Why is it that the Millennium Development Goals (MDGs) will not be met this year, particularly those relating to safe water and sanitation?

At the United Nations University Institute for Water, Environment and Health, we focus on rural, remote and otherwise marginalised (RRM) communities, so we have constrained our investigations to water-related diseases/conditions and RRM communities. In terms of what I see as the key challenges – not just to meeting the MDG targets, but also achieving universal access for all through a focus on RRM communities – are inadequate resources and reliance on traditional funding mechanisms; a need to invest in ‘software’ as well as hardware; and the need for a collaborative, trans-sectoral and multistakeholder approach that engages policy decision makers, practitioners, the private sector, researchers and communities.

What are the chief objectives of the water, sanitation and hygiene (WaSH) and Wellbeing programme?

The objectives are to implement a holistic approach that moves beyond the traditional biomedical model and to measure and understand the complex linkages between people, water, the environment and health. This should enable us to support evidence-informed decision making and integrate information and knowledge across geographies, scales, sectors and stakeholders. It will also allow us to place social empowerment and enhanced social capital at the centre of sustainable development interventions.

How does WaSH break the cycle of poor health outcomes related to waterborne diseases?

Inadequate sanitation accounts for a significant proportion of the pathogenic load in source waters. To break the cycle of disease, there must be interventions that reduce source water contamination (sanitation and wastewater treatment), remove pathogens from water before it is drunk or used to prepare food (water treatment), and prevent pathogen transfer from hands to mouth (hygiene). Given that WaSH breaks all of these transmission pathways, it is essential to introduce all elements into all aspects of community living – schools, healthcare facilities and homes.

What have been the project’s greatest achievements to date?

Beyond the emerging WaSH and Wellbeing network that spans policy, practice and research, the greatest achievement is that of ‘Waste to Wealth’. This project, supported by government-funded Grand Challenges Canada, has harnessed the WaSH and Wellbeing approach to develop a national wastewater management strategy through multistakeholder dialogue; bringing together policy, practice, research and the private sector. It is predicated on an innovative financing model using anaerobic digestion technology, which breaks down organic material, including human waste, into gas and a slurry that can be used for fertilizer or fuel pellets. The revenues from these by-products can be used to ensure sustainable operation and management of facilities, as well as expansion of sanitation services. Therefore, not only does the health of community members improve, but the environment becomes cleaner in terms of water and indoor air quality, deforestation is reduced as the demand for firewood and charcoal decreases, and markets are created for local entrepreneurs and established private sector companies.

How are you applying the Water-Associated Disease Index (WADI) – a global initiative to track waterborne disease – to your own research?

We are applying WADI to understand where the most vulnerable live in specific countries to inform our broader WaSH and Wellbeing approach. This is why, depending on funding, WADI:Schisto (a schistosomiasis application) and WADI:Patho (waterborne pathogens application) are important next developments for the tool.

With an eye to the future, why have you decided to focus on women and girls in particular?

The decision was an easy one. These are the individuals who bear the brunt of the burden associated with poor WaSH access and yet tend not to have a voice in decision making. Additionally, women and girls face particular vulnerabilities because of their income-generating, caregiving and reproductive roles in society.

Dr Corinne Schuster-Wallace describes the programme that is helping disadvantaged communities across the world to implement holistic, affordable and sustainable change to combat waterborne diseases.
Driving change of heart and mind

Poor sanitation leads to disease, inequity and diminished social capital. Novel initiatives developed by the United Nations University’s Institute for Water, Environment and Health in Canada aim to help marginalised communities break this vicious cycle.

ABOUT 2.5 BILLION people in developing countries, particularly in sub-Saharan Africa and Asia, lack adequate sanitation facilities, and about half only have the option of defecating in the open. As a result, disease-causing pathogens contaminate water supplies used for drinking and cooking – over 700 million people currently lack access to improved water. Unfortunately, improved sources do not mean the water is necessarily safe to drink; almost 2 billion people lack access to safe water.

Lack of potable water takes a heavy toll on health; about 600,000 children die each year from preventable diarrhoea. Poor sanitation erodes resilience and productivity, reinforcing disadvantage in rural, remote and otherwise marginalised (RRM) communities. It also perpetuates gender-based inequities, indignities and risk of physical harm, because the traditional roles of the female members of RRM communities centre on water collection and family caregiving: “Girls miss school because of a lack of sanitation and menstrual hygiene facilities. Women miss work to care for sick family members, and both women and girls face physical and sexual assault when water carrying or seeking a place to defecate,” explains Dr Corinne Schuster-Wallace of the United Nations University’s Institute for Water, Environment and Health in Canada.

WaSH AND WELLBEING

Schuster-Wallace is the principal investigator in an extended research programme on water, sanitation and hygiene, named WaSH and Wellbeing. The project’s approach is to explore knowledge, attitudes and practices at the water-health nexus through community-based, multistakeholder investigation. This is achieved by examining physical, social and political systems and developing tools for local use – particularly where resources are few – to support evidence-informed decision making. Furthermore, the programme develops innovative frameworks that overcome financial constraints, while providing comprehensive solutions.

Investigating local knowledge, attitudes and practices with regard to preventing waterborne disease is therefore the first line of research. Schuster-Wallace’s team has developed approaches for collecting data from people who are normally difficult to reach; for example, working with community leaders to identify study participants, applying community mapping to collect local knowledge and identify priorities, and using Photovoice as a data collection tool to record in-depth individual interviews. In this way, the researchers have collected data from countries such as the Dominican Republic, the Philippines, Uganda, Kenya and Sierra Leone.

For Schuster-Wallace, a key point of interest is that RRM community perceptions of risk are consistent, and consistently wrong: “In almost all countries, people believe that if water is clear, it must be clean, even though pathogens are microscopic,” she observes.

Cost, misconceptions about the cause of disease, and traditional practices and beliefs often undermine the use of sanitation facilities in RRM communities, even where they are provided. The WaSH and Wellbeing programme works on the understanding that the key to ensuring uptake is working with the community; first to understand the population’s beliefs, values, knowledge and practices and, second, to engage with locals to ensure a common view of the issues, barriers and possible solutions. This means not only that they will seek improvements, but also that they will drive change as a community to achieve them.

This, however, is not an easy feat. In one Kenyan community with which the WaSH and Wellbeing team has worked, it took two years to develop a vision for improved sanitation and water supply. The community was then able to implement it with great success. Land was donated for water kiosks and toilet blocks and the community elected a water committee who managed to obtain a connection to the municipal water supply. They then collected revenues for further facilities and erected a clothes washing slab: “The committee has started manufacturing soap

Revisiting the future for WaSH and Wellbeing

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for sale at the water point,” reflects Schuster-Wallace. “Revenue is now being reinvested in operations and maintenance, as well as service expansion.”

**VISUALISING RISK**

In Southeast Asia, dengue fever, transmitted by the Aedes mosquito, is estimated to incur annual direct healthcare costs of US $950 million. Since there is no vaccine, the usual approach to curbing dengue is insecticidal fogging of sites where Aedes breed. This, however, is only effective on adult mosquitoes, so public education and awareness campaigns seek to reduce the number of sites where stagnant water can collect. A limitation to this top-down strategy is that local perceptions of what might constitute a breeding site can vary.

To address this, Schuster-Wallace and her team explored local attitudes to the risk of dengue fever in two urban areas in Malaysia – Putrajaya and Seremban. The towns have very different urban characteristics; Putrajaya residents are largely civil servants and enjoy a relatively high socioeconomic status, whereas Seremban is an agricultural town set amongst tropical forest. In both areas, the dengue rate is 40 times higher than the national target.

Community groups were invited to participate in drawing maps marking possible mosquito breeding sites. The resulting rough sketches and landmarks were then imported into a geographical information system and georeferenced to create a digitised map of local knowledge. The maps differed significantly across the groups and, most notably, from the ‘expert’ municipal view of where the risk of dengue lay.

**VISUALISING VULNERABILITY**

The Water-Associated Disease Index (WADI) is a vulnerability mapping approach that integrates social and biophysical determinants of exposure and susceptibility to disease. Its outputs are maps that provide insight into complex pathways of disease vulnerability in the context of global environmental change.

Incorporating and aggregating such elements as climatic conditions, land cover, population educational status and water usage practices, Schuster-Wallace and her team extended the WADI to identify factors that determine incidences of dengue in Malaysian states. Different patterns of vulnerability emerged across regions, linked to factors such as access to water supplies and the timing of monsoon rains. The map pointed to the inapplicability of a uniform, nationwide dengue prevention and management strategy for Malaysia: regional variations require region-specific strategies. “WADI has been validated as a viable tool for larger scale analyses,” enthuses Schuster-Wallace, who now aims to further augment the WADI methodology to better understand the dynamics of waterborne disease, and cater for data projections and scenario testing in a wide variety of contexts and conditions.

**SAFEGUARDING MOTHERS AND BABIES**

In 2012, Schuster-Wallace and colleagues undertook an ecological quantification using data collected from 193 countries. The results indicated that for every quartile increase in improved access to water and sanitation, the mortality rates of mothers, newborns and children under five decreased by more than 1.5 per 1,000 people. More recently, in partnership with Save the Mothers’ Mother Friendly Hospital Initiative and a Canadian non-governmental organisation called H₂O 4 All, clean water was brought to a Ugandan maternity ward. The WaSH and Wellbeing researchers observed that pride in the facility increased and sepsis rates dropped exponentially. The direct link between improved hygiene and safer drinking water and lower numbers of deaths has prompted Schuster-Wallace to shift the focus of the WaSH and Wellbeing programme to maternal and child health, particularly during the labour, delivery and post-partum period. Looking forward, the team is planning to combine its accumulated knowledge from working in a wide variety of communities across the globe to develop novel supportive programmes and policies with innovative financing. Through the implementation of WaSH infrastructure, education and outreach, and monitoring and reporting tools to create a blueprint for protecting women and their babies, this research has the potential to improve the health of some of the most vulnerable individuals in the most remote communities.