

Watering Your Garden by Pedal-Power

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For the forty-six million people in Tanzania, water is life - just as it is in all parts of the world. One of the major problems here is accessing water for domestic and agricultural use.

Dar es Salaam, a city of about four million, spreads its water-seeking tentacles for miles inland to draw fresh water from rivers in the area to support its rapid growth. According to local officials, water theft is on the rise. An increasing number of illegal lines tapping into city water mains are putting additional stress on an already strained system.

Throughout the country-side, water is an issue, and it is interesting to see the various pumping devices and watering systems used in the rural areas.

At the Kihonda Regional Vocational Training Service Centre (Kihonda College, for short), the project which we are completing has installed a drip irrigation system. This project was sponsored by the Canadian International Development Agency. While drip irrigation is not a particularly new technology, it is a valuable instructional tool for their agriculture program. Not only does it provide water for a large demonstration garden plot, but it also allows students to get valuable hands-on experience in maintaining and working with something that they would otherwise only be able to learn about in books, or see on the Internet.

At Kihonda College, water can be introduced directly from the area's water main into two large, elevated storage tanks. As an alternative, water could be pumped from collection ponds or wells into the tanks using a pump connected to the power take-off on one of the two power tillers at the College. From the storage tank, water flows through a network of plastic tubes along the rows of plants, such as tomatoes, cucumbers, or eggplants. Tiny holes in the distribution tubes meter the water drop-by-drop into the soil directly below each plant. The beauty of drip irrigation is that it reduces waste that can occur by spraying the entire garden, and focuses this valuable resource exactly where it is needed for the growth of each plant.

One of the more ingenious pumps that I have seen is a concrete pedal pump which is manufactured in the area by "Water for the Third World" (W-3-W). The pump itself is made from a concrete block with two vertical cylindrical sleeves formed into it during the casting process. Following several days of underwater curing, the block is fitted with two pistons that ride up and down in the cylinders. Water inlet and outlet tubes run into and out of the cylinders. Through an arrangement of check valves, one of the cylinders will be filling with water on the up-stroke while water is being discharged from the other cylinder on the down-stroke. Power is supplied by a person standing above the pump working two large pedals that create the upward and downward motion of the cylinders. The tube on the suction side of the pump can be placed into a well or water collection pond. With relatively easy pedalling, water can be pumped to a large reservoir tank

located on a raised mound at the upper end of the garden plot. From here, the water can be directed through a drip irrigation system or by small trenches to the plants.

Another creative device is not quite as efficient as the concrete pedal pump. It is based on the rear wheel and pedal assembly of a bicycle. After the rear tire has been removed, a long, thin chain is loosely draped over the rim. Along this chain, many small plastic disks are attached at equally spaced intervals. The chain is run through a rigid plastic tube with a diameter slightly larger than the disks. Once the ends of the chain are fastened together, pedalling the bicycle will cause the disks on the chain to travel through the tube. If one end of the tube is placed in a water supply trench, pedalling will carry water up through the tube between the moving disks, and out the other end. After it leaves the tube, the chain goes back around to the inlet end of the tube where the disks pick up more water, and the cycle continues. Typically, water leaving the tube is directed into small irrigation ditches and flows by means of gravity through the garden plot.

Both the concrete pedal pump and the bicycle-based pump rely on human power in areas where electricity is often unavailable or unaffordable. They both illustrate all too well the intense labour inputs required to grow crops on the thousands of small-holder farms in Tanzania.



Using a Concrete Pedal Pump