The prefilter also clarifies the water to improve light transmittance and therefore UV dose throughout the entire water column.

In theory, UV systems compare favorably with other water disinfection systems in terms of cost, labor, and the need for technically trained personnel for operation and maintenance. UV treatment with the unit described in this paper is rapid and, in terms of primary energy use, approximately 6,000 times more efficient than boiling over a biomass cookstove. UV-treated water, like boiled water, must be handled and stored hygienically. UV treatment does not offer residual disinfection, and some bacteria can repair their DNA and reactivate after a few days of exposure to visible light [Harm, 1980]. Reactivation of bacteria, when it occurs, is on the order of a 1-log increase in post-treatment concentration; reactivation is related to UV dosage, and one study found that water dosed with 130,000 μW -s/cm^2 showed no reactivation after 24 hours [Lindenauer and Darby, 1994]. Our laboratory experiments for testing reactivation of E. Coli have yielded similar results.

UV WATERWORKS (UVWw)

In the summer of 1993, prompted by the outbreak in India of a mutant strain of cholera ("Bengal" Cholera) against which there was no vaccine, we initiated a design effort for a low-cost, robust, and low maintenance device for drinking water disinfection. We found that the cost of disinfecting water with a UV dose of 40,000 μW-s/cm^2 was attractively low at 2 US cents per metric ton of water. However, the available UV water disinfection systems had two drawbacks: they all (1) required a pressurized source of water, due to various filters integral to the devices, and (2) used a UV-transparent sleeve to separate the UV lamp from the surrounding water stream. This sleeve rapidly fouled with biofilm and chemical deposits, reducing its UV-transparency, and thus required frequent mechanical and chemical cleaning. This was beyond the technical and time resources of the communities we hoped to help.

Our goal was to disinfect communities' drinking water collected by hand from surface sources, or with handpumps. The water entering the device might have a pressure of only a few cm of water column. Thus, we decided to do away with any integrated filter (and the need for pressurized water to push it through the filter). If filtering was necessary, it would have to be done outside the device, using a slow sand filter, or an in-line filter cartridge if one had a pressurized line. We circumvented the sleeve fouling problem with a design having a bare UV lamp supported below a reflector, above the free surface of flowing water. There are no solid surfaces prone to fouling between the water and the UV lamp. We set the design maintenance interval conservatively at 6 months. Our initial design was wholly of welded stainless steel sheet, consumed 40 Watts, disinfected 30 liters per minute (lpm), and cost us about US$900 to fabricate.

Limited field tests of this design were conducted in India. The Indian communities informed us that the flow capacity of the device was far higher than necessary, and that the devices were too