

Sanitation Safety Plans: *an emerging framework for improved wastewater management*

● **Water Safety Plans** are increasingly being used as a framework for managing drinking water supplies. Now this concept is being extended to sanitation and human waste, both to protect health and allow for safe reuse. **LIS STEDMAN** reports on progress and an early trial applying the approach.

There is a perfect storm for sanitation,' says WHO technical officer Kate Medlicott, highlighting the fact that, while the drinking water target of the UN Millennium Development Goals (MDGs) has been declared fulfilled, many nations still lag behind on sanitation.

Fortunately sanitation is now getting the attention it deserves in the global agenda, she adds, noting that the greatest health and societal benefits of sanitation come not just from access to toilets but from ensuring that waste is removed safely from whole communities and the environment and put to beneficial use.

This point is reflected in the emerging UN development targets for after 2015, which go beyond access to sanitation and include safe management and treatment and safe reuse of faecal waste. 'There can be big direct and indirect health impacts from the use of human waste,' says Medlicott, adding that with safe management there are also huge opportunities for health benefits. Given this, sanitation safety planning can play a role in achieving these targets.

Sanitation Safety Plans

The Sanitation Safety Plan (SSP) concept is an extension of the approach adopted in Water Safety Plans (WSPs). Their genesis was in the third edition of WHO's 'Guidelines for drinking-water quality', which introduced a model of integrated, preventive risk management, enacted through WSPs as a way of putting into operation the principles, standards and best practices enshrined in the guidelines.

With health-based targets as a starting point, WSPs create a systematic and structured approach to assessing, managing and monitoring risks from catchment to consumer. They replace end-of-pipe water quality measurement with a hazard analysis critical

control points (HACCP) approach: a series of actions to be taken to ensure safety of the drinking water supply chain at key locations in the system. 'Water Safety Plans look from catchment to consumer; SSPs are trying to close the loop from toilet to table,' is how Medlicott sums up the way that for sanitation SSPs consider events from the point of waste generation to disposal and reuse.

'There has been a long debate leading up to SSPs, especially during Stockholm World Water Week conferences over recent years,' adds Robert Bos, Senior Advisor at the IWA, which is a key partner in the development and testing of SSPs, together with WHO and the International Water Management Institute. There has even been discussion about whether the cycles should be integrated as Water and Sanitation Safety Plans, he adds. These discussions continued at the recent IWA World Water Congress in Lisbon in September at a workshop on SSPs where the opportunities and challenges for institutionalising SSPs were debated. 'The conclusion was [that] it is part of the water cycle but

An open toilet in rural Vietnam. Although the Millennium Development Goal target for water has been met, many countries are lagging behind with regards to sanitation. Credit: Don Tran / Shutterstock.



at a different scale – water cycles can be big, but sanitation is mostly small and in an urban setting,' says Bos. 'The actors in the water supply and sanitation institutional frameworks are sufficiently different that it makes sense to keep them separate while making sure that wherever there is a need, there is communication.'

WHO's concept note for SSPs' explains that 'sanitation safety planning may function as a tool to promote and facilitate the priority setting and management of sanitation for the future.' While this is the ultimate aim, a decision has been made to move forward in more modest steps. Bos explains that while plans encompass the broader concept of sanitation, 'at the moment they are focused on wastewater, excreta and greywater use in agriculture and aquaculture'.

The approach chosen should smooth the way for countries that would otherwise find it difficult to attain the standards and norms, which would be a frustrating experience. 'That is why integrated risk assessment is there, to help achieve standardisation in an incremental way.'

WHO updated its guidelines for the safe use of wastewater, excreta and greywater in agriculture and aquaculture in 2006, also following HACCP principles, so agriculture and aquaculture have been chosen as the initial focus for SSPs, because while WHO has had drinking water quality guidelines for many decades, there are no similar guidelines for sanitation. Currently, the only normative document in sanitation are the guidelines for safe reuse in agriculture and aquaculture, Bos notes.

Trialling sanitation plans in Portugal

A Portuguese trial study presented at the Lisbon workshop 'showed the potential of the approach, going systematically through the risks for use of wastewater and sewage sludge in agriculture', Bos says.

The trials also laid bare the challenges. 'We are looking at multiple exposure groups and much greater institutional complexity,' says Medlicott, pointing to the fact that sometimes there is no utility, and that there is a range of stakeholders upstream and downstream who need to be engaged.

The SSP system looks at who is at risk, how significant the risk is, and what can be done to mitigate the risk, she says, adding that SSPs provide a tool for sanitation businesses to plan and demonstrate the measures they taking to make sure their product is safe.

Acquawise Consulting, local utility Aguas do Ribatejo and WHO

developed the Portuguese trial in Benavente. Several stakeholders, such as the Portuguese Water and Waste Regulating Authority (ERSAR), the health authority and the environmental authority, were involved in the project.

Ildio Magalhães, an agronomist at the Ministry of Agriculture, provided some background in Lisbon, explaining that the 9200 population town in the Santarém district produces a total of 332,000m³ of wastewater per year, with the Cerrado das Aguas system treating the highest volume.

The objectives of the trial were to use the town's wastewater as a new irrigation source and to exploit the minerals and nutrients it contains for the crops to use. The town generates sufficient wastewater to irrigate 50ha of maize each summer, and produces enough fertiliser to apply 12,000kg/ha of grain. In all, the waste of 9200 residents transforms into 600t of grain. Challenges included how to bring the wastewater to the crops and how to use it in order to minimise the risks, Magalhães explained.

'One of the objectives was to understand if we could use the wastewater and what the impact would be on the area,' says Raquel Mendes of Acquawise. The objective was to validate the methodology and develop an SSP for a wastewater drainage and treatment system with one key objective being to safeguard human health.

Although the trial covered a relatively small area, the intention was to promote national discussion. Benavente is a rural area with an urban settlement, above one of Portugal's most important aquifers, says Mendes. 'The region floods, and is a nitrate vulnerable zone (designated with reference to the EU directive for the protection of waters against pollution caused by nitrates from agricultural sources), with intensive pastoral and arable farming.' It undergoes application of manures, slurry and wastewater treatment sludge from other wastewater treatment plants, she explains. There are also three catchment areas, stormwater collection, private supplies, septic tanks, pesticides, and industrial waste and effluent to consider.

SSPs provided a means of guaranteeing the safety of using local wastewater. There were three project teams – a coordination team, the SSP team and a multi-stakeholder team of those who could be affected by or affect the sanitation system. The latter was quite a long list, including the health authority, municipal council, farmers' associations, environmental authorities and others. 'Engagement of stakeholders is the challenge and secret of success for a project like this,' she notes.

Similarities and differences between Water Safety Plans and Sanitation Safety Plans

Sanitation Safety Plans

Similarities

Derived from WHO Guidelines for the safe use of wastewater, excreta and greywater
Incremental risk management approach, HACCP, Stockholm Framework

Essential actions

- system assessment
- operational monitoring
- management

Systematic nature, following the sanitation chain

Differences

The systematic approach expands to downstream health and environmental effects

Considers multiple routes of exposure and multiple exposed groups in relation to microbiological and chemical risks

Usually no clear regulatory framework, with roles and responsibilities fragmented over different sectors and levels

Diversity in the decision making process

Objectives:

- reduce the exposure and negative health and environmental impact of wastewater, excreta or greywater disposal and use
- prevent wastewater from contaminating fresh water sources and produce

Implementing agency: may vary, national, regional or local authorities, depending on available resources and skills

Water Safety Plans

Similarities

Derived from the WHO Guidelines for drinking water quality
Incremental risk management approach, HACCP, Stockholm Framework

Essential actions

- system assessment
- operational monitoring
- management

Systematic nature, following the drinking water supply chain

Differences

The systematic approach remains confined to the drinking water supply chain

Focuses mainly on drinking water ingestion, considering microbiological, chemical and radiation risks

Usually operates in a clear regulatory framework

Uniformity in the decision making process

Objectives:

- prevent drinking water from being contaminated

Implementing agency: water utility, or for small community water supplies: a community association

Credit: WHO Concept Note 'Sanitation Safety Plans (SSPs): A vehicle for guideline implementation'

Mendes adds: 'SSPs have the potential to change the way sanitation is managed. They provide a framework to develop a coordinated approach across the whole sanitation system. They bring together stakeholders with the common goal of reducing health risks using a risk-based approach.' However, she notes that the requirement to prepare SSPs was 'unlikely to be regulator driven'.

She concludes: 'The main driver behind SSPs is the need to create confidence in what we eat and drink – to provide confidence that in all parts of this extensive process, the risks have been managed.'

Building on a water safety plan idea

SSP team leader Margarida Sousa (who is also the WSP team leader and an environmental engineer) explains that the utility, Aguas do Ribatejo, has an innovative management model, being a public water utility whose shareholders are the seven municipalities in which it operates, and providing both water supply and wastewater treatment services.

As a WSP had been implemented for the same region, there was knowledge of what could be gained by implementing a SSP, in terms of improving knowledge of the wastewater treat-

ment system and its surrounding environment, and the probability that it would help the utility to secure and control its processes and procedures.

The main goal was to assess and mitigate the risks holistically, says Sousa. In addition, there was an aim of establishing a mitigation plan and identifying opportunities to improve the quality of service in a cost-effective and sustainable way, and to cooperate on the WHO manual.

The major difference between WSPs and SSPs has to do with boundaries, continues Sousa. For SSPs there is a need to go beyond the boundaries of the utility. This means 'we need information', she notes. 'We communicated with the water authorities, regulators, farmers – everyone who can be involved. The major achievement in my opinion was bringing them all together. It was the only way we could do it. And having the information, we started to see where the systems interconnected.'

There was a complex range of interconnections: septic tanks; wastewater drainage and treatment; stormwater systems; sludge; and agricultural effluent. When all the characterisations were complete, the project was able to perform risk assessments and create an improvement



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Cleaning of a wastewater pumping station in the Sanitation Safety Plan pilot area in Benavente, north-east of the Portuguese capital Lisbon. Picture courtesy of Acquawise Consulting

plan for the wastewater system.

Another major event was a public presentation last June. 'It was very important to create awareness and understand if people were interested in such a methodology,' Sousa explains. At the end of the project there were conclusions about the methodologies and what SSPs can bring to utilities – among which are innovation, a risk-preventive approach and improvements in understanding of wastewater systems, as well as identification of operational practices, regulations and improvements.

The team also concluded there were weaknesses. 'It requires full engagement from all stakeholders,' says Sousa. 'It can be seen as a water and wastewater utility problem. It may require further regulation and inspection, and there may be extra monitoring costs.'

Threats include the lack of government and regulatory drivers, the fact that stakeholders may not carry out the actions required, and that there may be insufficient information in the right format.

Further development of the sanitation safety plan concept

WHO is keen to develop the concept of SSPs. For example, the International Water Management Institute is working with WHO on a project in which IWMI wants to scale up smallholder agriculture based on wastewater use by applying a 'business plan' approach. Bos explains that the SSP component in the project is aimed at ensuring this can be done with due regard for human health.

The first thing WHO has to do, he adds, is develop proper normative guidelines addressing sanitation issues in their broad sense. Once these exist, a manual for SSPs can be developed to implement them. WHO is working on this using the drinking water quality guidelines and the WSP manual as a blueprint.

Like WSPs, SSPs identify risks at critical points in the chain, in their case from where the wastewater originates to where agricultural products end up on the table. 'Just as in drinking water, where it is no longer good enough to look at quality out of the tap, you must look at the whole production chain,' Bos argues.

It is early days for the topic, he concludes. 'It may grow quite a bit, depending on how we define sanitation, going beyond agriculture to look at what we do with human waste.' This would in effect be a return to the approach taken prior to the 1970s, when a much broader 'environmental sanitation' concept was applied that encompassed a wide range of issues including, for example, solid waste disposal. 'For the time being, it is to be practised with a stepwise focus and narrow boundaries,' he notes.

The Lisbon session, he says, 'was very helpful, it highlighted a conceptual approach, there was a lot of discussion at an international level and the case study provided an example of how they are applying SSPs in Portugal.' ●

Note

¹ WHO concept note Sanitation Safety Plans (SSP): A vehicle for guideline implementation: www.who.int/water_sanitation_health/wastewater/sanitation_safety_plans_Concept_NoteV11_4_2_17_092010.pdf