BRIEFING PAPER
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Container-based sanitation and climate resilience

KEY MESSAGES

- Container-based sanitation (CBS) services are water-efficient, portable, and have proven resilient to floods and several other climate shocks.
- Resilience stems from both inherent design (e.g. sealed, flood-resistant containers) and provider adaptations (flexible collection schedules, elevated superstructures, emergency protocols).
- Evidence from Kenya, Peru, and South Africa shows CBS users experienced fewer service problems than users of conventional sanitation during a range of shocks.
- CBS supports both adaptation and mitigation, aligning with climate resilient sanitation goals of reducing emissions while withstanding climate impacts.

Why climate-resilient sanitation matters

Sanitation services are increasingly exposed to climate hazards. Floods, droughts, sea-level rise, and extreme rainfall can overwhelm infrastructure and services, contaminate water supplies, and undermine progress toward universal access. Find out more on the Climate Resilient Sanitation Coalition website.

What the evidence shows about CBS and resilience

Container-based sanitation (CBS) uses portable, sealable containers to collect human waste, which are regularly collected and safely treated, reused, or disposed of off-site. This makes it viable in dense informal settlements, refugee camps, flood-prone areas, and locations with rocky ground, high water tables, or limited space. A recent study by Cranfield University generated the following insights on CBS and resilience:

Photos: SOIL

CBS design supports continuity during crises

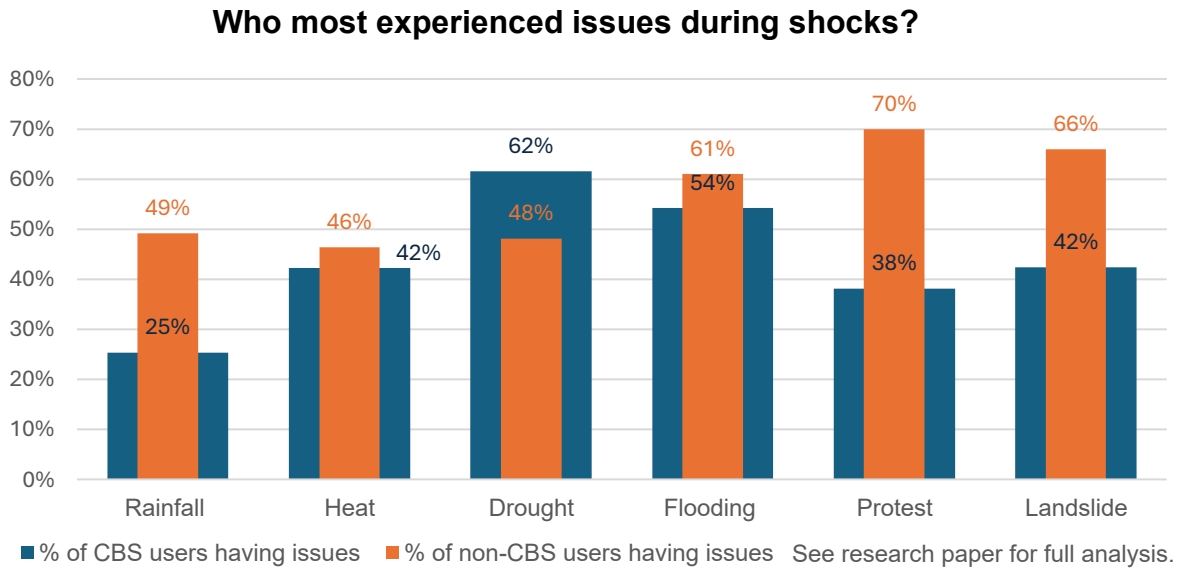
Academic literature highlights CBS design and operational features that enable service continuity under diverse shocks – ranging from rapid deployability, to flood-resistant and low-water designs, to flexible collection schedules, and adaptive workforce and supply chain strategies. These features demonstrate the capacity of CBS to anticipate and prepare for disruptions, cope with shocks, and adapt to evolving conditions. Interviews with CBS providers revealed real-world examples of how these features have supported service continuity during shocks, particularly floods and heavy rainfall, and how providers are actively adapting services to strengthen resilience.

Adaptive management enhances resilience

CBS providers strengthen service continuity through technical, proactive, and system-flexibility adaptations. Strong relationships with communities further enhance resilience, enabling providers to anticipate challenges, coordinate effectively during shocks, and maintain safe sanitation access even under floods, protests, or water shortages.

Examples of CBS provider adaptations – flooding		
Technical	**Proactive**	**System flexibility**
Raised superstructures, improved drainage at treatment plants, concrete toilets, relocation of transfer sites	Maintain cover material stock, pre-distribute extra containers, train users on interim measures (e.g. sealing containers), advance collections	Switch vehicle type, use collection points for containers, handcarts, temporary storage at transfer sites, post-event cleaning and collection, support to employees

Comparative evidence shows CBS often fares better during shocks
The study analysed secondary data across Nairobi, Lima, and Cape Town that compared CBS and non-CBS users during climate- and event-related shocks and found that CBS users consistently reported fewer toilet problems during floods, heavy rains, and most other crises.



CBS is good for mitigation too
In addition to CBS's climate adaptation features, it is also effective for mitigation, making it a strong example of climate-resilient sanitation, which prioritises service continuity while seeking to cut emissions where possible. Most CBS providers not only actively manage their services but also convert waste into reuse products such as fertilisers, biogas, and soil conditioners – supporting the circular economy in ways valued by climate funds such as the Green Climate Fund.

Recommendations

- **Plan**: Integrate CBS into urban sanitation strategies to ensure resilient, inclusive services.
- **Finance**: Include CBS in efforts to mobilise climate finance, supporting operational and capital costs as shocks intensify.
- **Generate evidence**: Conduct systematic analyses on CBS and resilience to fill knowledge gaps and guide planning.
- **Prepare**: Standardise adaptation planning across providers to anticipate and respond to disruptions