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Community-based rainwater harvesting: a viable alternative to medically-induced commodification of water in the dry zone, Sri Lanka☆

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ABSTRACT

Chronic kidney disease of unknown etiology (CKDu) has become a growing public health concern in Sri Lanka and some parts of Mesoamerica over the past three decades. CKDu has disproportionately affected rural, poor agricultural communities in the dry zone. In the context of a lack of scientific consensus on the etiology, CKDu has become a contested disease where more than thirty hypotheses have been proposed to explain the causation of the disease. Among them, the polluted drinking water hypothesis has attracted by far the most attention, prompting widespread deployment of Reverse Osmosis (RO) filtration systems. While RO provision is framed as a preventive public health intervention, it has also contributed to the commodification of drinking water in rural communities.

This study examines the viability of community-based rainwater harvesting as an alternative drinking water source to RO-filtered water in a CKDu-affected village in the dry zone of Sri Lanka. Viability is assessed across three dimensions: (1) physicochemical and microbiological water quality, (2) household-level water sufficiency, and (3) social acceptability. Using a mixed-method, citizen science–based approach, authors combined laboratory water testing, community-led water quality monitoring, semi-structured interviews ($n = 15$), focus group discussions ($n = 2$), and ethnographic observation.

Laboratory analyses demonstrated that harvested rainwater met national potable water standards for physical and chemical parameters. Citizen science monitoring confirmed consistent water quality within permissible limits and phenomenological qualitative observations. These findings revealed high social acceptance of rainwater for drinking and cooking, reduced economic burden, and decreased gendered labour associated with accessing RO-filtered water. The paper argues that rainwater harvesting constitutes a technically safe, socially acceptable, and cost-effective alternative to RO-filtered water provision. Furthermore, the citizen science component facilitated cognitive justice by positioning community members as active producers of environmental health knowledge rather than passive recipients of technological solutions.

1. Introduction

Towards the end of the twentieth century, different forms of chronic kidney disease of unknown etiology (CKDu) were reported across lowland agricultural communities in tropical climates close to the equator, including Sri Lanka, India, Egypt, and several Mesoamerican countries, such as Nicaragua, El Salvador and Mexico ([9]; Almaguer, Herrera and Orantes, 2014; Kierans, 2019). In Sri Lanka, CKDu was first identified in the early 1990s, as a form of kidney failure not linked with known causes of chronic kidney disease, such as Type 2 diabetes mellitus, hypertension, or obesity [4,23], and disproportionately affects rural, poor, farming communities mainly in the north-central "dry zone" of the island (see Fig. 1). Since 1993, local hospitals have reported around 200,000 cases of CKDu, alongside 35,000 deaths [8,19]. While in Mesoamerican contexts, the cause of CKDu has been strongly associated with heat stress and dehydration [12,16], in Sri Lanka, the scientific, medical, and policy debate has almost entirely focused on water pollution [7]. In the context of increased association between polluted water and CKDu, the agrochemical water pollution hypothesis has emerged as one of the most popular explanations of CKDu causation [15].

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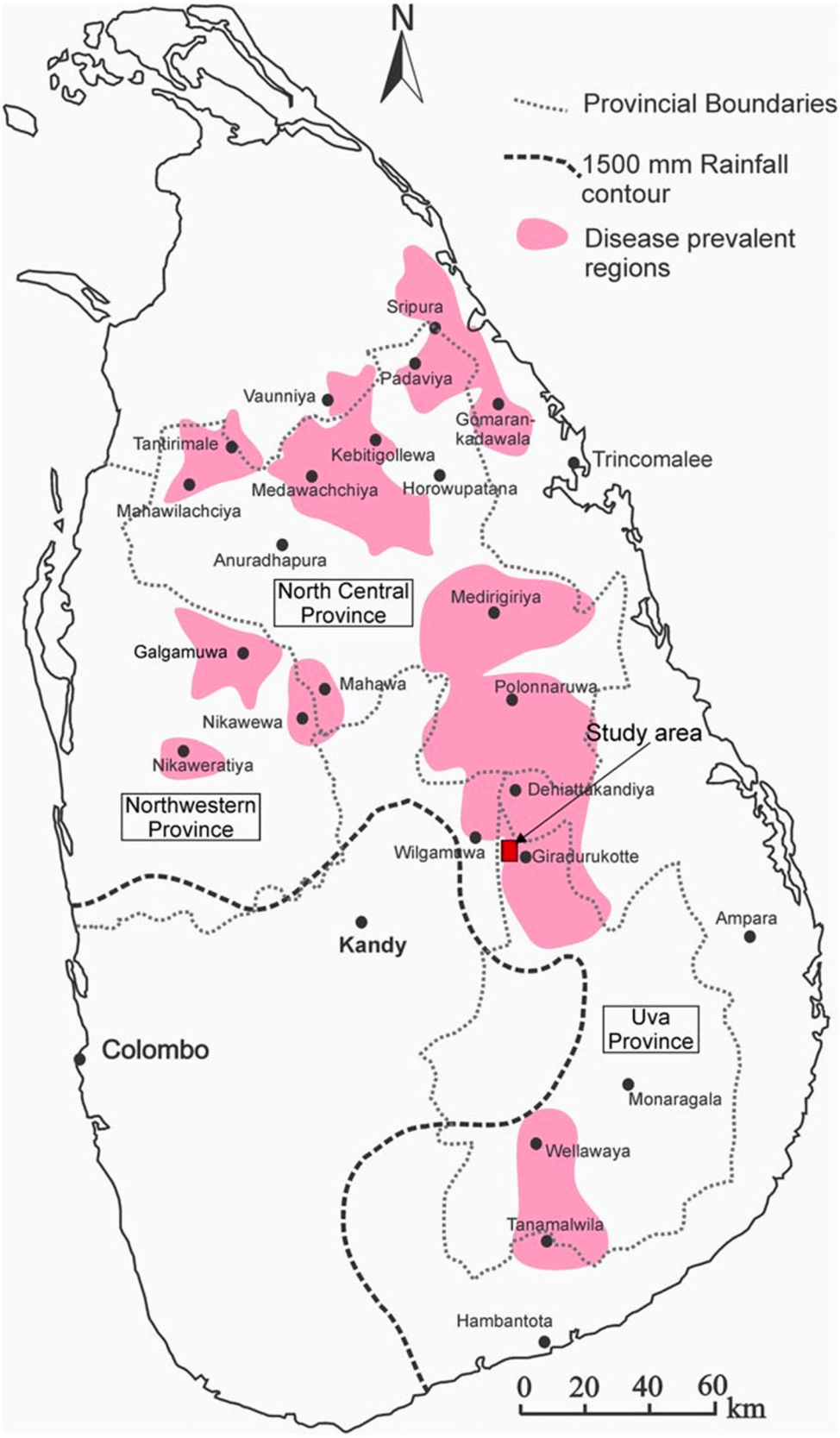


Fig. 1. CKDu prevalent regions of Sri Lanka and the study location (Source: [5]).

Biomedical studies suggesting a link between contaminated water and CKDu have influenced public perceptions of drinking water quality and consumption patterns. There is a broad consensus among Sri Lankan researchers that providing clean drinking water is the most effective strategy for CKDu prevention [22,32,33]. In line with this, recent government and philanthropic efforts have focused on expanding water-supply systems and establishing community-level, reverse-osmosis (RO) plants in affected areas.

This has generated parallel questions: how to distinguish safe and unsafe drinking water? What is the role of water purification technologies in CKDu prevention? What are the costs and benefits of various 'high' and 'low-tech' solutions for water purification? What are the long term economic and health implications of such solutions?

In this context, exploring alternative drinking water sources for dry zone communities is imperative for two main reasons: (1) to improve the well-being of CKDu-affected individuals, and (2) to provide a sustainable drinking water solution for the dry zone.

The primary objective of this research is to assess the viability of rainwater as an alternative to reverse osmosis (RO)-filtered water for drinking purposes in CKDu-affected rural farming communities in Sri Lanka's dry zone. In this study, viability is conceptualized as a multidimensional construct encompassing three interrelated dimensions: water quality, defined as compliance with national drinking water standards; water quantity, referring to the adequacy of household-level supply, particularly during extended dry periods; and social acceptance, including perceptions of taste, perceived health effects, labour implications, and trust in the water source.

1.1. Strengths and limitations of the study

The main strength of this research is the active involvement of villagers as research participants in testing their drinking water source and in making sense of water quality, its potential relationship with CKDu, and critically evaluating different drinking water sources (i.e. RO-filtered water and rainwater) in terms of their cost-effectiveness and environmental sustainability. Recognizing the villagers' capacity to engage in scientific inquiry as active contributors, this citizen science intervention sought to reduce the gap between researchers and community members as research participants. This approach would promote "cognitive justice," which is defined as the "equal treatment and representation of different ways of knowing the world" ([27]: 37) and the "right of different knowledges to coexist […]" [28]. In the context of Ginnoruwa, authors aimed to place villagers' experiential knowledge of drinking water and CKDu in dialogue with scientific knowledge produced by researchers, shifting community discussions from fear-based speculation to evidence-based dialogue.

An interdisciplinary, mixed-method approach is another strength of this study. Rather than relying solely on laboratory analyses to assess drinking water quality, authors sought to examine community members' perceptions and lived experiences of consuming different types of water alongside chemical and microbiological assessments. By integrating methodological approaches from water chemistry, citizen science, and medical anthropology, authors were able to develop a more nuanced understanding of drinking water quality and its implications for people's everyday lives.

A major limitation of this study is its limited generalizability. As a pilot project conducted within a single village community in the dry zone of Sri Lanka, the findings cannot be readily extended to broader geographical contexts without additional research. This limitation arises in part because the sustainability of rainwater harvesting practices is shaped by ecological as well as socio-cultural factors.

2. Methodology

This research study was conducted in Ginnoruwa from February to December 2023. Ginnoruwa receives rainfall during the northeast monsoon period, which occurs from November to January, with an average annual precipitation of 1000 mm. The area falls within the semi-arid climatic zone, with mean annual temperatures ranging between 29 °C and 33 °C [6]. The research employed a mixed-method research methodology, combining qualitative and quantitative research methods.

2.1. Recruitment of participants

The fieldwork was conducted in the local language (Sinhala). The study was publicly announced at the village funeral society meeting, where its aims and objectives, sample selection criteria, and methodology were explained in detail. Villagers were allowed to seek clarification, and any questions raised were addressed.

2.1.1. Inclusion criteria for participants

Community members aged 18 or older residing in the study village, consuming rainwater for drinking purposes, and willing to provide informed consent were invited to participate in the study. They were included women, who are primarily responsible for household water management, youth representatives, and community leaders.

2.1.2. Exclusion criteria for participants

Community members who were less than 18 years old or did not use rainwater and were unwilling to provide informed consent were not included in the study.

2.2. Data collection

2.2.1. Semi-structured interviews

In-depth semi-structured interviews were carried out with villagers (n = 15). The number of interviews conducted was determined according to the principle of data saturation, whereby data collection continued until no new themes, insights, or relevant information emerged from the participants. Each interview was approximately 60 min long and included questions about villagers' perceptions of drinking water scarcity and CKDu, consumption of RO-filtered water and rainwater, and the social acceptability of rainwater harvesting systems.

2.2.2. Focus group discussions (FGD)

Two FGDs were held with male farmers and female farmers, with eight participants in each group. Each FGD lasted approximately 60 min. The focus group aimed to identify group norms and explore participants' beliefs, thoughts, experiences, and perceptions regarding shifts in water use and local perceptions regarding rainwater, including coping mechanisms, and changes in water consumption patterns.

2.2.3. Citizen science project

A participatory citizen science approach was integrated into the study to actively involve community members in the monitoring and interpretation of rainwater quality. A group of 10 participants received basic hands-on training in water sampling techniques, the use of portable pH and EC/TDS meters (Hanna HI98129), and the interpretation of key scientific indicators of water quality in relation to national potable water standards (SLS 614:2013). Rainwater samples were tested monthly over a six-month period across all 17 rainwater harvesting units.

During the citizen science project, participants engaged in detailed discussions that connected laboratory and field measurements with their everyday experiences of water use. They compared readings of pH, turbidity, electrical conductivity, and other water quality indicators across different households and sampling rounds, noting seasonal variations and the effects of recent rainfall. Participants interpreted these results in relation to taste, odour, and visual clarity, reflecting on how they feel about rainwater compared to previously used groundwater. The specific locations in the village where semi-structured interviews, FGDs and the citizen science project were conducted are illustrated in

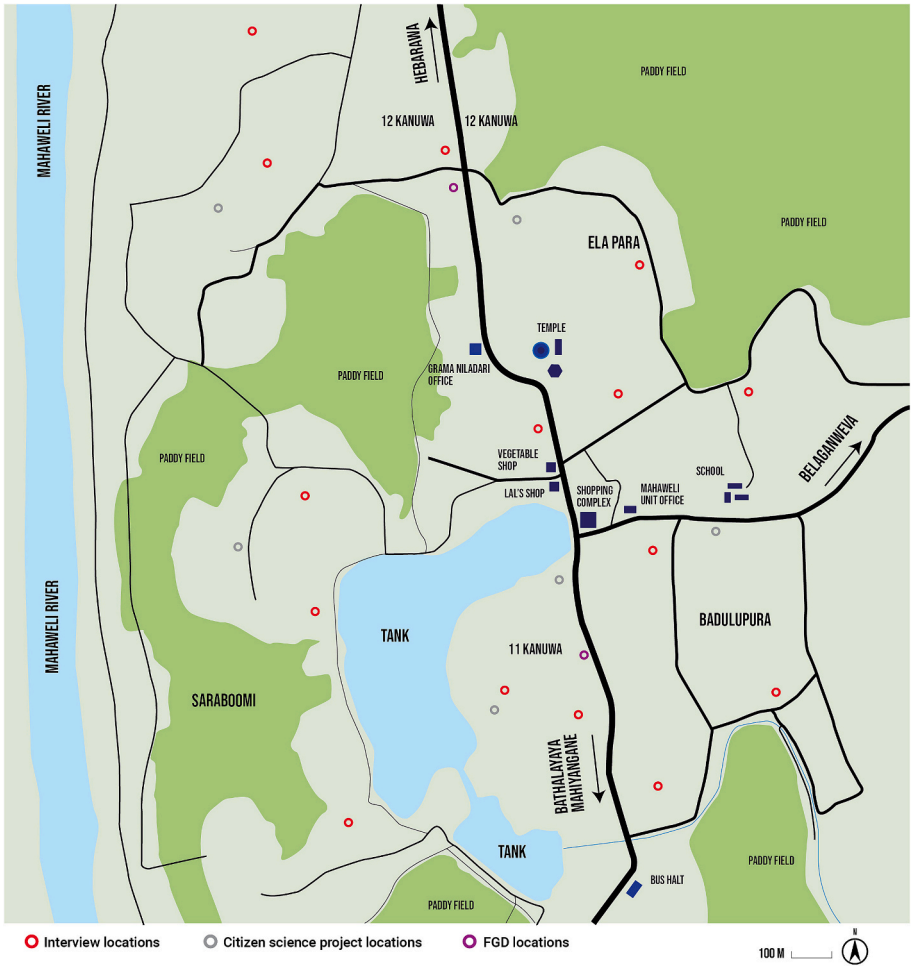


Fig. 2. Ginnoruwa village map with qualitative data collection locations.

Fig. 2.

2.2.4. Laboratory water testing

Laboratory water testing was conducted to assess physicochemical and microbiological parameters in accordance with the Sri Lanka Standard Specification for Potable Water (SLS 614:2013). Two of the seventeen rainwater tanks were randomly selected for laboratory testing of rainwater quality by an accredited laboratory in four rounds. Sampling occurred over two rainfall seasons (two rounds in each season) – always after the first three heavy rains, facilitating the first-flush system – to ensure the reliability of test results and account for temporal variations. To minimize variability due to tank quality, roof conditions, and the influence of tank handlers, the same tanks were used for rainwater sample collection across all sampling rounds. Fig. 3 shows a detailed overview of the research process.

2.3. Rainwater harvesting setup and mechanism

Each rainwater harvesting system consists of a 5000-L plastic tank installed on an 18-in. cement base, with the base diameter matching the tank's (see Fig. 4). A plastic tap is fixed 5 in. from the tank bottom, and a gutter system connects the roof to the tank. A home-made filter—comprising charcoal and stones—is placed at the tank inlet. Rainwater is collected from the roof via the gutter, filtering through this setup (see Fig. 4). The rainwater harvesting systems follow the first-flush principle ([1]: 13). This is facilitated by an extended vertical pipe fitted with a removable cap, which connects the gutter to the storage tank. During the first three heavy rains, the cap is removed, enabling the initial runoff – potentially containing accumulated debris, dust, and contaminants – to be diverted away from the tank. Once the roof and gutter surfaces have been flushed, the cap is replaced, allowing subsequent rainwater to be directed into and stored in the tank.

This paper draws on the first author's doctoral research [30] and a subsequent collaborative study conducted by both authors, titled "*Assessment of rainwater as an alternative drinking water source in the dry zone of Sri Lanka*". As part of these research initiatives, 17 rainwater harvesting units were installed with the support of a charitable organization.

3. Results

3.1. Laboratory water testing

Rainwater samples were collected in four rounds and tested for physical, chemical and microbiological parameters (see Table 1). Test results of Rounds 1 and 2 (first rainfall season) are presented in Table 2, while Table 3 presents the results of Rounds 3 and 4 (second rainfall season). These laboratory analyses demonstrated that harvested rainwater from the study site met national potable water standards for both physical and chemical parameters. Across all four sampling rounds, colour, turbidity, odour, and taste were within acceptable limits, pH ranged between 7.0 and 7.4, and electrical conductivity remained low. Key chemical contaminants, including fluoride, arsenic, cadmium, and silica, were not detected, while hardness and alkalinity levels were minimal compared to local groundwater sources, indicating that harvested rainwater consistently complied with national chemical safety

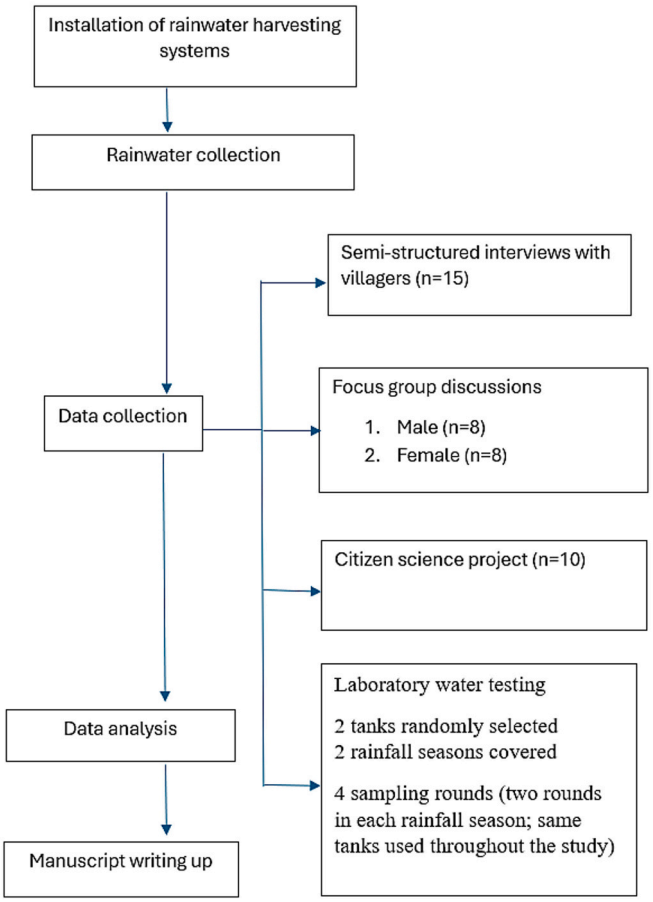


Fig. 3. Research flowchart.



Fig. 4. A rainwater harvesting setup in Ginnoruwa (Source: Upul Wickramasinghe).

standards.

Microbiological testing indicated that no *E. coli* or coliforms were detected in Rounds 2 and 4, while coliforms were detected in Round 3. No contamination was observed in Round 4, and microbial testing was not conducted in Round 1 due to procedural constraints (see Tables 2 and 3).

3.2. Results of the citizen science project, focus group discussions and semi-structured interviews

Phenomenological qualitative observations regarding the consumption of rainwater were obtained from the citizen science project, semi-structured interviews and focus group discussions. All participants reported that they did not experience any bad odour or taste in rainwater. They also noted a clear difference in taste of rainwater compared with groundwater, which they had previously used for drinking, because the latter was bitter due to excessive hardness. Participants did not observe an oily surface in tea and food when they prepared it with rainwater as was the case with groundwater. Moreover, there was no mineral layer deposited in the kettle when boiled rainwater, which happened with groundwater. There was a stark difference in water intake between people who consumed rainwater and those who consumed groundwater. According to a 55-year-old male focus group discussion participant, who also joined the citizen science project, this increase in water consumption was primarily attributable to the favorable taste and odour of the harvested rainwater – "When we were drinking groundwater, I couldn't drink much because it had a salty taste. Even after a meal, I would only have a few sips of water. But rainwater tastes much better, so we can drink more. Since installing the rainwater tank, I feel that we drink more water overall. During hot, dry days, I used to experience a burning sensation, but now that I can drink more water, that problem has disappeared."

It is also noteworthy that villagers reported no longer experiencing the burning gastric sensations or dysuria that had been common when consuming groundwater, particularly during the dry season. Moreover, most participants perceived an increase in urine output following their transition from groundwater to harvested rainwater.

4. Discussion

RO-filtered water has not proven to be a complete solution to drinking water challenges in Sri Lanka's dry zone. Its growing use has generated new forms of uncertainty, as concerns have emerged about potential health risks associated with demineralized water, including hypocalcemia, joint pain, and fatigue, particularly among children [24]. Amid these concerns, rainwater harvesting has gained attention as a safer alternative for CKDu-affected communities. Widely used for drinking [21] and non-drinking purposes in several countries [10,11,17], rainwater contains very low levels of fluoride, calcium, and magnesium and may help reduce the incidence and severity of CKDu [13]. More than 30,000 rainwater harvesting systems have been established in Sri Lanka by governmental and non-governmental organizations [3]. However, most policies and interventions, including the National Rainwater Policy and Strategy (2005), have promoted rainwater mainly for non-potable uses such as gardening, cleaning, and bathing. This study examines the viability of rainwater harvesting as an alternative to RO-filtered water through three dimensions: water quality, water quantity, and social acceptance.

Table 1
Water quality parameters, test methods and specifications.

Parameters	Test Method	Unit	LOQ	Requirements according to Specification for Potable Water SLS 614: 2013
Physical parameters				
Colour	APHA 23rd ed.: 2017: 2120 B	Hazen	–	max. 15
Odour	Sensory evaluation	–	–	Unobjectionable
Taste	Sensory evaluation	–	–	Unobjectionable
Turbidity	APHA 23rd ed.: 2017:2130 B	NTU	–	max. 2
Chemical parameters				
pH at 25 °C	APHA 23rd ed.: 2017:4500H + B	–	–	6.5 to 8.5
Electrical Conductivity at 25 °C	APHA 23rd ed.: 2017: 2510 B	µS/cm	–	
Fluoride (as F)	APHA 23rd ed.: 2017: 4500 – F—C	mg/L	0.1	max. 1.0
Nitrate (as NO^{3-})	APHA 23rd ed.: 2017: 4500 -NO3- B	mg/L	–	max. 50
Total Silica (as Si)	CPSD-AN-00742-ICP-MS	mg/L	10.0	
Total Alkalinity (as $CaCO_3$)	APHA 23rd ed.: 2017: 2320 B	mg/L	–	max. 200
Total Hardness (as $CaCO_3$)	APHA 23rd ed.: 2017: 2340-C	mg/L	–	max. 250
Arsenic (as As)	APHA 23rd ed.: 2017: 3125 B	mg/L	0.001	max. 0.01
Cadmium (as Cd)	(ICP-MS)	mg/L	0.0001	max. 0.003
Microbiological Parameters				
Escherichia coli	SLS 1461: Part 1/Section 3:2013	MPN/100 mL	–	ND
Total Coliform	SLS 1461: Part 1/Section 3:2013	MPN/100 mL	–	Treatment works and piped distribution systems: max. 3; Individual or small community supplies (wells, bore holes and springs): max. 10

4.1. Water quality

Criticisms of rainwater harvesting are often accompanied by claims that rainwater collected from rooftops is unsafe, arguing that roofs and gutters may be contaminated with animal droppings, other external impurities, and cyanobacteria (i.e., green algae) that may proliferate when water is stored for extended periods [14]. However, our analysis of harvested rainwater quality in Ginnoruwa indicates a different outcome.

The failure to meet microbiological standards in round 3 would be more likely due to contamination during the sampling rather than being contaminated during the water collection or storage. Since round 4 testing was conducted after round 3, any persistent microbiological contamination in the harvested rainwater would have been detected in round 4. However, no microbes were detected in round 4, which suggests that the microbial detection reported in round 3 likely occurred during sampling rather than reflecting contamination that occurred during rainwater harvesting or storage.

According to the citizen science project, interviews and focus group discussions, no evidence of algal growth was detected in the stored water. While algal growth can affect aesthetic characteristics such as colour and taste, microbial contamination risks are more commonly associated with faecal inputs from birds and other animals on roof catchments and gutters. For instance, according to a 45-year-old female citizen science participant, "we thought there would be *diya sewala* (green algae) inside the tank when we store it [rainwater] for several months, however, it was not the case." As citizen science project results show, everyone who consumed rainwater had a positive perception and a strong desire for rainwater.

4.2. Water quantity

Based on public health guidelines [18], an adult requires 1.5–2 L of drinking water daily. For a five-member household, this amounts to about 10 L for drinking and an additional 15 L for cooking, totalling approximately 25 L per day. Under typical dry-zone conditions, a standard 5000-L rainwater harvesting tank can meet this demand for around 200 days (about six months). According to a 36-year-old male interviewee, "we filled our tank fully during the last rainy season and we could manage our needs during the subsequent dry season…there is a total of five members in our family, and we used rainwater only for drinking and cooking."

Climate change has altered precipitation patterns across Sri Lanka over the past three decades, increasing both the frequency of extreme rainfall events and the occurrence of prolonged droughts [2]. Furthermore, the Northeast monsoon, which traditionally brings rainfall to

Table 2
Test results – Round 1 and 2.

Parameters	Round 1		Round 2	
Physical parameters	**Tank A**	**Tank B**	**Tank A**	**Tank B**
Colour	<10	<10	<10	<10
Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
Taste	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
Turbidity	0.2	0.2	0.2	0.2
Chemical parameters				
pH at 25 °C	7.2	7.1	7	7.1
Electrical Conductivity at 25 °C	31.5	40.7	33.6	43.8
Fluoride (as F)	ND	ND	ND	ND
Nitrate (as NO^{3-})	0.3	0.3	0.2	0.2
Total Silica (as Si)	ND	ND	ND	ND
Total Alkalinity (as $CaCO_3$)	14.4	18	10.8	14.4
Total Hardness (as $CaCO_3$)	12.2	16.3	16.3	16.3
Arsenic (as As)	ND	ND	ND	ND
Cadmium (as Cd)	ND	ND	ND	ND
Microbiological Parameters				
Escherichia coli	Test did not perform		ND	ND
Total Coliform	Test did not perform		ND	ND

Table 3
Test results – Round 3 and 4.

Parameters	Round 3		Round 4	
Physical parameters	**Tank A**	**Tank B**	**Tank A**	**Tank B**
Colour	<10	<10	<10	<10
Odour	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
Taste	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
Turbidity	0.2	0.2	0.3	0.4
Chemical parameters				
pH at 25 °C	7.1	7.4	7	7.1
Electrical Conductivity at 25 °C	33.2	46.1	52.8	53.1
Fluoride (as F)	ND	ND	ND	ND
Nitrate (as NO^{3-})	0.2	0.2	0.4	0.8
Total Silica (as Si)	ND	ND	ND	ND
Total Alkalinity (as $CaCO_3$)	14.4	18	14.4	18
Total Hardness (as $CaCO_3$)	24.5	20.4	12.2	14.3
Arsenic (as As)	ND	ND	ND	ND
Cadmium (as Cd)	ND	ND	ND	ND
Microbiological Parameters				
Escherichia coli	ND	80	ND	ND
Total Coliform	80	250	ND	ND

Ginnoruwa village and typically commences in December, has exhibited temporal shifts in recent years, with its onset occurring later than usual in some instances [20]. According to participants' testimonies, however, this did not cause an issue in Ginnoruwa because the total amount of rainfall they received was sufficient to fill tanks.

4.3. Social acceptance

The widespread use of RO-filtered water has created an additional financial burden for communities already facing economic hardship. In CKDu-prone dry-zone areas, a private market for filtered water has emerged, forcing residents to purchase drinking water due to the lack of alternatives. Although philanthropic initiatives have improved access to RO water, they have also contributed to the commodification of drinking water, which was previously a free and publicly accessible resource [24,25].

The cost-effectiveness of water technologies is another important consideration. RO systems require expensive maintenance, frequent filter replacement, and a continuous electricity supply. In contrast, rainwater harvesting systems are simple, user-friendly, and can be maintained at little or no cost without electricity. However, their higher initial installation cost may discourage low-income households unless financial assistance is available.

Accessing RO-filtered water also places a disproportionate labour burden on women, who are primarily responsible for household water collection in many developing countries[26], including Sri Lanka. Thus, women must walk several kilometers—only a few can afford to travel by vehicle—to the RO plant frequently, an arduous task in a hot climate, while home-delivery services are often more expensive [24,25,29,31]. Consequently, households face a trade-off between the financial and labour costs of obtaining filtered water and the health risks of consuming untreated water, reinforcing class and gender inequalities. By contrast, rainwater harvesting systems located at home significantly reduce women's time and labour burdens, as confirmed by participants in this study: “earlier, we used to walk several kilometers to the RO plant daily. It was an arduous task, also time-consuming. Now we can collect water just outside of the house, which has made our [women] life much better” (a 52-year-old female FGD participant).

Environmental concerns further challenge the sustainability of RO filtration. Producing one litre of RO water may require up to three liters of groundwater, with the remaining water discharged as concentrated wastewater [24]. Several FGD participants expressed concern about the large volumes of wastewater generated by nearby RO plants but reported no comparable environmental concerns regarding rainwater harvesting systems: “person who is looking after the RO-plant in the neighboring village is a close friend of mine. He said that they pumped around five thousand liters groundwater per day but only produced around 1000-1250 liters of filtered water. There is a huge pit next to the plant filled with wastewater, which has become a major concern” (a 55-year-old male community leader). Table 4 presents a comparative perspective of participants' perceptions on rainwater and RO-filtered water.

5. Conclusion

This study conceptualized the viability of rainwater as a multidimensional construct comprising water quality, water quantity, and social acceptance. Using laboratory testing, participatory monitoring through a citizen science project, and qualitative insights from interviews and focus groups, the research provides a comprehensive assessment of rainwater harvesting as a potential household drinking water source in water-stressed rural settings.

The findings highlight the strong potential of rainwater harvesting as a viable and socially acceptable response to drinking water insecurity in CKDu-affected communities in Sri Lanka's dry zone. When supported by adequate maintenance systems, technical guidance, and targeted financial assistance, rainwater harvesting can serve as a cost-effective and environmentally sustainable alternative to existing water supply options. In contrast, reliance on RO-filtered water often places a significant financial burden on rural households already facing economic vulnerability, potentially limiting equitable access to safe drinking water. Rainwater harvesting, therefore, offers a more accessible and

Table 4
Comparative perspectives of rainwater versus RO-filtered water.

	Rainwater	RO-filtered water
Water quality	No bad odour or taste;	No bad odour or taste, but fear of health risks due to total elimination of minerals
Access/Distance travel	Easily accessible at the doorstep	Need to travel frequently to the RO plant (or buy from mobile vendors for higher prices)
Money spend	Relatively higher initial cost, but almost zero cost afterwards	Initial cost is lower but need to pay whenever buying water. So, in the long term, the total cost would be higher.
Energy consumption	No need of electricity	Continuous supply of electricity is needed; requires changing filters frequently and maintenance
Environmental sustainability	Waste generation is zero	Around 2 l of toxic effluent is produced for 1 l filtered water.

locally appropriate option that can enhance household water security.

The study also demonstrates the epistemic value of citizen science in public health research. Involving community members in the research process recognizes diverse knowledge systems, promotes cognitive justice, and ensures that local experiences inform both the understanding of health risks and the development of context-sensitive interventions and policies.

CRediT authorship contribution statement

Upul Wickramasinghe: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Sithumini Agampodi:** Writing – review & editing, Writing – original draft, Validation, Resources, Project administration, Methodology, Formal analysis, Data curation, Conceptualization.

Ethical considerations

The research that this article is based on received ethics approval from the Research Ethics Committee, Department of Anthropology, Durham University, and from the Ethics Review Committee for Social Sciences and Humanities, Faculty of Arts, University of Colombo (ERCSSH/18/13).

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

Data will be made available on request.

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