

TRANSFORMING WASTE INTO HOPE: A COMMUNITY-DRIVEN SOLUTION IN THE KRUGER TO CANYONS BIOSPHERE RESERVE

SUBMITTING UNIVERSITY: University of the Western Cape

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SUMMARY OF THE IMPACT:

This university-community partnership has transformed waste management practices across three rural villages in the Kruger to Canyons UNESCO Biosphere Reserve, directly benefiting over 1,500 households while protecting one of South Africa's most important conservation landscapes. Building on foundational research into rural waste characterization (2022) and disposable diaper usage patterns (2023), the University of the Western Cape (UWC) and Kruger to Canyons Biosphere Reserve (K2C) pioneered a collaborative governance approach that empowers communities to co-create solutions to environmental challenges. Working with Enable, Phiring, and Malaeneng villages, the partnership facilitated democratic community processes that resulted in locally-owned interventions including incineration systems, reusable cloth diaper programs, and community-led collection networks.

Key beneficiaries and impacts include:

- **Rural communities:** Over 40 families now use eco-savings groups to access reusable diapers, significantly reducing household expenses while improving waste management practices
- **Environmental protection:** Dramatic reduction in the estimated 209,000 disposable diapers previously entering rivers and sensitive ecosystems daily across the region
- **Community governance** Democratically elected village committees now manage complex multi-stakeholder environmental programs with women and youth taking leadership roles
- **Policy influence:** Research findings directly informed South Africa's national disposable diaper strategy through the Department of Forestry, Fisheries and Environment.
https://www.dffe.gov.za/sites/default/files/legislations/nemwa_draftstrategy_absorbenthygienicproducts_g52388gon6049.pdf.
- **Academic innovation:** The First-ever Life Cycle Assessment on the effect of disposal practices of rural unserved communities, contributing new knowledge to global waste management literature
- **Scalable model:** The collaborative governance framework is being replicated across the broader biosphere region and adapted for other waste streams

The partnership demonstrates that when universities and communities work as **equal** partners, respecting both academic rigor and indigenous knowledge systems, transformative solutions emerge that address environmental challenges while strengthening social cohesion and economic opportunities. This model has attracted additional national and international funding, established an influential One Health Forum,(<https://wasteroadmap.co.za/wp-content/uploads/2024/01/054->

[UWC Final-Strategy One-Health-AHP-Waste-Forum 2023 2026.pdf](#)) and produced award-winning documentation that is informing policy discussions beyond South Africa's borders [here](#).



Figure 1: Kruger to Canyons area

UNDERPINNING ACADEMIC WORK

During 2019- 2022 Prof Schenck, with a background in Social Work, was funded by the DSTI/CSIR Waste Roadmap to conduct the “Clean Cities/Towns Project” to determine reasons for littering and illegal dumping in urban and rural areas (technical report [here](#))

It was during this research that the UWC team became aware of the difficulty unserved communities encounter to manage their waste in general, especially disposable diapers. K2C, the NPC responsible for the UNESCO Biosphere, was approached to collaborate understanding the usage and disposable practices of disposable diapers in unserved areas (Technical report [here](#) and article [here](#)).

The video “Our Waste”, which was awarded the 2nd prize at the International Solid Waste Association’s (ISWA) conference in Cape Town in 2024, provides an overview of the waste problem. View [here](#)

The data of the studies was used to complete a Life Cycle Assessment (LCA) of disposable diapers in a rural context (see Chitaka et al 2025 [here](#)). This is the first article authored on the effect of **disposal** practices of disposable diapers in a rural context.

Further funding was then granted by DSTI for a follow up project to co-develop a Collaborative Governance Framework with the three selected communities. Mrs Nell, PhD student at Stellenbosch University’s School of Public Leadership, with Ms Mafogo, Ms Rasakanye and Mr Khoza facilitated workshops to identify the chosen governance structures and management of disposable diapers. The process was based on work by Ansell et al. (2022), Ostrom (1990), and Hara et al. (2009). The report containing the research process is still under embargo, awaiting completion of Mrs Nell’s PhD thesis. The video “Our Governance” ([here](#)) is testimony of this process.

NARRATIVE DESCRIPTION OF THE IMPACT:

In the landscapes of the Kruger to Canyons Biosphere Reserve (K2C), a UNESCO-designated area spanning two of South Africa's premier tourism destinations, an invisible crisis was unfolding. Rural communities within this biodiversity hotspot were grappling with the problem of managing the disposal of an estimated 209,000 disposable diapers generated **daily** across two municipalities, with 90% ending up in rivers, rangelands, and open spaces, due to the absence of formal waste management services.



Figures 2: Dumped diapers in the riverbed.

Figure 3: Mapped dumped diaper on a of the village

As stewards of this globally significant ecosystem that supports rare and endemic species, K2C recognized that environmental conservation and community wellbeing are inseparable. The indiscriminate disposal of disposable diapers wasn't just an environmental threat but a manifestation of deeper systemic inequalities affecting the communities whose ancestral knowledge and daily practices are essential to K2C's conservation mission.

When the UWC research team approached K2C to collaborate, K2C saw an opportunity to demonstrate that meaningful conservation happens when communities lead. K2C's 20-year relationship with rural villages had taught them that sustainable solutions emerge from the ground up, not from external impositions.

The partnership with UWC's research team, aligned perfectly with K2C's participatory approach to biosphere management. K2C brought deep community relationships, local knowledge systems, and practical implementation capacity, while UWC contributed research methodology, academic frameworks, and policy connections.

Working in Enable, Phiring, and Malaeneng villages, we facilitated a collaborative governance process that respected traditional authority structures while empowering communities to identify problems and co-create solutions.

Through democratically elected committees representing diverse voices such as women, youth, traditional leaders and health workers, communities chose their own paths. Enable village opted to pilot all three proposed interventions: an incineration system, reusable cloth diapers, and improved collection infrastructure. Phiring and Malaeneng focused on reusable diaper initiatives integrated with savings groups.



Figure 4: The co-creation meeting in Phiring

What emerged exceeded our expectations. Communities didn't just adopt solutions, they innovated:

- **Resource Integration:** Enable's committee connected diaper incineration to K2C's alien invasive plant removal projects, using cleared biomass as fuel while addressing two conservation challenges simultaneously.
- **Economic Innovation:** Committees explored turning incinerator¹ ash into resources for local brickmakers, creating potential circular economy opportunities.
- **Social Innovation:** Eco-savings (similar to 'stokvel') and credit groups emerged organically, with over 40 parents across three villages using collective financial mechanisms to access reusable diapers and support waste management logistics.



Figure 5: Reusable diapers.

- **Collaborative Governance Innovation:** Village-level steering committees became models of inclusive leadership, with women and youth taking prominent roles in environmental decision-making.

¹ The incinerator is currently with UJ PEETS to ensure emission compliance. Funded by a UWC Technology Transfer grant from the DVC R and I



Figure 6: Diaper collection systems in action

The results validated our community-centred approach:

- **Environmental:** Reduction in diaper waste entering sensitive ecosystems and detrimental impact on livestock,
- **Social:** Enhanced community cohesion and leadership capacity, with democratically elected committees managing complex multi-stakeholder processes. See video of self-organised community cleanup. View [here](#)
- **Economic:** Families saved substantial amounts on disposable diaper purchases while exploring local enterprise opportunities
- **Health:** Improved waste management practices reducing disease transmission risks
- **Cultural:** Solutions integrated traditional knowledge with modern approaches, respecting local beliefs about waste and health

The collaborative governance framework is now replicated across our broader landscape. Local government partners, including the Limpopo Department of Economic Development, Environment and Tourism, are advocating for national support.

This project demonstrates that biosphere reserves can be laboratories for addressing global challenges at local scales. Climate change, waste management, and social inequality are interconnected crises requiring integrated responses. By proving that community-led governance can tackle complex environmental problems while strengthening social cohesion, we're contributing to global conversations about just transitions and inclusive conservation.

EVIDENCE AND SOURCES TO CORROBORATE THE IMPACT:

Articles

Chitaka, T. Y., Nell, C., & Schenck, C. (2025). A critical view of applying life cycle assessment on disposable diapers in a rural context. *South African Journal of Science*, 121(3/4).

Nell, CM., Schenck, C., Joubert, J., Chitaka, T., De Wit, MP. (2024). Disposable diaper usage, disposable practices and quantity estimation in rural areas. *Environmental Challenges*.(16)101001.

Technical reports

Schenck C J., Nell, C., Chitaka, T. (2023). Exploring disposable diaper usage and disposable practices in rural areas.

Some of conference presentations

1. Nell, C. M. (2024). Collaborative governance of disposable diaper waste in rural areas *International Solid Waste Association* September 2024. https://wasteroadmap.co.za/wp-content/uploads/2025/04/59-UWC_Final_Conference_NELL-SU-diapers-ISWA-2024.pdf
2. Schenck, C., Nell, C. M (2025) Mountains and mountains of disposable diapers in rural south Africa https://wasteroadmap.co.za/wp-content/uploads/2025/04/59-UWC_Final_Presentation_Schenck-Nell.pdf
3. Schenck, C., Nell C. (2024) Managing disposable diapers in the K2C Biosphere. *Science for Society Conference*. Wits Rural Hub Acornhoek. https://wasteroadmap.co.za/wp-content/uploads/2025/04/59-UWC_Final-presentation_Wits-rural-hub-Aug-2024.pdf

Videos

UWC and K2C produced two short videos:

<https://kruger2canyons.org/links-2/>

Three videos called “our Waste” Full video and trailer and “Our Governance”

“Our Waste” won 2nd place at ISWA Video Awards 2024),

<https://www.facebook.com/ISWA.org/photos/announcing-the-winners-of-the-2024-iswa-video-awards-invisible-waste-warriors-tr/494552426582149/>

Media

[https://www.linkedin.com/posts/kruger-to-canyons-biosphere-region_partnerseries-k2cbiosphere-partnerseries-activity-7331552003409575937-](https://www.linkedin.com/posts/kruger-to-canyons-biosphere-region_partnerseries-k2cbiosphere-partnerseries-activity-7331552003409575937-1TPk?utm_source=share&utm_medium=member_desktop&rcm=ACoAAAtgnC8BSKXH1VhSoTv454Zo)

[1TPk?utm_source=share&utm_medium=member_desktop&rcm=ACoAAAtgnC8BSKXH1VhSoTv454Zo](https://www.linkedin.com/posts/kruger-to-canyons-biosphere-region_partnerseries-k2cbiosphere-partnerseries-activity-7331552003409575937-1TPk?utm_source=share&utm_medium=member_desktop&rcm=ACoAAAtgnC8BSKXH1VhSoTv454Zo)
kA_T9jLDr38

<https://www.facebook.com/watch/?v=1071749101839354&rdid=Kpeb2xV4yFsrChog>

https://kruger2canyon.co.za/when-science-meets-society-finding-common-ground-for-change/?fbclid=IwY2xjawMmz7VleHRuA2FlbQlXMAbicmlkETFTTjVxR1pDVzZZRGRaWnVGAR6frPbZsPEsj_rC7JFtbj0QEwCZmqhuZ4-IXFolvcNVMxTeT1dxcSgo3vg0Eg_aem_QoPNLYJf7_wTLDEZ5_eP5g

Signed off on behalf of the University by (Name, position and email address):

Date: 26 September 2025



DVC: Academic
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