WORLD TOILET DAY 2017: WHERE DOES OUR POO GO?



WHAT IS THE CHALLENGE?

World Toilet Day 2017 continues the theme from World Water Day earlier this year, with the focus on wastewater.

As part of this topic, we are asking the question, 'Where does our poo go?' For billions of people around the world, sanitation systems are either non-existent or ineffective. Poo gets out into the environment and spreads killer diseases, seriously undermining progress in health and child survival. Even in wealthy countries, treatment of wastewater can be far from perfect, leading to rivers and coastlines that cannot be safely fished in or enjoyed.

To achieve SDG 6, we need everyone's poo to be contained, transported, treated and disposed of in a safe and sustainable way. In addition to the profound impact this will have on health and living conditions, safely-managed wastewater has massive potential as an affordable and sustainable source of energy, nutrients and water.



HEADLINE FACTS

- **Around 60% of the global population – 4.5 billion people – either have no toilet at home or one that doesn't safely manage excreta.[1]**
- **869 million people worldwide practise open defecation and have no toilet facility at all. [2]**
- **1.8 billion people use an unimproved source of drinking water with no protection against contamination from faeces. [3]**
- **Globally, 80% of the wastewater generated by society flows back into the ecosystem without being treated or reused [4]**
- **Only 39% of the global population (2.9 billion people) use a safely-managed sanitation service, that is, excreta safely disposed of in situ or treated off-site. [5]**
- **Combined with safe water and good hygiene, improved sanitation could prevent around 842,000 deaths each year. [6]**

WHAT ARE THE "SDGS"?

The Sustainable Development Goals (SDGs) are a set of goals, targets and indicators, signed up to by all UN Member States, that aim to eradicate extreme poverty by 2030. Collectively, these goals provide a framework – the 2030 Agenda – within which all efforts towards sustainable development should be made. Launched in 2015 to replace the Millennium Development Goals, the SDGs are designed to be interconnected; for example, improvements in gender equality should lead to better reproductive health outcomes.

[1] WHO/UNICEF (2017) Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines

[2] WHO/UNICEF (2017) Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines

[3] WHO/UNICEF (2017) Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines

[4] On average, high-income countries treat about 70% of the wastewater they generate, while that ratio drops to 38% in upper-middle-income countries and to 28% in lower-middle-income countries. In low-income countries, only 8% of industrial and municipal wastewater undergoes treatment of any kind (Sato et. al, 2013).

[5] WHO/UNICEF (2017) Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines

[6] WHO (2014), *Preventing diarrhoea through better water, sanitation and hygiene: exposures and impacts in low- and middle-income countries*: http://apps.who.int/iris/bitstream/10665/150112/1/9789241564823_eng.pdf

POO, WASTEWATER AND SDG 6

The fulfilment of SDG 6 – "To ensure availability and sustainable management of water and sanitation for all" – will help drive progress across many other SDGs.

SDG target 6.2 requires us by 2030 to "achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations." The achievement of this target is essential for improving human health and dignity.

Better managing human waste is a key part of reducing the impact of poorly treated wastewater from all areas of society. SDG target 6.3, requires us by 2030 to "improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally." The achievement of this target is essential for healthy water environments and creating sustainable livelihoods.

THE SANITATION CHAIN: WHERE SHOULD OUR POO GO?

SDG 6 is about ensuring everyone has access to, and uses, "safely-managed sanitation services". This is defined by the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene as a "private improved facility where faecal wastes are safely disposed on site or transported and treated off-site".

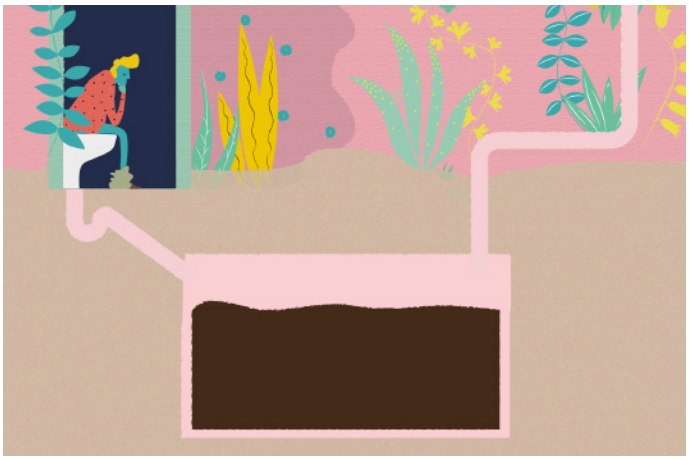
Dealing with our poo properly is not only about averting danger, it's also about seizing an opportunity. Poo, safely treated and reused, is 'brown gold'. "Safely-managed sanitation services" generate jobs, investment opportunities, and valuable products such as energy and fertiliser.

Involving women, who are usually the most knowledgeable of their community's sanitation and water situation, is key to the success of any new facilities, and helps empower females in society.

Across different contexts there will be a variety of approaches to improving sanitation, and all of them will need a conducive and supportive political, economic and governance environment. However, the principles of each stage of the process remain the same.

To achieve SDG 6, we need everyone's poo to take a 4-step journey:

1. Containment



Poo must be deposited into a hygienic toilet and stored in a sealed pit or tank, separated from human contact.

Toilets across the world can take many forms, from flush toilets connected to piped sewerage systems, to

simple pit latrines, to 'ecological' facilities that collect urine and separately compost the faeces in a sealed tank. However, no matter what the toilet technology, it should be safe, private, accessible, appropriate, have accompanying handwashing facilities, and effectively prevent human waste from coming into contact with people or the surrounding environment. Some technologies provide treatment and safe disposal on-site and do not need transport and treatment elsewhere.

2. Transport



Pipes or latrine emptying services must move the poo to the treatment stage.

Across the developed world, waterborne waste disposal remains the most effective method for transporting domestic, commercial and industrial wastewater. In developing countries, onsite systems are currently the most common, although increasing development is likely to see an increase in waterborne waste disposal. In towns and cities in particular, onsite systems need to be regularly emptied and transported for treatment. Emptying services should adequately protect sanitation workers and ensure excreta is not spilled or dumped before reaching treatment.

3. Treatment



Poo must be processed into treated wastewater and waste products that can be safely returned to the environment.

Essentially, there are three ways poo can be treated. Off-site treatment of waterborne sewage, for example by using conventional technologies, such as filtration, and innovative solutions. Off-site treatment of faecal sludge emptied from pit latrines or septic tanks, using, for example, lime stabilization, co-composting with organic municipal solid waste or incineration. And on-site treatment and disposal of faecal sludge, such as covering and abandoning a pit when full or storing until contents are safe to empty and use, for example in twin pit latrines or composting latrines. In any case, the level of treatment level should be appropriate for the intended next use or disposal.

4. Disposal or reuse



Safely treated poo can be used for energy generation or as fertilizer in food production.

Using safely treated wastewater and waste byproducts in agriculture and other sectors is increasingly considered a method of combining water and nutrient recycling, increasing household food security and improving nutrition for poor households. The growing interest in wastewater use is driven by scarcity of water and nutrients. However, care is needed to mitigate the health and environmental risks.

CASE STUDIES

Biologically purifying wastewater before discharging. The effluent volume from Schiphol Airport, Amsterdam, is comparable to that of a small city with a population of 45,000. About half of the wastewater originates from passengers and businesses at the airport, 25% is discharged by aircraft and catering, and the remaining volume is produced by other aviation-related businesses. The on-site wastewater treatment plant biologically purifies water to a quality fit for discharge into local waterways.[7]

Decentralized excreta management and local greywater reuse in a peri-urban community: El Alto, Bolivia. The systems installed by the project collect and treat urine and faeces separately, for resource recovery and agricultural reuse. Faeces is composted with worms (vermicomposting), while urine is treated by storage. Greywater from basins and showers is channelled to small constructed wetlands in the household's garden, with ornamental and edible plants. Testing found that both water and excreta products were safe to reuse, including for food production. The excreta-derived fertilizers (vermicompost and treated urine) have been found to be even more nutrient-rich than organic fertilizers commonly used in the region (such as cow manure), as evidence by both nutrient testing and crop yields. Potato yields from plants fertilized with human vermicompost and urine were double those of plants fertilized with cow manure. The household systems installed by the project include urine-diverting dry toilets, to minimize water use. The UDDTs have a single vault, in which faeces is collected in 100-litre plastic containers and urine in 20-litre jerry cans. The containers are collected using pick-up trucks, and transported to the common treatment plant. Faecal matter is vermicomposted for eight to nine months using red Californian earthworms. [8]

Use of wastewater in farming. It is estimated that more than 40,000-60,000 km^2 of land is irrigated with inadequately-treated wastewater or polluted water,

[7] UN-Water: World Water Development Report 2017: 'Wastewater: An untapped resource': http://www.unwater.org/publications/publications-detail/en/c/853650/

[8] Extract from UNEP and SEI (2016): 'Sanitation, Wastewater Management and Sustainability': https://www.sei-international.org/mediamanager/documents/Publications/SanitationWastewater&Sustainability-Chapter9-Case-studies.pdf

posing health risks to farmers and to eventual consumers of the agricultural products. Available technologies allow removal of almost all contaminants from wastewater, making them suitable for every use. The WHO Guidelines on Safe Use of Wastewater in Agriculture and Aquaculture and the Sanitation Safety Planning approach provides a comprehensive framework to ensure that health risks are managed to protect public health. [9]

Recovery of energy and biofuels from biosolids. The new Sewerage Act of Japan of 2015 requires sewage operators to utilize biosolids as a carbon-neutral form of energy. In 2016, 91 wastewater treatment plants recovered biogas for electricity and 13 produced solid fuels. A leading example is the city of Osaka, which produces 6,500 tonnes of biosolid fuel per year from 43,000 tonnes of wet sewage sludge for electricity generation and cement production.[10]

Farming in a semi-desert with water and nutrients from sewage in Egypt. Sohag Governorate is a semi-desert region in central Egypt with around 4.5 million inhabitants. A two-year experiment in a farm outside the city of Gerga in Sohag demonstrated the potential benefits of reusing treated sewage wastewater to irrigate and fertilize crops on otherwise dry and infertile soils, simultaneously relieving pressure on scarce water resources and helping to meet growing demand for food.[11]

Reuse of sewage sludge in agriculture, Paraná State, Brazil. . Sanitation Company of Paraná (Sanepar) runs 234 wastewater treatment plants serving over 7 million people in the state of Paraná, Brazil. Since 2002, agricultural use has been the final disposal method for the sewage sludge. The treated sludge has been used for green manure crops, mulberries, rye, coffee, sugarcane, barley, citrus, beans, corn, soybeans, grass and eucalyptus and pine reforestation. One aspect of the treatment at the plant is disinfection of sludge through prolonged alkaline stabilization. In this process, the sludge's pH is raised to 12 by adding large quantities of lime. This means that the treated sludge can act as a soil acidity corrector, representing further savings for the farmers.[12]

The Gulper and Vacutug, East and Southern Africa. In densely populated urban areas, emptying latrines safely and efficiently is a challenge. Small enterprises often meet the demand for latrine-emptying services, bridging the gap between household/neighbourhood human waste storage and municipal treatment plants. In Dar es Salaam, Tanzania, some firms use a manually-operated pump called 'The Gulper'. This is basically a hand pump that fits on top of a permanent pipe rising out of a latrine pit, and lifts waste out of the pit and into a container to be taken away for processing. In many cases, private contractors run collection services, taking the waste away to municipal treatment works on a regular basis. Similarly, in Maputo, Mozambique, an engine-powered 'Vacutug' machine empties shallow pit latrines. [13]

[9] UN-Water: World Water Development Report 2017: 'Wastewater: An untapped resource': http://www.unwater.org/publications/publications-detail/en/c/853650/

[10] UN-Water: World Water Development Report 2017: 'Wastewater: An untapped resource': http://www.unwater.org/publications/publications-detail/en/c/853650/

[11] Extract from UNEP and SEI (2016): 'Sanitation, Wastewater Management and Sustainability': https://www.sei-international.org/mediamanager/documents/Publications/SanitationWastewater&Sustainability-Chapter9-Case-studies.pdf

[12] Extract from UNEP and SEI (2016): 'Sanitation, Wastewater Management and Sustainability': https://www.sei-international.org/mediamanager/documents/Publications/SanitationWastewater&Sustainability-Chapter9-Case-studies.pdf

[13] WaterAid (2014): 'The urban sanitation business' blog: http://www.wateraid.org/news/news/the-urban-sanitation-business