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## SLH Learning Brief

# Rural sanitation in a changing climate: Reflections and case studies

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## Introduction

To date, rural sanitation and hygiene are often conspicuously left out of discussions on climate change impacts on water, sanitation and hygiene (WASH) services. There are few studies that illustrate the impacts of climate hazards and shocks on rural sanitation and hygiene and limited programmatic guidance on how to achieve more resilient systems. It's not hard to see why given the size of the challenge – in 2022 an estimated 3.5 billion people lacked safely managed sanitation, including 1.9 billion people who lack access to a basic sanitation service and 419 million who practice open defecation (WHO and UNICEF 2023). Many of the people left behind represent the most vulnerable and marginalised groups living in rural and remote areas. Are climate change impacts on sanitation and hygiene really a priority for them?

There are good reasons to believe they should be. Diarrhoeal disease incidences increase with a rise in temperature and after heavy rainfall and flooding events (Levy et al. 2016). Hard-fought gains in movement up the sanitation ladder are also at risk. There are documented cases of large proportions of people living in rural areas that do not rebuild or repair latrines after damage from heavy rainfall and flooding (Mosler et al. 2018; Chambers et al. 2021). And where water-based toilets are used, water shortages can lead to people reverting to open defecation or using poorly designed facilities (McGill et al. 2019; UTS-ISF et al. 2021). Consequently, leaving climate change as something to be considered only after eliminating open defecation or after achieving safely managed sanitation is a mistake that leaves people increasingly exposed to pathogens and to a loss of their investments in sanitation.

Yet, the message about the need for climate resilient rural sanitation and hygiene services, and what can be done, is not entirely clear. Research about the climate impacts on rural sanitation and hygiene are needed to persuade action and equitable allocation of resources. Furthermore, implementers need practical guidance on what to do and how to situate sanitation within the wider pressures of both climate change on people's livelihoods, as well as integrating climate adaptations within ongoing sanitation programming. This has flow-on effects for how people prioritise sanitation amongst other needs and how they manage risks (Kohlitz and Iyer 2021). With this rationale, the Sanitation Learning Hub (SLH) and University of Technology Sydney's Institute for Sustainable Futures, (UTS-ISF), along with a range of partners, have undertaken three case studies on climate change and rural sanitation with the aims of:

Building the evidence on the **direct and indirect impacts of climate hazards** on rural sanitation and hygiene practices.

Using participatory research methods to **understand diverse local realities and experiences**.

Exploring the feasibility of **integrating climate-sensitive thinking into rural sanitation and hygiene programming through trialling climate-responsive sanitation interventions**.

Facilitating learning and sharing with partners within and across case study regions to **think through evidence-based recommendations for sanitation programming**.

The case studies, spanning three countries, collectively address each of these objectives, although not all case studies focus on every objective. They represent a spectrum of initiatives to collect evidence of climate impacts on rural sanitation and take climate action within rural sanitation programming (see Figure 1). This *SLH Learning Brief* provides a brief summary of these case studies, reflections from the SLH and UTS-ISF on their experiences developing the case studies, the results of a learning workshop between the partners involved in each case study, and a proposed way forward.

**Figure 1: Case study methods: From collecting evidence to taking action<sup>1</sup>**



Source: Authors' own

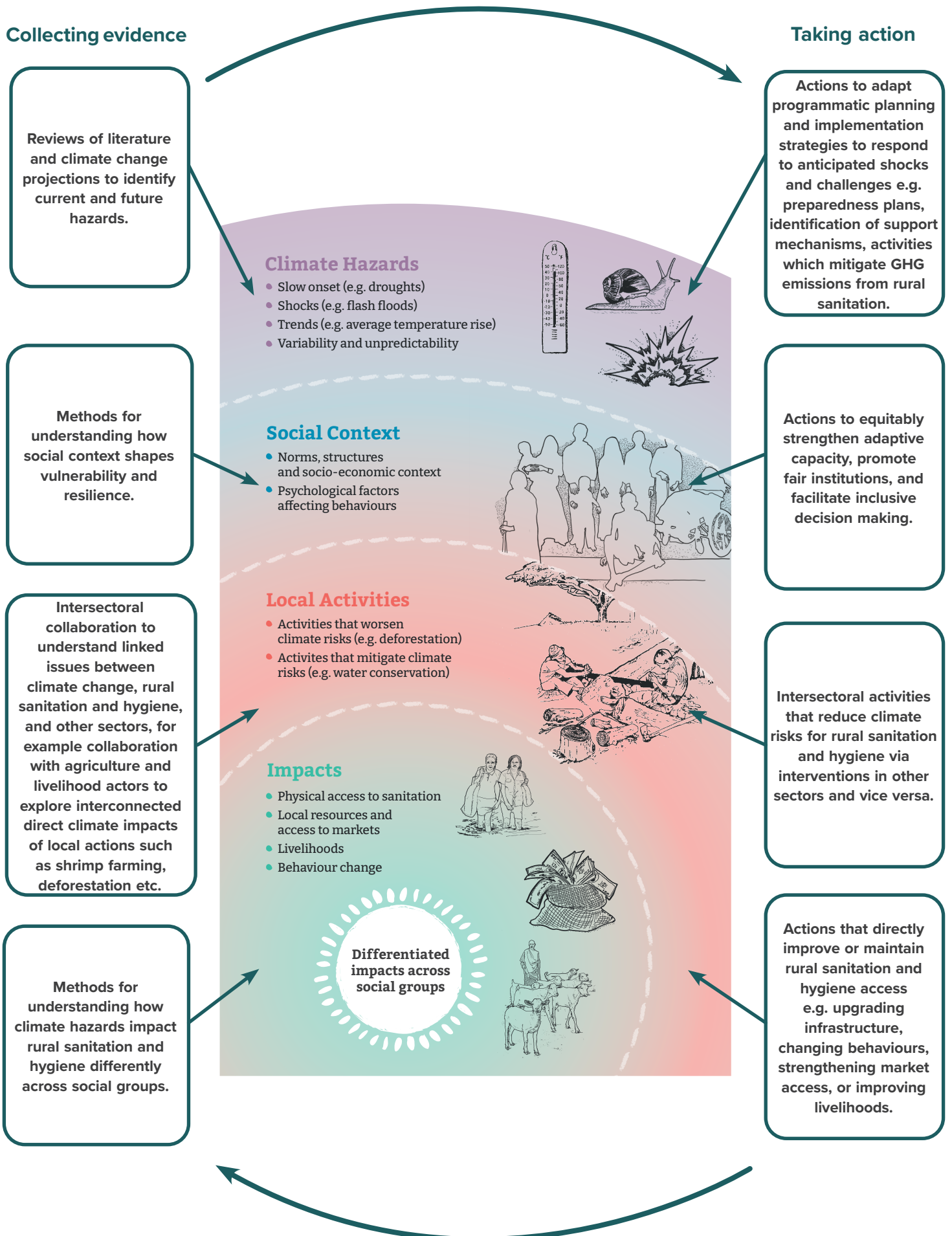
## Contributions of the case studies to understanding and addressing climate impacts on rural sanitation

In [Issue 17](#) of *Frontiers of Sanitation*, UTS-ISF and SLH developed a framework of climate change impact pathways for rural sanitation. The framework was designed to present and link the various ways in which climate-related hazards impact rural

sanitation. Individual experiences of impacts are determined by a combination of dynamic and intersecting factors such as age, location, physical mobility, gender, caste and more. The framework also aims to support WASH implementors to develop more climate sensitive and responsive actions within existing sanitation programming. Sanitation stakeholders can act to collect evidence on, or implement solutions to, any part of the framework (see Figure 2).

<sup>1</sup> Figure 1 photo credits: Image 1: Exchanges with women in the village during the impact diagram activity. *Credit:* IRSS Research Team, Burkina Faso; Image 2: Community consultation process for qualitative data collection. *Credit:* Rupantar/Shahin; Image 3: Community members go on a transect walk through their village. *Credit:* Jeremy Kohlitz.

Figure 2: Operationalising the framework: Climate change impact pathways for rural sanitation



Source: Authors' own

There are gaps in knowledge in operationalising the framework. For example, methods and approaches need to be identified, trialled and tested, actionable ways forward identified, and their feasibility for integration into sanitation programming assessed. The case studies are a starting point to build this evidence base. They contribute across the spectrum from collecting the evidence to taking action.

### Summary of Burkina Faso case study: Collecting evidence

The Burkina Faso case study used participatory methods, working with communities and practitioners to identify relevant climate hazards, understanding how these hazards impact rural sanitation and determine actions.

#### What we did:

UNICEF Burkina Faso and researchers from Institut de Recherche en Sciences de la Santé used participatory activities and semi-structured interviews to draw out the experiences of community members about direct and indirect climate impacts on rural sanitation. Processes to collect evidence included community mapping, a climate and sanitation specific transect walk and hazard mapping

#### What we learnt:

Community members reported that **heavy rains caused the collapse** of pits and superstructures built from basic materials like wood and terra cotta. The repeated rainfall damage caused some community members to become **fatigued with repairing their latrines** and consequently give up on maintaining them. Impacts of heavy rainfall and droughts such as dying crops and cattle being washed away made people less likely to want to invest in sanitation and hygiene facilities. Meanwhile, water scarcity in the dry season can lead to **less frequent bathing** as community members need to prioritise water for competing uses. The CLTS principle of **community solidarity has helped** some households to recover from climate impacts.

Read more about the case study [here](#).

### Summary of Bangladesh case study: Translating evidence to potential pathways for action

The Bangladesh case study modifies an existing approach to formative research to identify ways of taking action on the climate impacts on rural sanitation.

#### What we did:

WaterAid Bangladesh and Rupantor undertook a participatory Ward Vulnerability Assessment through a variety of tools such as seasonal calendars, participatory mapping, institutional mapping and problem prioritisation exercises. These engaged several stakeholders including climate vulnerable populations, development practitioners, researchers, and local government in coastal Southwest Bangladesh to create an evidence-based approach to address climate-induced WASH vulnerabilities. WaterAid and Rupantor then undertook various validation activities at Ward, Union and Sub-district level to identify actions for strengthening local government decision-making to include climate and sanitation.

#### What we learnt:

The study found that human activities in the region combine with ongoing climate hazards to make people more vulnerable to shocks and stresses. Floods, cyclonic storms and river erosion inundate sanitation facilities, weaken and break latrine infrastructure, and sometimes, even submerge latrines. When latrines are not accessible, open defecation increases. During these periods, waterborne diseases and skin conditions are commonly reported.

Women face discomfort with toilet access during floods where toilets are too flooded or dark to use comfortably or safely. Since many women and girls are forced to use saline water for menstrual hygiene management, several report problems and discomfort with rashes, burns, frequent urinary tract infections and blisters. Many also face increasing time pressures in the dry and hot season, walking two-three hours every day for water collection.

Read more about the case study [here](#).

### Summary of Lao PDR case study: Taking action

The Lao PDR case study highlights lessons from trialling climate-sensitive methods and assessing their feasibility for integration into sanitation programming.

#### What we did:

SNV Laos piloted three participatory, community-based activities for facilitating community members to consider flooding risks to sanitation with a CLTS process. The activities were:

- o **Transect walk** of flood-risk areas: Community members are facilitated to discuss flooding risks to sanitation as they take a transect walk through their village and also visit parts of the village that flood first or most easily.
- o **Community mapping** of flood hazards: During a community mapping exercise, community members identify areas that are affected by flooding in the community and the implications for the spread of faeces and building latrines.
- o **Power walk**: Participants role play different members of the community (e.g. a pregnant woman, a person with a disability) to consider how diverse people experience climate impacts on sanitation differently.

#### What we learnt:

The activities had a number of successes and challenges. The activities were effective in stimulating discussion and identifying new risks (e.g. a community member reported defecating directly underneath the house when it rained too much), and their differential impacts on diverse people. Improvements were needed to ensure inclusive participation, manage time, and address questions about financing.

Read more about the case study [here](#).





Data validation and problem prioritisation at Ward-level, Krishnanagar Union under Sathkhira subdistrict, Bangladesh  
Credit: Rupantar/Sadia

## Reflections for future studies

Case studies are useful resources for advocating to decision-makers about allocating more resources to climate resilient rural sanitation and hygiene, and for providing practical advice to implementers on how resilience can be strengthened.

Our case studies were designed to address the climate resilient rural sanitation gaps as prioritised by the in-country partners. In Burkina Faso, little policy attention is given to the links between sanitation and climate disasters, so the case study aimed to document these links in support of advocacy for greater attention locally and nationally.

Meanwhile, in Bangladesh, there is a long history of responding to climate disasters on WASH because the country is prone to severe cyclones and flooding. There is also extensive local community knowledge on disaster response and adaptation efforts. Hence, WaterAid and other organisations have already developed tools to account for disaster preparedness in WASH programming. The Bangladesh case study profiles one such toolkit and how it could be strengthened to understand and respond to sanitation related vulnerabilities to climate hazards both within existing programming and through targeted local government efforts.

Finally, in Lao PDR, [research](#) by UTS-ISF and SNV (2022) identified feelings of disempowerment among local government staff to address climate impacts on rural sanitation. To this end, the Lao PDR case study highlights low-cost and replicable methods for integrating climate risks into existing CLTS processes.

While these case studies provide valuable lessons responding to various parts of the framework (Figure 2), other gaps remain that future research-practice partnerships and studies could usefully fill:

**Collecting evidence on how the social context shapes vulnerability and resilience:** Qualitative research [approaches](#), such as micronarratives, photovoice and life histories, could be used to create rich, descriptive case studies of how social norms and power dynamics shape people’s sanitation and hygiene experiences during climate events, as well as their adaptive behaviours (or lack thereof).

**Equitably strengthening adaptive capacity, promoting fair institutions and facilitating inclusive decision-making:** Improving people’s agency and strengthening institutions to uphold the human rights to water and sanitation can lead to improved resilience outcomes. Approaches that seek to transform unequal power relations may require sustained

engagement with disempowered and relatively powerful groups (e.g. governments, community leaders). Longitudinal studies could document these transformative approaches over time and draw out the subsequent outcomes for enhanced climate resilience.

**Capturing and building on ways of locally knowing, learning and responding:** Thinking and managing risk and uncertainty is often a common aspect of many people’s daily lives and living, with local innovations and solutions often undocumented. There is value in researchers exploring how this can be leveraged for sanitation and hygiene, to minimise ongoing disruptions and ensure outcomes are sustained over a longer term and cause less fatigue to people than having to respond constantly.

**Intersectoral collaboration to collect evidence and take action on climate impacts that cross sectors:** [Issue 17](#) of *Frontiers of Sanitation* advocates for a consortium approach for assessing and responding to climate impacts across sectors. Relationship and trust-building across organisations (or even across departments within an organisation) can take time to develop. Novel conceptualisation of climate impacts on WASH interlinked with other sectors may also need to be developed. Future case studies could document the processes or outcomes of breaking down siloes to comprehensively address key climate impacts on communities. Cross sectoral research could also help identify synergies and routes for longer term collaboration.

**Actions to mitigate greenhouse gas (GHG) emissions:** Emerging evidence suggests that pit latrines and septic tanks (especially if poorly constructed and maintained) can emit significant amounts of methane (Reid et al. 2014; Johnson et al. 2002). Future studies could explore methodologies to calculate GHG emissions from rural sanitation or the implementation of technologies or practices that reduce the production of methane. Importantly, the burden of reducing emissions should not be carried by marginalised communities who contribute the least to global warming. Solutions for reducing GHG emissions must support access to safely managed sanitation for vulnerable households with incurring additional costs or inconvenience compared to other safely managed options.

Additionally, further studies that take a different angle to **collecting evidence** on climate impacts on rural sanitation and hygiene, and **documenting activities for addressing impacts in practice**, will create a stronger base from which the sector can advocate for climate resilient sanitation and build on successes.

## Reflections from practitioners

The SLH and UTS-ISF facilitated an online workshop with UNICEF Burkina Faso, WaterAid Bangladesh and SNV Laos on 30 November 2022. The aim of the workshop was to discuss the results and learning across the studies, share their reflections on implementing climate-resilient sanitation practices and discuss implications for future programming.

Commonalities in the reflections and priorities of UNICEF, WaterAid and SNV included:

- o **Different contexts, but similar challenges:** Each of the case studies were in different geographic (savannah in Burkina Faso, riverine plains in Laos, and the mangrove belt in Bangladesh) and social contexts. Yet, many of the challenges that emerged are similar. Limited water for maintaining hygiene, poor containment of waste during flooding, and extreme weather events destroying facilities, combined with resource constraints that make it difficult to respond. Hence, shared learning about impacts and responses across contexts is worthwhile.
- o **Barriers to safely managed sanitation are also barriers to climate resilience:** Existing barriers such as poverty and social marginalisation are also barriers to climate resilience. Gender, equity and other kinds of transformative programming recognised in the sanitation sector as good practice can also go a long way towards boosting climate resilience as it builds the capacities and capabilities for people to cope and respond.
- o **Prioritise and integrate climate change into sanitation efforts:** Programmes that focus on eliminating open defecation, moving communities up the sanitation ladder, or other goals, can and should prioritise climate change. Climate relevant thinking and actions can be integrated within existing programming, with no need to overhaul entire projects.
- o **Give communities a menu of options:** More robust, resilient latrines are helpful, but they should not be the only option offered to communities who may struggle to afford them. People should be advised on a broader range of actions and support mechanisms they can take to help themselves, such as more deliberate planning on siting sanitation facilities, selecting suitable and available materials (that are more resistant to climate hazards) for construction, and possible financing options.
- o **Community-led adaptation is key:** Due to the confusing jargon and science around climate change, it can be tempting to leave climate change to the “experts”. But it’s important to enable communities to lead resilience efforts where they can. Careful planning and implementation sustained over time is needed to help communities understand what climate change and its implications are. Subsequently, strengths-based approaches can be used to support communities to develop their own preparedness plans. Preparedness plans can build on existing adaptation efforts, such as raised facilities or arranging materials for quick repairs. Communities may also choose to change activities that worsen climate risks, such as deforestation.
- o **Specific GESI-related planning is needed so no one is left behind:** Climate change can widen gaps in inequalities so climate resilience efforts need to explicitly account for the needs of marginalised groups. Community, NGO, and government planning should actively involve women, people with disabilities and other disadvantaged groups to identify and address their needs, and consider a range of [support mechanisms](#) for disadvantaged groups.
- o **Consider the needs of displaced people and impacts of climate-induced migration:** Climate change could force [hundreds of millions](#) of people to migrate within their own countries due to climate impacts on liveability and livelihoods. These displaced people, who may move out of or into rural areas, must have their sanitation needs met. Rural communities may lose population or swell in size due to internal migration. Sanitation service delivery needs to be adaptive so it can react to shifting population patterns and address the potential marginalisation of displaced people.

## Going forward

Attention on climate change in the WASH sector has grown rapidly in recent years and it is due time to translate discourse into action. A 2022 GLAAS Report (WHO 2022) shows that just 38 per cent of surveyed countries reported they have WASH policies or plans that address the climate resilience of rural sanitation technologies and managements systems. Continuing to communicate evidence of climate impacts on rural sanitation and hygiene, and how impacts can be addressed, to subnational and national leaders is needed to attract policy attention that, in turn, is needed to attract climate financing. Conversely, governments can encourage climate resilient rural sanitation and hygiene programming though laying out clear goals, targets, roles and responsibilities in policy.

There is not an absence of ideas on what could be done. [Actionable ideas](#) (Kohlitz and Iyer 2021) and [objectives](#) (SLH and ISF 2021) for research and learning, and practice and programming, have been put forth. Now these ideas need to be tested in the real-world and documented to gain experience and evidence on what really works and in what contexts. Pilots and projects must be implemented, and governments and the private sector must begin mainstreaming climate resilience into service delivery. Climate change is continuing to accelerate, the rural sanitation and hygiene sector must accelerate to keep up.

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## References

Chambers, K. G., Carrico, A. R., and Cook, S. M. (2021) 'Drivers of sustained sanitation access: social network and demographic predictors of latrine reconstruction after flooding disasters', *Environmental Science: Water Research & Technology*, 7(10): 1861-1872

Institute for Sustainable Futures, University of Technology Sydney (UTS-ISF), Universitas Indonesia (UI) and UNICEF (2021) *Climate resilient urban sanitation in Indonesia: Hazards, impacts and responses in four cities*, Sydney: UTS-ISF

Johnson, J., Zakaria, F., Nkurunziza, A.G., Way, C., Camargo-Valero, M.A. and Evans, B. (2022) 'Whole-system analysis reveals high greenhouse-gas emissions from citywide sanitation in Kampala, Uganda', *Communications Earth & Environment*, 3(1): 80

Kohlitz, J. and Iyer, R. (2021) 'Rural Sanitation and Climate Change: Putting Ideas into Practice' *Frontiers of Sanitation: Innovations and Insights* 17, Brighton: IDS, <https://sanitationlearninghub.org/resource/rural-sanitation-and-climate-change-putting-ideas-into-practice/>

Levy, K., Woster, A. P., Goldstein, R. S. and Carlton, E. J. (2016) 'Untangling the impacts of climate change on waterborne diseases: a systematic review of relationships between diarrheal diseases and temperature, rainfall, flooding, and drought', *Environmental Science & Technology*, 50(10): 4905-4922

McGill, B. M., Altchenko, Y., Hamilton, S. K., Kenabatho, P. K., Sylvester, S. R. and Villholth, K. G. (2019) 'Complex interactions between climate change, sanitation, and groundwater quality: a case study from Ramotswa, Botswana', *Hydrogeology Journal*, 27(3): 997-1015

Mosler, H. J., Mosch, S. and Harter, M. (2018) 'Is Community-Led Total Sanitation connected to the rebuilding of latrines? Quantitative evidence from Mozambique', *PLoS one*, 13(5): e0197483

Reid, M.C., Guan, K., Wagner, F. and Mauzerall, D.L. (2014) 'Global methane emissions from pit latrines', *Environmental Science & Technology*, 48(15): 8727-8734




The Sanitation Learning Hub and Institute for Sustainable Futures, University of Technology, Sydney (2021) 'Call to Action: Building Momentum around Climate Change in Rural Sanitation' Rapid Action Learning Paper, The Sanitation Learning Hub, Brighton: Institute of Development Studies, <https://sanitationlearninghub.org/resource/rural-sanitation-and-climate-change-putting-ideas-into-practice/>

UTS-ISF and SNV (2022) 'Inspiring local governments to integrate climate action into WASH Experiences from Nepal and Lao PDR', SNV Case Study – Beyond the Finish Line, The Hague: SNV, <https://www.uts.edu.au/sites/default/files/2022-11/202211-local-govt-mainstream-climate-action-wash-uts-isf-snv.pdf>

WHO (2022) 'Strong systems and sound investments: evidence on and key insights into accelerating progress on sanitation, drinking-water and hygiene', *UN-Water global analysis and assessment of sanitation and drinking-water (GLAAS) 2022 report*, Geneva: World Health Organization, <https://glaas.who.int/glaas/un-water-global-analysis-and-assessment-of-sanitation-and-drinking-water-glaas-2022-report>

WHO and UNICEF (2023) *Progress on Household Drinking Water, Sanitation and Hygiene 2000–2022: Special Focus on Gender*, Geneva: WHO, <https://data.unicef.org/resources/jmp-report-2023/>



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