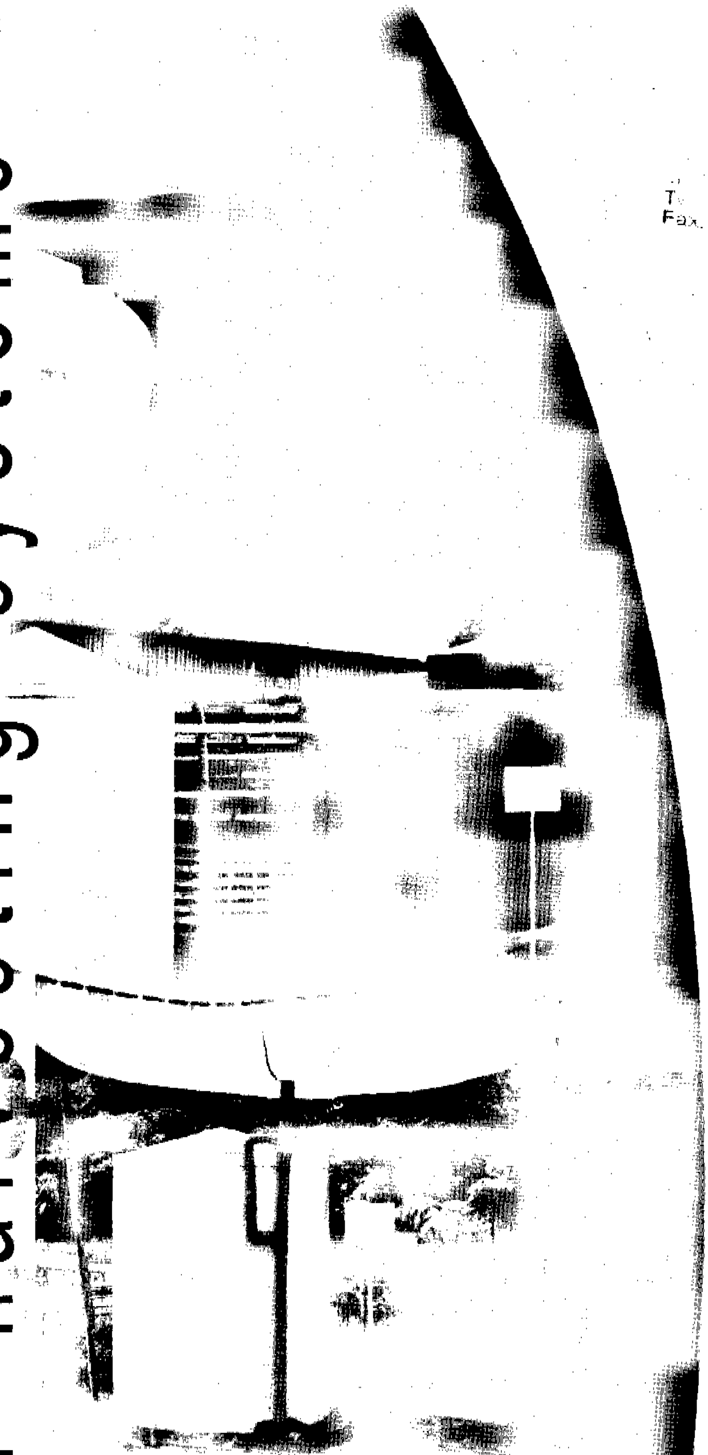
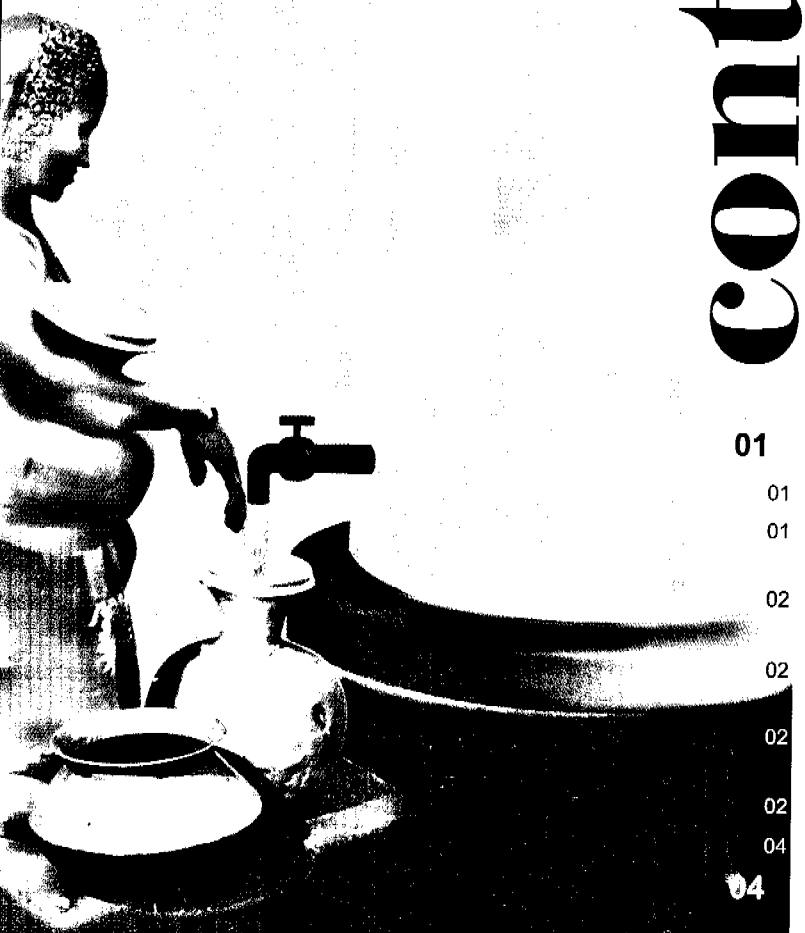
rainwater harvesting systems



innovation ***in***
rainwater
harvesting

IDE
Bangladesh



contents

introduction intro

International Development Enterprises (IDE)

IDE is a not-for-profit development organization based in Denver, Colorado, USA. Our mission is to improve the social, economic and environmental conditions of the world's poorest people by identifying, developing, and marketing affordable technologies that can be manufactured locally and sold at a fair market price through a private sector supply chain.

From its inception in 1981, IDE has used a market-driven approach to development. Through the use of this approach, IDE has successfully increased the annual incomes of millions of farm families and small businessmen and women in Asia, Africa, Latin America and the Caribbean - areas with high concentrations of small poor farm families, rural poverty, and water scarcity.

Employing over 500 staff (99% in the field), each country program is staffed by nationals, with one expatriate Country Director. IDE maintains country programs in Bangladesh, Cambodia, China, India, Nepal, Sri Lanka, Vietnam and Zambia.

Key components of IDE's approach to sustainable development

The four key components to the sustained success of IDE's programs are:

Appropriate: The technologies incorporate user feedback to develop and adapt products which meet the specifications and needs of the rural customers.

Affordable: This is the most critical component to IDE programs. The technologies are engineered using local materials and labor processes to ensure that a majority of rural households can afford to buy them at full retail price while allowing local businessmen and women to make reasonable profits.

Available: IDE's goal is to establish and train producer and dealer networks to ensure that the products are available to the majority of rural households including the smallest farm families in the most remote villages.

Sustainable: The final goal is to ensure that the local private sector supply chain has the skills and knowledge to keep the process going on its own. That is, quality products are produced and successfully sold and spare parts/after sales services are available. When this is achieved, IDE leaves behind a sustainable network with local capacity that will continue to serve the poor.

IDE's approach to addressing the arsenic mitigation

In recent years, scientists have detected dangerous levels of arsenic in the ground water in most areas of Bangladesh. It is agreed that as many as 80 million people in the country could be at the risk of arsenic poisoning and eventual death.

As part of its efforts to address the arsenic crisis, IDE concentrated its activities on the imperative of exploring a variety of arsenic mitigation technology options, and to look for alternative sources of safe drinking water.

The critical factors IDE took into consideration are: ***a***. provision for household level solutions, ***b***. affordability (offer multiple technology/price options), ***c***. reliability and effectiveness. At the same time, IDE's focus has been to innovate technologies that can be manufactured locally and distributed through the private sector to the majority of the arsenic affected population on a sustainable basis.

Low Cost Rainwater Harvesting System is a specific technology that IDE has developed through intensive laboratory and field-testing. Low-cost Rainwater Harvesting Systems are ready for rural use.

Rainwater: An alternative source of drinking water

Rainwater harvesting is an age-old practice, which takes advantage of the seasonal abundance of precipitation during the Monsoon, most of which would be lost to runoff or evaporation. It is a major source of drinking water for millions of people in neighboring countries, but is a relatively new concept to Bangladesh, except for a few coastal areas. In Bangladesh, where the population has become heavily dependent upon groundwater for household consumption, rainwater harvesting provides a natural, safe and inexpensive solution to the current arsenic epidemic.

IDE Efforts on Rainwater Harvesting Systems (RWHS)

In the case of rainwater harvesting, IDE has developed a program designed to provide safe drinking water to rural households through the adaptation, production and dissemination of low-cost rainwater harvesting systems **(RWHS)**.

We are currently working closely with **SDC, DPHE, UNICEF, World Vision** and local partner NGOs to achieve three goals.

Goals:

1. **To increase public awareness through education on the arsenic contamination of ground water in Bangladesh**
2. **To test arsenic levels in tube-wells and other water sources**
3. **To develop low-cost arsenic mitigation options which includes rainwater-harvesting systems (RWHS).**

Specific Objectives:

1. To demonstrate a proven rainwater harvesting technology at the rural household level
2. To train the private sector supply chain ensure quality production and demonstration of low-cost technologies at the local level
3. To build-up capacities of Local Partner NGOs, enabling them to intensify awareness on arsenic contamination and the collection of safe drinking water

4. To establish a sustainable market for the appropriate and affordable technology of Rainwater Harvesting Systems

5. To raise awareness on indigenous storage systems which could potentially be used as rainwater collection devises at a more affordable price

Beginning in April 2000, the development of RWHS has evolved through several stages each providing an option for safe drinking water. The original design costs varied between 4,500 Taka and 7,500 Taka for a 2,000 and 3,000-liter storage tanks. However, it was found that the lowest construction cost, per liter, was for the 3000-liter storage system. This model was found to be the optimal size among all households. It was also found that the 3,000-liter tank was the optimal size to provide the average family's drinking water needs throughout the 5-month dry season.

In September 2001, at its research center in Savar, IDE innovated a **"breakthrough"** technology, which reduced the cost of the conventional 3,000-liter rainwater storage tank, dramatically.

IDE's new low cost RWHS incorporates a vertical cylindrical sheet metal tank to house the stored rainwater. The inside of the tank is coated with a locally manufactured non-toxic, inert material, specifically designed for the insides of drinking water tanks. The sheet metal tank housing is stabilized in a one-layer brick and cement platform and is sealed at the bottom in a cement cap onto the platform. This also forms a barrier against insect penetration from the bottom. A cone shaped, sheet metal lid is tightly fitted on top, creating moisture seal. In addition, stainless steel mesh screen is used inside the overflow and inlet points, which eliminates the possibility of mosquitoes entering and laying their eggs in drinking water supplies.

In September 2001, Han Heijnen, Health Advisor to the ***World Health Organization (WHO), Bangladesh***, reported at the International Rainwater Harvesting Conference in Germany that this was the cause of the spread of Dengue Fever, particularly in the coastal regions of Bangladesh. The health risk is great if vector control is not practiced in the construction of Rainwater Harvesting Systems.

The current cost per liter is 1.3 Taka of this tank to the customer for a 3,000-liter system, which includes guttering systems and a reasonable profit for private sector supply chain. IDE continues research on further reduction of cost per liter.

Up to now, clean, safe, Rainwater Harvesting Systems have only been available to a small number of households in arsenic affected rural communities. However, with the combination of an affordable RWHS and creating access to a credit system, it holds the potential for a practical and effective household option for safe drinking water.

IDE is now introducing another **"breakthrough"** technology, which is ready for field-testing. This technology incorporates 2 PVC lined concord cloth bags (1,500 liters each) held in a bamboo frame. The cost per liter for this system is 0.6 Taka per liter, not including the bamboo frame. (Technical details on page #09)

Other potential low cost options, such as motka, are currently available at many households.

The "MOTKA", a large clay jar traditionally used for storing rice, can be connected easily to a guttering system for rainwater collection and storage. These vary in sizes from 100 to 1,000 liters. A "MOTKA" can be fitted with a vector control cover for approximately 15 Taka and a faucet installed for 15 to 150 Taka. If a suitable roof is not available, a 6' x 6' plastic sheet catchment may also be installed in an open area for less than 150 Taka.

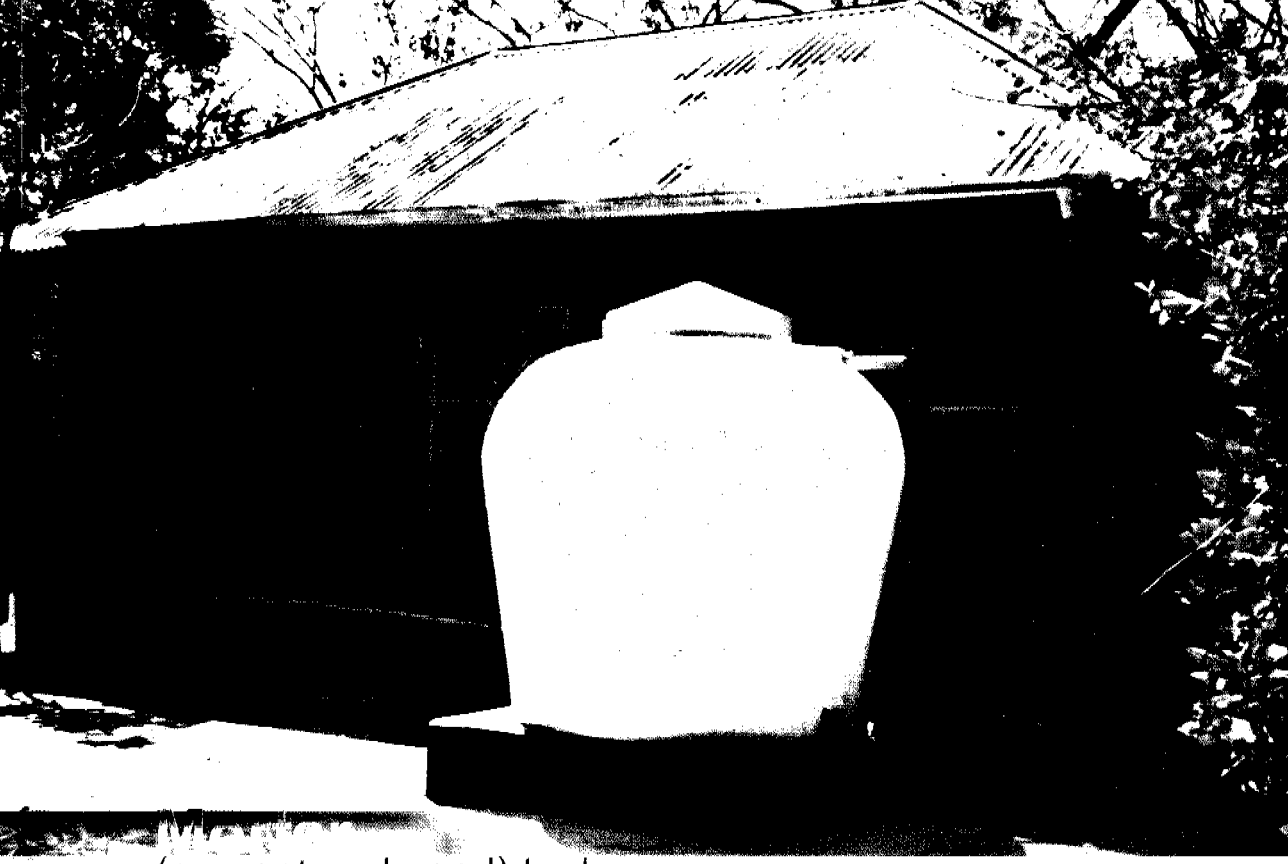
Many other storage containers can be found existing at most rural households including large Kolshis (pitcher), clay pots, plastic buckets, etc. These may be adapted effectively to collect rainwater during Monsoon season.

Rainwater as a safe drinking water source

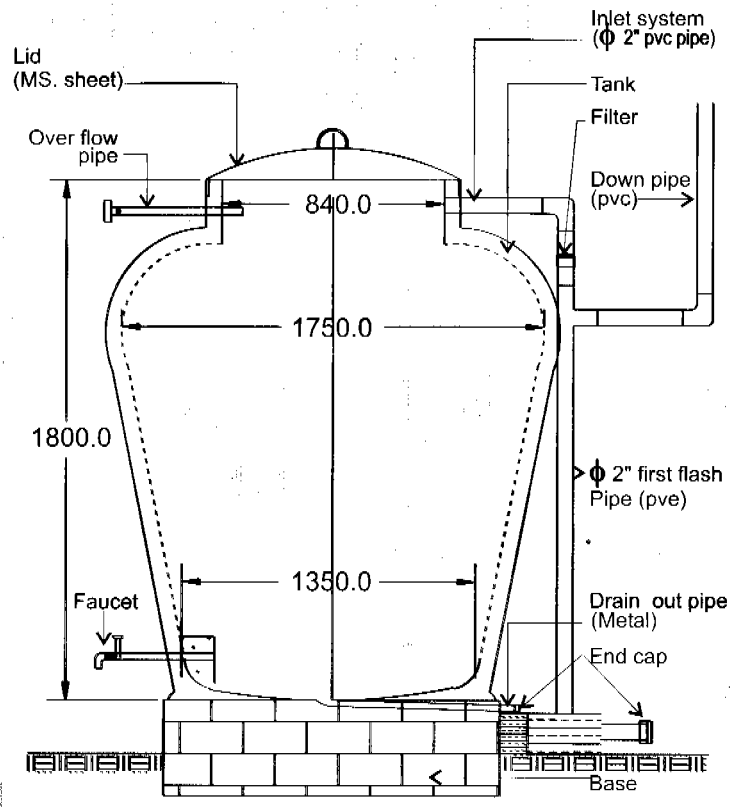
Rainwater is:

1. Abundant and free
2. Bacteria free and clean
3. Free from iron and other minerals
4. Appropriate to use for drinking and cooking purposes
5. Used worldwide for drinking and cooking

available technology option



(cement and sand) tank



specification

05

Capacity: 3,000 liters

Diameter: 1.75m

Height: 1.8m

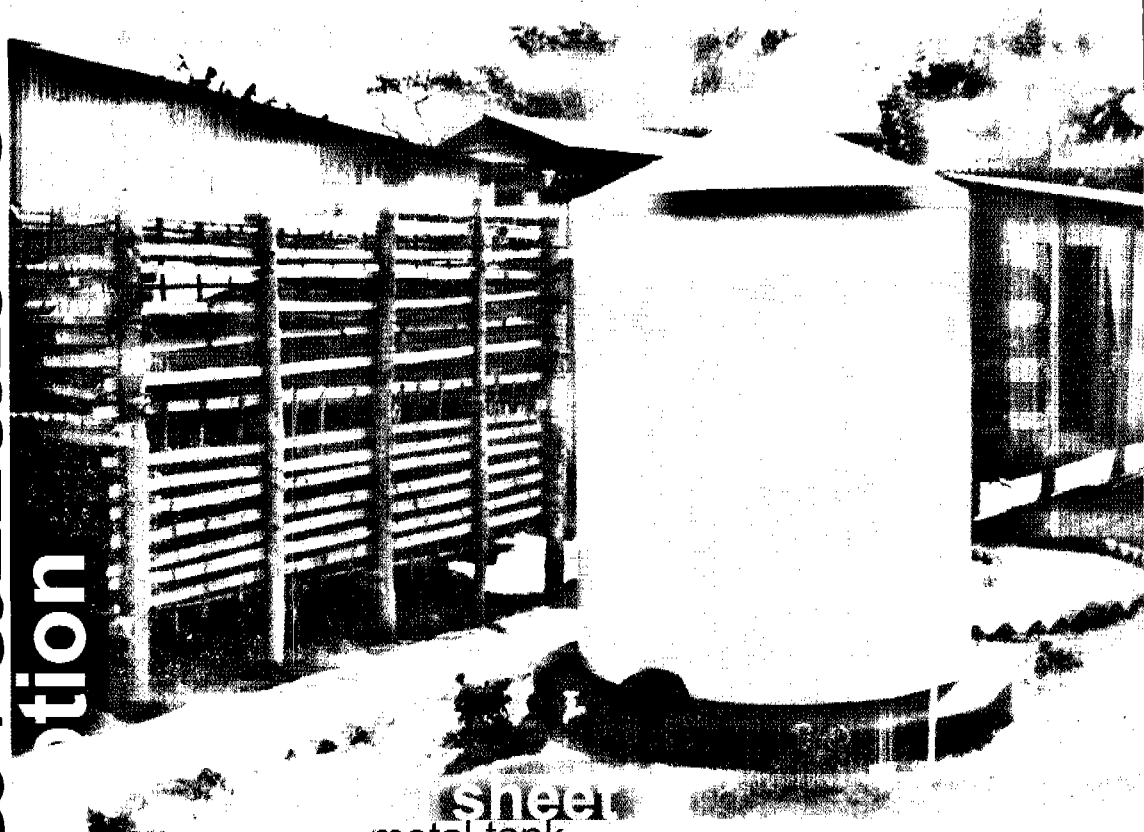
Material used: Cement, Bricks and Sand platform

Total construction cost: 5,100 Taka to the household

1.7 Taka per liter construction cost including guttering system and supply chain profit

Note: Cost may vary slightly + - 5% depending on local material cost

available technology



sheet metal tank

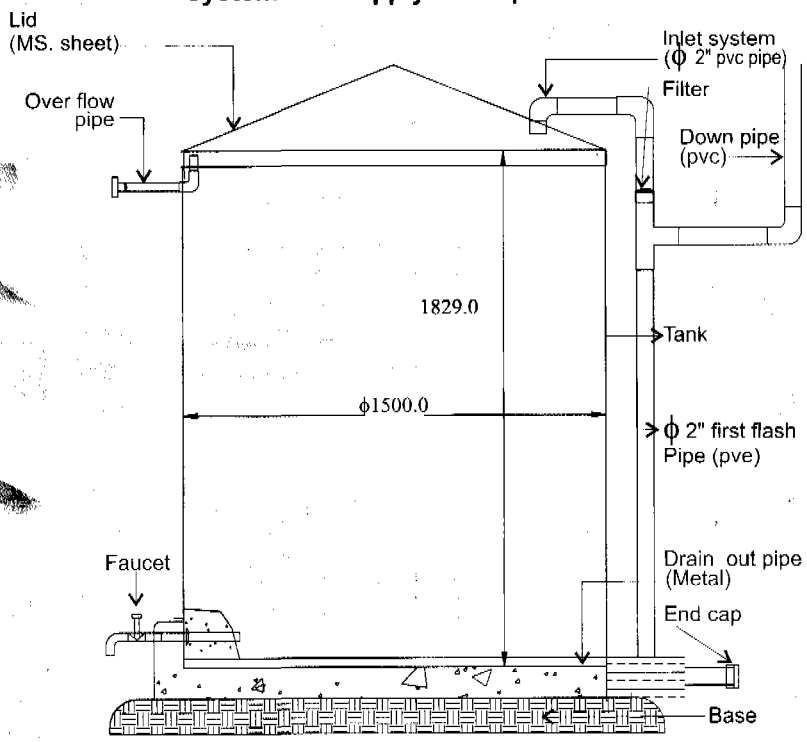
specification

Capacity: 3,000 liters, **Diameter:** 1.5m, **Height:** 1.8m

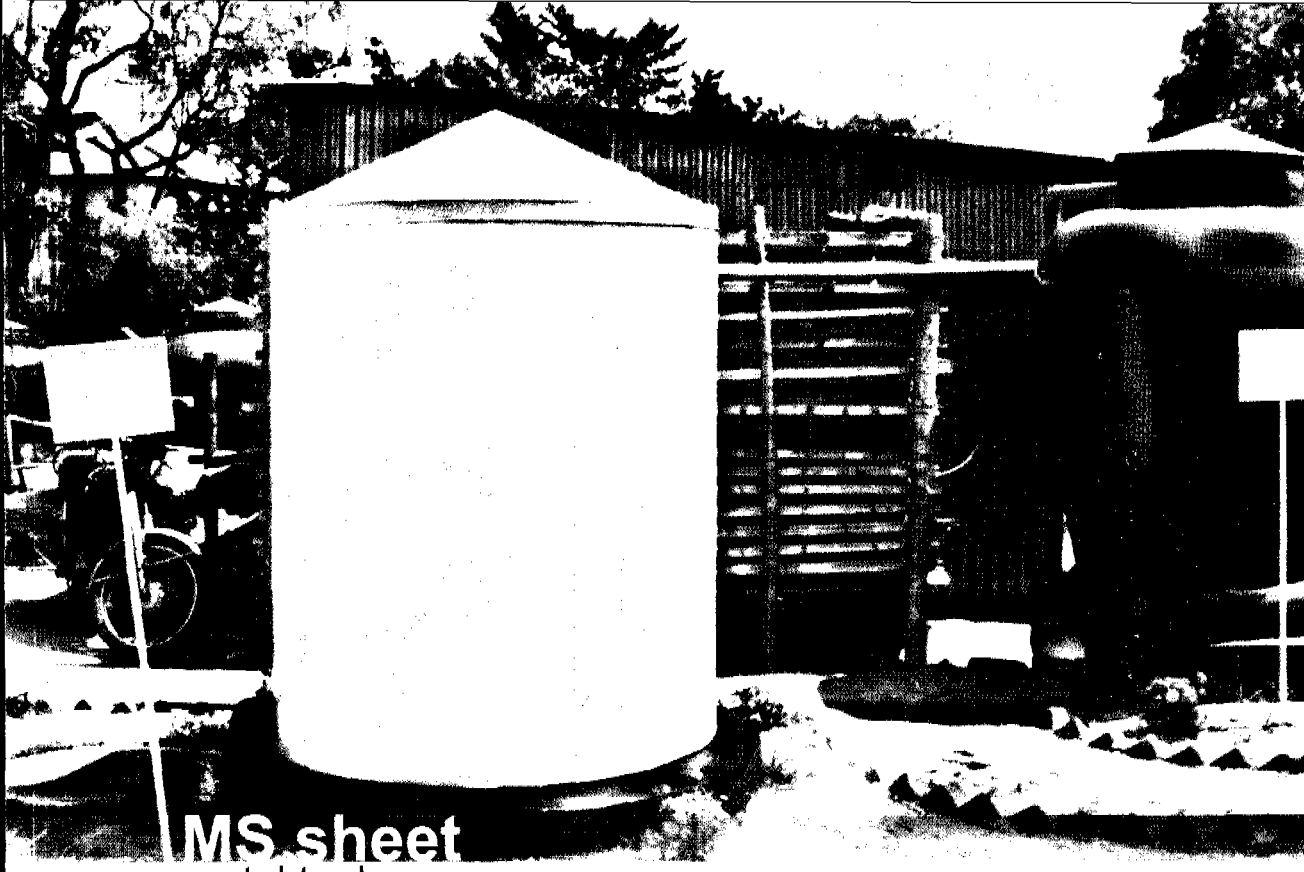
Material used: GI sheet 22 gauge, Cement, Brick and Sand platform

Total construction cost: 3,900 taka to the household

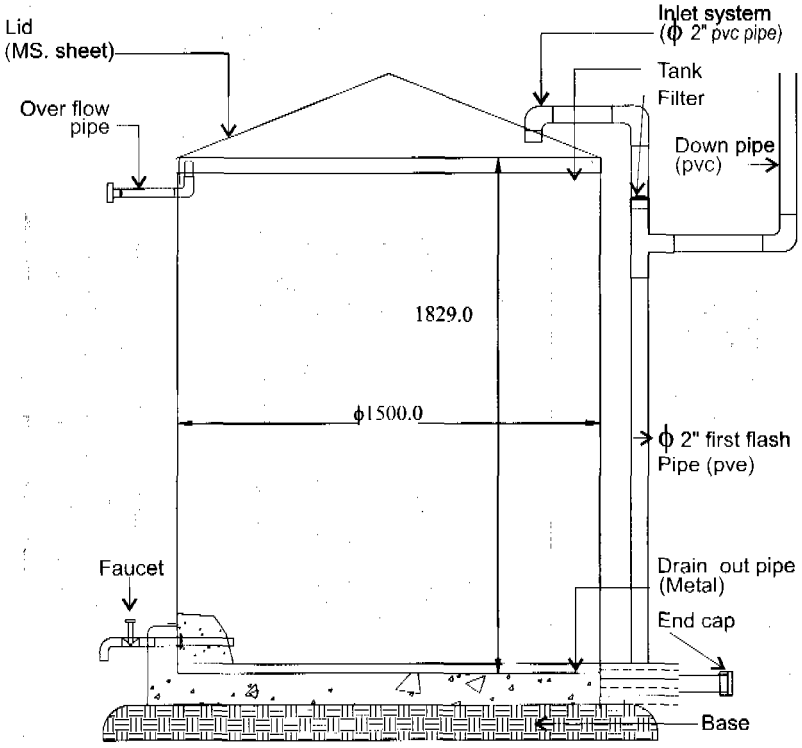
1.3 Taka per liter construction cost including guttering system and supply chain profit



Note: Cost may vary slightly + - 5% depending on local material cost



MS sheet
metal tank



specification 07

Capacity: 3,000 liters

Diameter: 1.5m

Height: 1.8m

Materials used: MS sheet 22 gauge, Cement, Brick and Sand platform

Total construction cost: 3,700 taka to the household

1.23 Taka per liter construction cost including guttering system and supply chain profit

Note: Cost may vary slightly + - 5% depending on local material cost

GI/MS sheet metal tank
with plastic sheet catchment

specification

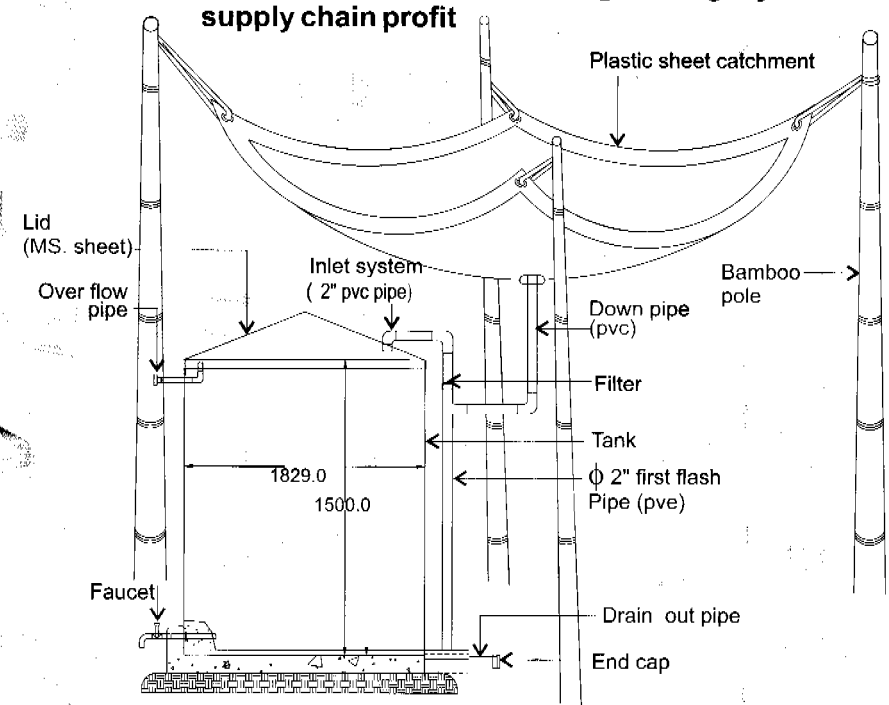
Capacity: 3,000 liters, **Diameter:** 1.5m, **Height:** 1.8m

Plastic sheet catchment: 3m x 4m

Materials used: GI/MS sheet 22 gauge, Cement, Brick, Sand and plastic sheet catchment

Total construction cost: 4,300 Taka to the household

1.43 Taka per liter construction cost including plastic sheet catchment, guttering system and supply chain profit



Note: Cost may vary slightly + - 5% depending on local material cost

PVC lined concord cloth
with bamboo frame

specification 09

Capacity: Approx: 3000 liters

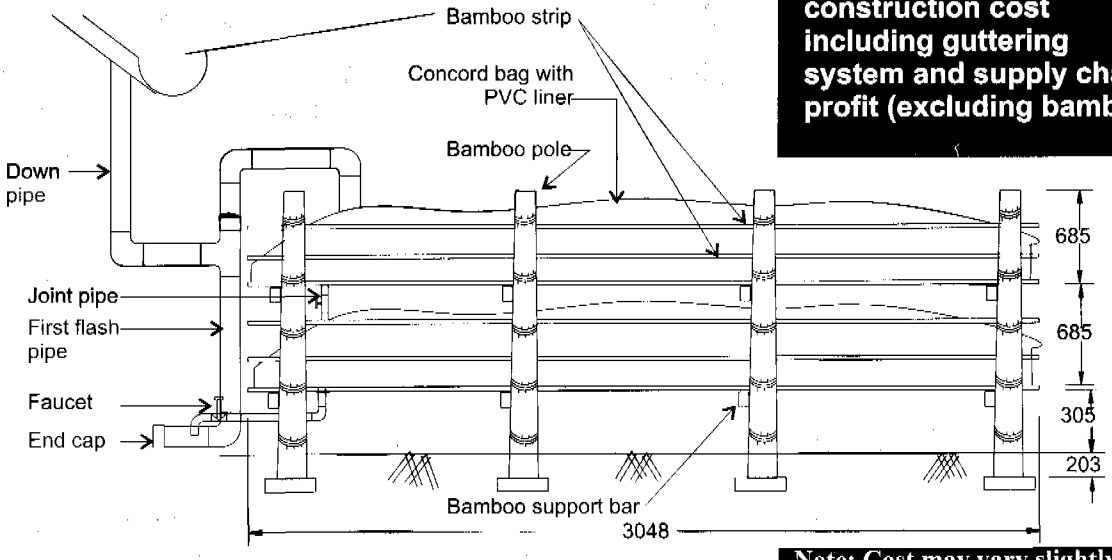
Bag size: 3m x 0.7m x 0.7m

no of bag: two

Materials used: PVC lined concord cloth

Total construction cost: 1,800 Taka to the household

0.6 Taka per liter construction cost including guttering system and supply chain profit (excluding bamboo)



Note: Cost may vary slightly + - 5% depending on local material cost

The Motka (Traditional Clay Jar) System with plastic sheet catchment

specification

Capacity: 100 to 1,000 liters

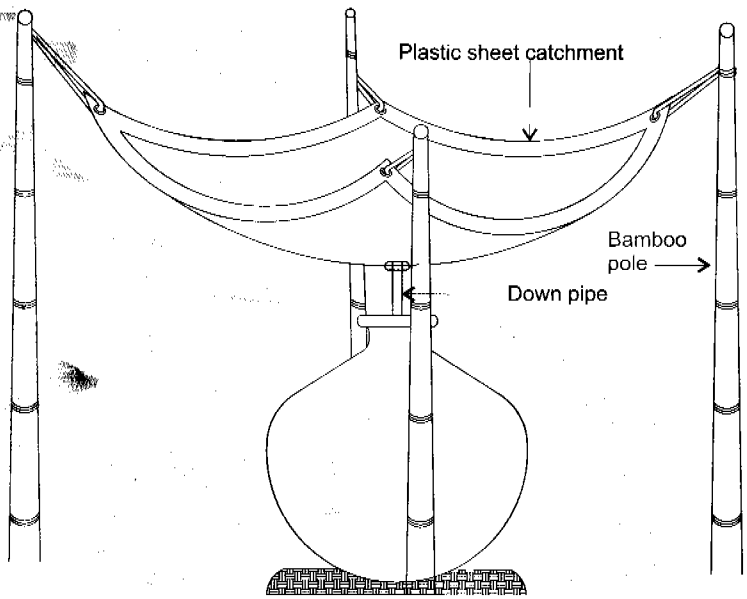
Circumference: 3.38m to 4.31m, Height: 1m to 1.23m

Plastic sheet catchment: 2m x 3m

Materials used: The Motka and plastic sheet catchment

Total construction cost: 150 Taka to the household (plastic sheet catchment only)

1.5 to 0.15 Taka per liter construction cost including bamboo and supply chain profit

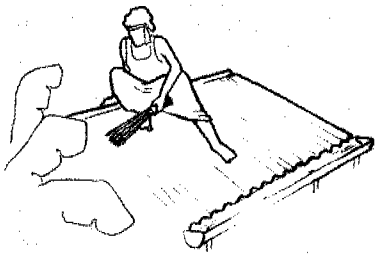


Note: Cost may vary slightly + - 5% depending on local material cost

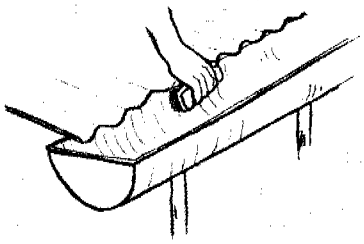

rainwater
harvesting systems

User's manual

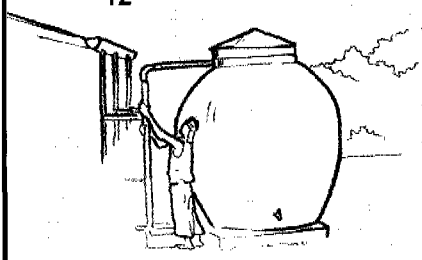
বৃষ্টির পানি ট্যাংকে ধরার পদ্ধতি



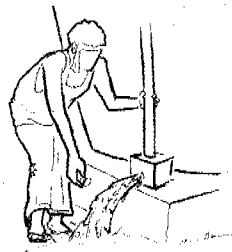
বৃষ্টির আগে টিনের চাল পরিস্কার করে নিন



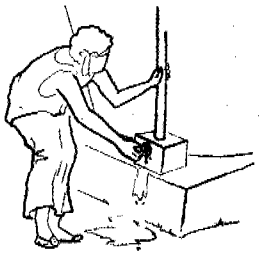
টিনের চালের সাথে সংযুক্ত গাটারিং পরিস্কার করে নিন



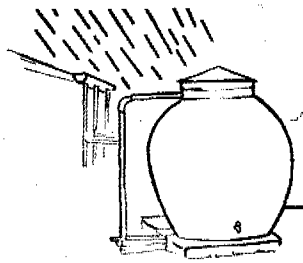
ডাউন পাইপ, ইনলেট পাইপ পরীক্ষা করে দেখে নিন কোন ছিদ্র আছে কিনা



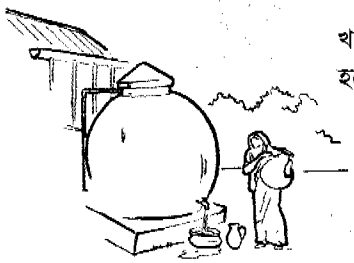
৮ - ১০ মিনিট বৃষ্টির পানি ফেলে দিন



৮- ১০ মিনিট পরে ফ্লাশ পাইপের পানি নির্গমণের পথ বন্ধ করে দিন



বৃষ্টির পানি টিনের চাল থেকে গাটারিং হয়ে ডাউন ও ইনলেট পাইপের মাধ্যমে ট্যাংকে জমা হচ্ছে

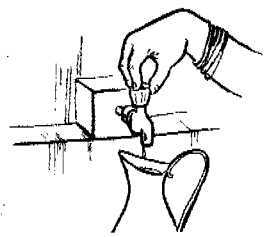


খাবার পানি ট্যাংক হতে সংগ্রহ করুন

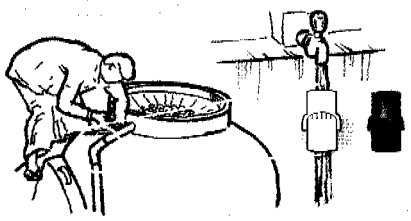
ট্যাংকে ধরা বৃষ্টির পানি পান করুন

লক্ষণীয়

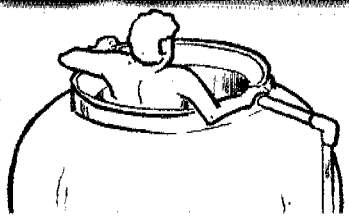
বৃষ্টির পানি শুধুমাত্র পান করার জন্য



পানি সংরক্ষণের পর পানির কল ভালভাবে বন্ধ করতে হবে

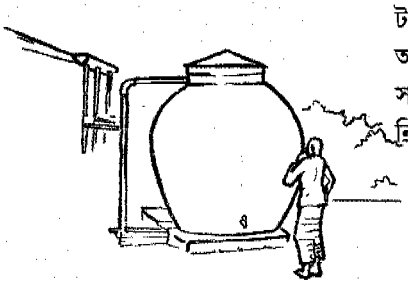


ইনলাইন ফিল্টারটি ডাউন পাইপ থেকে খুলে পরিস্কার করুন



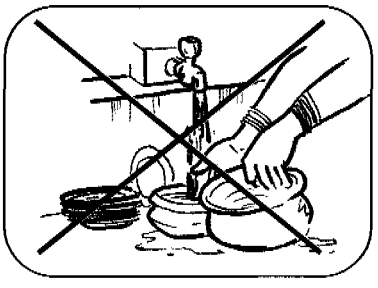
ট্যাংকের পানি শেষ হওয়ার পর এর ভিতরে ঢুকে সমস্ত ময়লা পানি ড্রেইন পাইপের মাধ্যমে বের করে, পরিস্কার পানি দিয়ে ভাল করে সমস্ত ট্যাংক পরিস্কার করে নিন

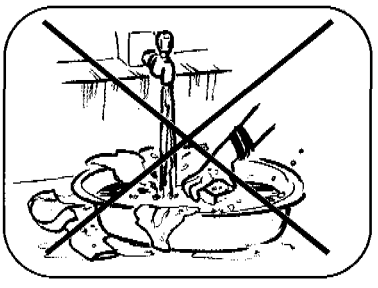
ট্যাংক পরিস্কারের জন্য ট্যাংকের ভিতরে প্রবেশের আগে গোসল করে নিন

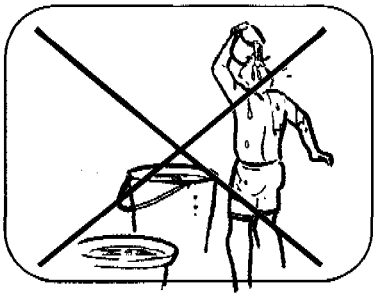


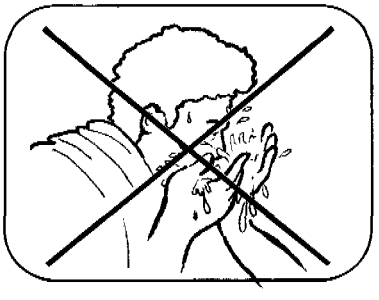
ট্যাংকে কোন সমস্যা আছে কিনা এর জন্য সমস্ত পদ্ধতিটি দেখে নিন

যথাযথ ও পরিমিত সংরক্ষিত বৃষ্টির পানির ব্যবহার করুন

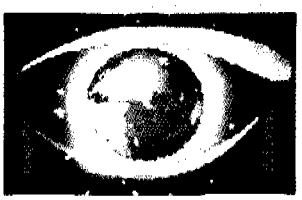








unicef



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