

WATERING THE Wastelands

In late 2007 our family moved from Auckland, New Zealand, to a “city older than Rome” on the other side of the world. Located in one of the former republics of the Soviet Union, it is a city of old and new, where horse drawn carts still clog up the traffic and internet cafes can be found alongside traditional bazaars, and where both Turkic languages and Russian are spoken.

I am an engineer with a non-government organisation working in the area of Appropriate Technology. The NGO evaluates and uses simple sustainable

technology to improve local people’s living standards in the areas of water supply, sanitation and housing.

I had been forewarned that coming to work here wouldn’t be like engineering in New Zealand, and my first trip out to a work site in a neighbouring town, to construct and install a new pump, served to underline that fact. There was the welding machine “plugged” into the power by bare cables pushed into the supply box, with similarly bare cables laid along the ground, awaiting the unsuspecting foot; the visit by a local official keen on a bribe for “allowing” the pump to be installed; the drunk policeman who passed by carrying a gun... I was definitely not in New Zealand any more.

While work here has many challenges to productivity that you don’t face in New Zealand (for example, two power cuts totaling about twelve hours every day), it is still possible to achieve positive change and improvement in living standards for people who desperately need it. Following the break up of the Soviet Union in 1991, living standards dropped as the economy collapsed, and although it has recovered slightly, the country is still one of the poorest in the world.

Over the past seven years our organisation has worked with communities to develop appropriate technology solutions such as non-electrical water pumps for irrigation, passive solar houses, solar water heaters, high efficiency ovens and hygienic toilets. Other technologies currently being developed

Installing a coil pump, which works without electricity.



are biogas (producing gas for cooking from cow dung), micro hydro power, and wind energy for electricity production. Some of our technologies have been readily adopted by the local communities while others have not been widely used due to a clash with the traditional way of life and culture. Two good examples of our projects are the coil pump and the passive solar house.

The low annual rainfall here – it’s drier than in Central Otago! – and the very hot summers (with temperatures up to mid-40’s Celsius) mean that many farmers rely on irrigation to water their gardens and crops. Without irrigation the farms turn into wasteland. During Soviet times irrigation was carried out by a system of canals and electric pumps, but many of the irrigation channels are now broken, the price of electricity has greatly increased, and the cost of an electric pump is beyond the financial means of most farmers. If they can scrape together enough money to buy a pump, they have no money left over to pay for repairs when – after a short time - it breaks down because of its inferior quality and the damage caused by fluctuating voltage and intermittent power supply.

Having to carry water by hand from the river or canal severely limits the amount of land that can be watered. Then there’s the physical effort involved for those sent to get the water – often children and women whose lives are already hard enough! Carrying water instead of doing school work is a fact of life for rural children.



As an alternative to the electric pumps, our organisation introduced a “ram” pump, which does not need electricity. A ram pump is good if there is a big height difference between the water supply and the pump location. However, there are many streams and canals where there is a good flow of water but no significant change in elevation. A new pump was needed that could work without electricity and use only the power of the water flow to operate.

Then along came Jonathan, an engineer from New Zealand... he and his family spent

a year here as part of Interserve’s On Track programme. From theoretical beginnings (with a little help from Archimedes), through to prototypes – made from rubbish bins and garden hoses – all the way up to full working models, Jonathan developed the coil pump. The coil pump uses the water flow energy in a stream or canal to drive a paddle wheel with a large coil of pipe attached to it. The greater the length of pipe on the paddle wheel, the higher the water can be pumped uphill away from the river.

From Jonathan’s initial work, the pump has been further developed and installed in lots of places, supplying water to houses, small farms, and even to trees in a cemetery. By using only stream energy these coil pumps can lift water up to 30 or 40 metres vertically above the river and supply 10-60m³ (up to 60,000 litres) per day. They are built with locally available materials, cost much less than electric options to set up, and – best of all – cost nothing to run. The coil pumps are very popular, with word of mouth as the main advertising, and the demand for the pumps each summer is greater than can be supplied. Our aim is to teach people how to make the pumps themselves so that they don’t have to keep relying on us, however there are often problems caused by poor quality materials and ongoing design issues that continue to need our attention.

The climate here in the winter months is also fairly tough. Temperatures below zero are normal and last winter saw many

days of -20 degrees Celsius, colder than in much of the rest of the country. With the dramatic increases in energy costs, most people struggle to keep warm during winter. Traditional houses use mud bricks and are usually not insulated, meaning they are cold in winter and weak during earthquakes. We live in an earthquake zone even more active than Wellington; there have been a couple of big earthquakes since we arrived here, the most recent wiping out most of the buildings in a village about 100 kilometres from us, killing 74 people.

To address the need for warm, safe and cheap housing, our organisation developed the passive solar house. With our region averaging 270 sunny days per year, solar energy is a readily available source for heating. The passive solar house is well insulated and uses the sun's energy during late autumn, winter and spring to heat the house. Large windows face the sun and trap the heat (working rather like a greenhouse), utilising a verandah area that then circulates warm air through the house via internal vents. During the hot season, when the sun is higher in the sky, the windows are protected from the sun by large eaves. The house uses a new type of oven for cooking and heating (another product developed by our project); it is significantly warmer, less smoky and more fuel efficient than traditional models. The house is also more resistant to earthquakes because of its foundation design and timber framed

walls, which allow it to flex and move without being destroyed. The new building technology uses only locally available materials and is no more expensive than houses built in the traditional way.

All our project work seeks to help rural communities and urban poor. By providing free advice and assistance with technologies like those described above, we can bring about change for good. We can break down distrust and suspicion as to our motives, and show local people what it means to live out a holistic faith that affects all areas of life – physical, social and spiritual.

Our work is not done in isolation, but in partnership with others, locals and expats, including the community development teams who research the problems faced by local communities. We all work together to provide appropriate technological solutions, which are developed to be within the means of most people. As the technologies become more widely known and sought after, we train up local technicians, businessmen, and even pastors, so that they, in turn, can make them available to a larger number of people, while at the same time earning an income for themselves.

The success of the coil pump in bringing life-giving water to the wastelands demonstrates the great impact that someone with technical skills can have here. We're always in need of more workers (engineers, teachers, health professionals and so on), so if you want to make a difference through your work and witness, enjoy novel work environments and interesting countries stuffed full of mountains, please contact us! ☺

Andrew and Anne and their children, Luke and Hannah, are Kiwi partners who enjoy living in Central Asia; they invite you to join them there.



A passive solar house under construction.