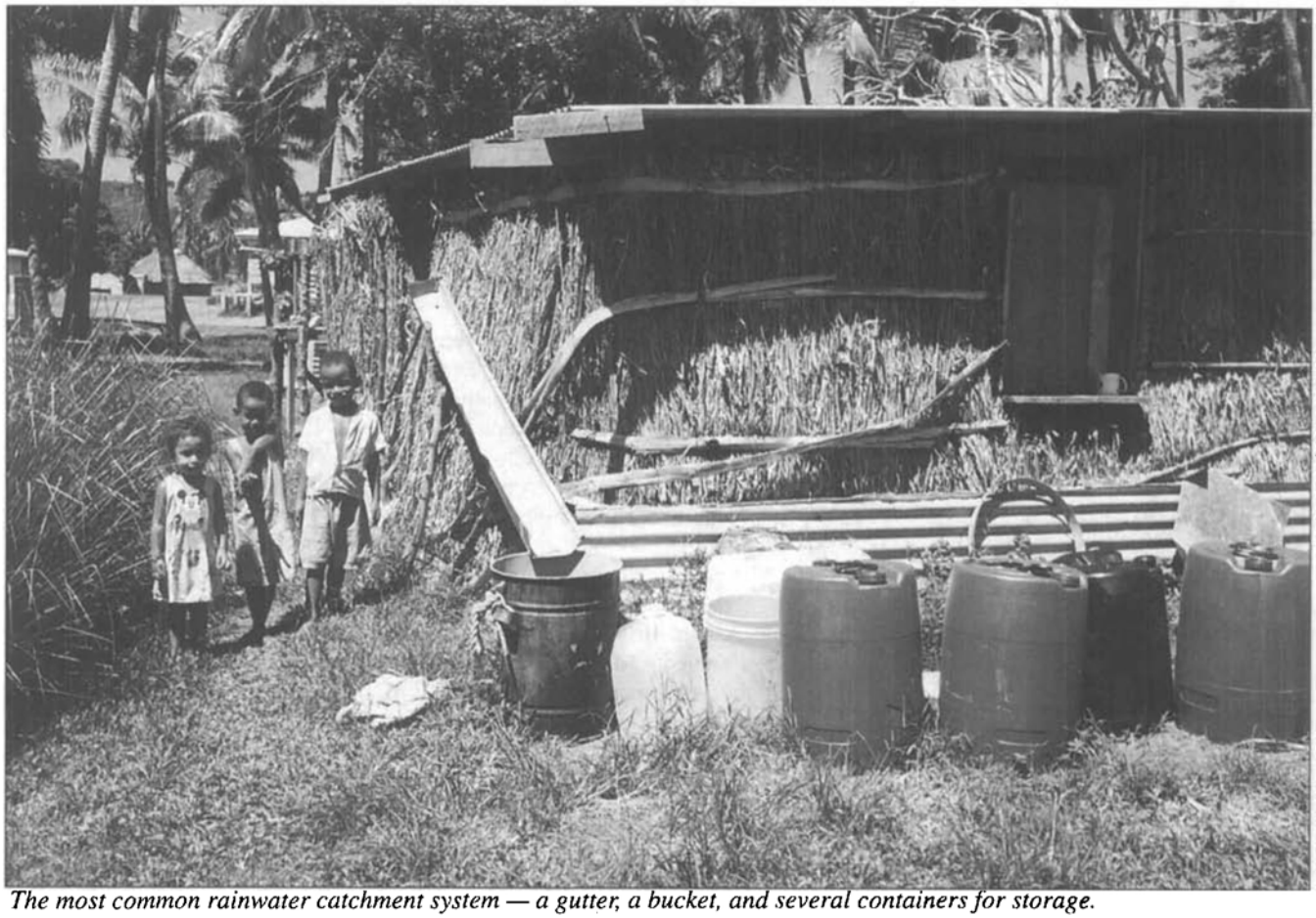
A PWD-built community rainwater catchment system — only the last resort?



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The most common rainwater catchment system — a gutter, a bucket, and several containers for storage.

flush toilets and rainwater catchment systems.

Day-to-day village matters are managed by a *turaga ni koro* (village headman) who delegates different duties to villagers as required. One man is usually assigned the task of caring for the village water supply. This often involves no more than closing and opening the main valve as a rationing method during droughts.

Indo-Fijians, on the other hand, live in more widely dispersed settlements, on land commonly leased from the indigenous community. Their settlements tend to be organized on a less communal basis so, although strong ties do exist through sugar-cane harvesting groups, rice co-operatives, and the extended family, issues such as obtaining proper water supplies and other domestic developments are often managed on an individual basis; the whole community tends to become involved only when a piped-water supply is introduced; developing rainwater catchment systems is viewed as being the responsibility of the individual person or family.

Emergency water supply

Every year, the Fiji Government spends a considerable amount of money on transporting emergency water supplies to rural areas on the main islands, and to remote outlying islands. In 1994, a very dry year in which the west of the country was hit particularly badly, the government spent over 750 000 Fijian dollars (1 F$ = US$0.73) on trucking and shipping water to drought-stricken areas. Not surprisingly, the government is attempting to improve the water supply situation.

Developing rural water supplies

Over half of Fiji's population (68 per cent) is provided with a reticulated water supply. The remainder, who live mainly in rural areas, rely on the efforts of the PWD's three divisional offices, and on their own initiative. Through a rural self-help scheme, communities can obtain two-thirds of the material costs for their water supply from the government. The community has to find the rest of the money, and provide the labour. The Rural Water-Supply Office provides technical assistance and supervises the work. The resulting water supply becomes the full responsibility of the community, including meeting all future maintenance and repair costs.

The rural water-supply officers of the PWD determine the most feasible water-supply system for each village. Where surface water is available, it is developed. Clear springs are rare and, therefore, most of the village water supplies consist of open dams, in creeks upstream from the village, from which pipes lead to a large — usually ferrocement — communal storage tank. From here, water is supplied by gravity to the communal taps and showers in the village. The area around the dam is often a seepage area, and here the villagers grow their *dalo* (*taro*), a tropical plant whose roots, when boiled, are a staple food. The water is vulnerable to contamination by people and animals defecating nearby, or other activities.

Water resources assessment

For the last ten years, the MRD has been carrying out a water-resources assessment programme for small islands. The programme's main objective is to advise the PWD on the development of groundwater resources on the small islands. Although MRD's primary responsibility is groundwater assessment, over the years, the surveys have looked increasingly at all water resources, including rainwater.

Small islanders should not depend solely on groundwater for their water:

- The fresh groundwater resource is often limited and vulnerable to over-exploitation, leading to a rise in the level of the underlying saline water, and contamination of the water in the well;

- the costs associated with groundwater development — such as drilling — are high; and
- there are continuous operational and maintenance costs — maintaining a pump can become a crucial factor.

For these reasons, groundwater development is only recommended in situations where other sources do not meet the demand adequately, or where surface sources do not exist. Experts recommended that groundwater should be supplemented from existing surface sources or rainwater systems; the recent investigations of the small islands' water resources by the MRD indicate that, on the majority of the islands visited, rainwater is not being harvested to its full potential.

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Women's groups know that rainwater catchment means cleaner drinking-water, so they promote the technology — and provide financial help.

Catch it if you can

Very few homes in Fiji's rural areas have permanent systems for rainwater collection, although many houses have corrugated-iron roofs with some form of guttering. Villagers usually collect rainwater in open containers such as 200-litre drums and pans, and good storage facilities can be scarce. Water is stored in bottles and other small containers; clearly, individual households need larger rainwater-storage tanks.

To go some way towards remedying this, the PWD has been helping local communities to construct a number of large, communal rainwater-storage tanks in villages where there are no alternative water sources, or where the existing piped-water supplies are inadequate. In general, the tanks are made of ferrocement, and collect rainwater from between three and five adjacent houses. These PWD systems come under the auspices of the rural self-help scheme described above, and are subsidized by the government.

Fijian villagers can also obtain funding and technical assistance to build rainwater catchment systems from local NGOs, church groups, women's groups, and youth groups. The efficiency of these systems will depend on the skills of local tradesmen. A school, community hall, or a church normally provides the largest roof area in a village so, naturally, these are used. Although there are some good examples of well-constructed systems, many are poorly designed and maintained.

School committees recognize the importance of providing clean drinking-water for their students so, unlike the rest of the community, most Fijian schools have some sort of rainwater catchment system; but they lack effective strategies for operation and maintenance.

Household systems

Families who can afford them, often construct their own household rainwater catchment systems. But because of the local tradition of *kerekere* — which means that everything is shared — most Fijian villagers opt for a communal rainwater catchment system. The individual household systems that have been introduced, however, seem to function very well and their owners tend to take more care of them. Of course, people view the cost of rainwater catchment systems as a major obstacle to private ownership.

The average Fijian villager lacks the money for the initial investment; he or she does not lack the knowledge necessary to install the system itself! Working together as a community, Fijians can usually raise considerable funds to build churches and community halls.

So, although there is real potential to raise money to provide the village with a number of household systems, cultural barriers within the villages mitigate against this approach. In the Indo-Fijian communities, where communal ties are weaker, and people tend to benefit less from government subsidies, individual water supplies are more common and many more household rainwater catchment systems can be found. The development of individual systems depends, to a large extent, on how critical the water shortages are in any particular locality, and how much households can afford to invest.

Fiji's potential

Many of Fiji's communities develop their own rainwater catchment systems, with or without government or other assistance. Individual and village efforts have proved that rainwater harvesting is a technology which is highly appropriate to meet a large proportion of the country's rural water needs.

Although rainwater catchment is certainly not the only option for supplying water to Fiji's villages, its potential as an important water source can be developed much further. Where other sources such as surface water and groundwater have already been developed, rainwater can serve to supplement household needs as it is easily collected and, in general, is of better quality than surface sources.

There is no rainwater catchment systems programme running in Fiji at the time of writing, although the government assists in development. The technology and the ideas deserve to be disseminated widely, and people should be given the financial support that they need to implement rainwater systems at the household level. For rural areas, this would represent an important source of potable water, and reduce water and health problems.

Long-term investment

Government spending on emergency water supplies could be cut back if it provided more financial assistance — in the form of subsidies — to develop rainwater catchment systems. Although the Fijian Government may lack the human resources within its water-supply division for a major rainwater-catchment programme at present, this is an ideal opportunity for local or regional NGO involvement. With the right education and adequate training, local communities could develop and maintain such simple but important systems themselves.

Lineke Mourits is a Land and Water Engineer. She works for Fiji's Mineral Resources Department under the Pacific Water Supply and Sanitation Programme. This UNDP-funded programme, based in the South Pacific Applied Geoscience Commission (SOPAC), sees the promotion of rainwater catchment systems in the Pacific Region as one of its aims. Contact: SOPAC, Private Mail Bag, Suva, Fiji. Fax: +679 370040. E-mail: lineke@sopac.org.fj. Prem Kumar is Principal Geologist and head of the Applied Geology Section at Fiji's Mineral Resources Department. As a hydrogeologist, he is responsible for the water-resources assessment studies on the small islands. Contact him at the Mineral Resources Department, Private Mail Bag, Suva, Fiji. Fax +679 370039.