



Mainstreaming ecosystem-based adaptation into climate resilience strategies for informal settlements in Windhoek, Namibia



Urgent actions for tackling the
development and climate emergency

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A drought-hit Namibia with growing informality

“Areas in the south-western region (of Africa), especially in South Africa and parts of Namibia and Botswana, are expected to experience the largest increases in temperature (with climate change). The western part of southern Africa is projected to become drier, with increasing drought frequency and number of heatwaves towards the end of the 21st century.” (Intergovernmental Panel on Climate Change, 2018)

In Windhoek, the capital of Namibia, 32% of the urban population currently live in informal settlements (i.e. housing built outside formally recognized systems), frequently characterized by:

- (i) Insecure land rights and tenure for residents;
- (ii) Habitations in marginal and hazardous areas; and
- (iii) Lack of basic public services like energy and sanitation

While Namibia is a sparsely populated country, population growth in these poor urban areas is unprecedentedly high – with a growth rate between 9-11% every year, compared to around 4% in formal areas¹. Despite social, economic and health benefits, rural-urban migration can increase residents' vulnerability to the predicted impacts of climate change such as unpredictable rainfall patterns (resulting in both drought and flood events, including increased flash floods) and higher temperatures². An estimated 500,000 people are at risk, and 60,000 animals have died in the last six months³. Consequently, in 2018, the state of informal settlements in Namibia was considered a humanitarian crisis, and in 2019, following six years of drought, a state of emergency was declared.

¹ Weber, B. and Mendelsohn, J. (2017) Informal settlements in Namibia: their nature and growth.

² Hoegh-Guldberg et al, 2018: Impacts of 1.5°C Global Warming on Natural and Human Systems. In: Global Warming of 1.5°C; - Shikangalah, R. N. and Mapani, B. (2019) 'Precipitation variations and shifts over time: Implication on Windhoek city water supply'. Physics and Chemistry of the Earth, Elsevier, (August 2018), pp. 0-1. ; - New, M. and Bosworth, B. (2018) OPINION: What global warming of 1.5 °C and higher means for Botswana and Namibia, Climate & Development Knowledge Network 3 BBC (2019) More than 500,000 at risk in drought-hit Namibia <https://www.bbc.com/news/48185946> (7th May)

Planning for climate change in Windhoek

The municipality authority - City of Windhoek (CoW) - is now in the process of formulating Namibia's first city-specific Integrated Climate Change Strategy and Action Plan (ICCSAP), for seven years between 2019-2026. This policy is currently in its draft form, covering **adaptation measures**: (1) water security and efficiency; (2) biodiversity and ecosystem goods and services; (3) human settlements; (4) healthy communities; and (5) disaster preparedness; and **mitigation measures**: (1) sustainable energy and low carbon development; (2) waste minimization and management; (3) sustainable transportation; and crosscutting public awareness and capacity building.

To ensure ICCSAP is democratically accountable and serves all community members, it is important that strategies for climate adaptation in marginalized and under-serviced communities are included in this plan, as well as in other plans such as the in-situ upgrading policy of the Human Settlements Division.

Role of green infrastructure and ecosystem services

Urban Green Infrastructure (UGI)⁴ refers to interconnected multi-functional green spaces that contribute to ecosystem functioning and human wellbeing. These spaces provide a range of different **ecosystem services**⁵, which are frequently classified as:

- (1) **Supporting services** (e.g. nutrient cycling, biodiversity maintenance);
- (2) **Provisioning services** (e.g. food, fiber, timber);
- (3) **Regulating services** (e.g. climate regulation or carbon

⁴ Gómez-Baggethun, E. and Barton, D. N. (2013) 'Classifying and valuing ecosystem services for urban planning', *Ecological Economics*. Elsevier B.V., 86, pp. 235–245.
Lindley, S. et al. (2018) 'Rethinking urban green infrastructure and ecosystem services from the perspective of sub-Saharan African cities', *Landscape and Urban Planning*. Elsevier, 180(August), pp. 328–338.

⁵ TEEB (The Economics of Ecosystems and Biodiversity) (2011). TEEB manual for cities: Ecosystem services in urban management.

sequestration); and (4) **Cultural services** such as (e.g. recreation, spiritual and aesthetic appreciation)

Ecosystem-based Adaptation (EbA) is the use of UGI and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change. In other parts of Southern Africa, decision-makers and communities have mainstreamed ecosystem-based adaptation into citywide climate risk reduction strategies. For example, in South Africa, the extended public works programme Working for Water aims to provide income generating opportunities by restoring riparian buffer zones to clean water, reduce erosion, reduce downstream flooding, and beautify green spaces in informal settlements.



(Left) Not all trees have been cut down in informal settlements of Windhoek. Some are valued for shade, as meeting places, and are protected by the residents. *Prosopis* trees, which are classified as invasive in certain policies, are common here. Suitability of these trees should be explored further.

(Right) A woman cuts grass from the riverbeds, to sell as fodder to farms on the periphery



Bold policy and action to shape change

“Nature can be conserved, restored and used sustainably while simultaneously meeting other global societal goals through urgent and concerted efforts fostering transformative change.”

Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2019)

Recent research involving key informant interviews, workshops, and household and field surveys, has found that organizations, private businesses and individuals working on diverse initiatives for informal settlement development – *inter alia* the provision of land tenure; water, energy and sanitation services; solid waste management, and health and wellbeing - should recognize (along with residents themselves), the possible synergies and trade-offs that may exist between their activities and UGI in Windhoek’s informal settlements. Doing so would help to increase the climate resilience of these marginalized communities.

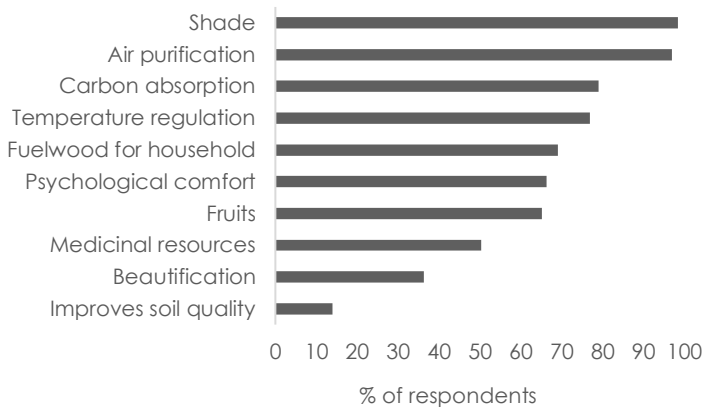
Research can help us uncover benefits and services from Urban Green Infrastructure (UGI) for Windhoek’s informal settlements, which may previously have gone unnoticed.

In the context of Windhoek, UGI in and around informal settlements mainly refers to the ephemeral river system (including riverbeds and vegetation on riverbanks), shrub land on hill slopes, trees in the settlements’ surroundings, the Goreangab dam and associated vegetation.

According to a recent household survey of 332 participants (carried out in Windhoek’s informal settlements by the Urban Ecolution project⁶ in 2019)⁷, informal settlers receive key ecosystem services from the UGI around them:

⁶ <http://www.acdi.uct.ac.za/green-urban-infrastructure-peri-urban-areas-sub-saharan-africa>

⁷ Thorn, J. P. R. and Wijesinghe, A. (In prep.) Ecosystem services derived from Urban Green Infrastructure in peri-urban landscapes: A comparison of two African cities.



(Above) Top 10 ecosystem services identified by informal settlement respondents



Examples of ecosystem services in and around informal settlements Tomatoes and other vegetables being cultivated by an informal settlement resident **(Above-L)**; riverbed with vegetation that can absorb nutrient and form a barrier against stormwater **(Above-R)**; Penduka, a tourist destination, recreation location, and livelihood development center near Goreangab dam **(L)**

Recommended actions towards change in Windhoek

In developing bold policy, and based on ongoing research, we recommend that the following policy domains and aspects of Windhoek's urban social-ecological system should be considered:

Water: Various stakeholders, from NGO initiatives like Farm Okukuna to the City of Windhoek's (CoW) Parks Division, already use innovative, dryland-adapted, water-sparing green infrastructure systems, which can be adapted for the informal settlements. Growing non-invasive dryland-adapted tree species could provide shade and cooling in a scenario of increasing temperatures, as demonstrated by previous UNFAO projects in other SSA dryland systems⁸. For instance, a localized semi-purification facility for water from the Goreangab dam could be integrated into the upgrading programme of the CoW's Human Settlements Division, with water subsequently channeled through pipes for a street trees programme in the informal settlements.

Food: Food insecurity and a lack of nutritional diversity in informal settlements could be addressed by promoting urban agriculture, which also provides an opportunity for livelihood diversification. Developing urban agriculture systems should consider: water sparing cultivation systems; changing attitudes towards cultivation through awareness; (re)conceptualizing security for harvest; provision of skills training, inputs and start-up capital; all which could aid scaling up of current efforts for sustainable dryland urban farming.

Energy: Forty percent of energy in informal settlements still comes from firewood for household cooking, while bushland surrounding Windhoek's periphery in the last ten years has sharply declined by 284.41 ha in just the last 10 years, and informal settlements have grown 267%. Systematic investigation of

⁸ UNFAO (2016) Trees, forests and land use in drylands: The first global assessment

⁹ Thorn, J. P. R. and Wijesinghe, A. (In Prep) Ecosystem services derived from Urban Green Infrastructure in peri-urban landscapes: A comparison of two African cities.

firewood supply chains is needed in and outside poor urban centres, exploring the mix of renewable energy sources that would be socially and economically feasible in informal settlements to replace firewood. This would both reduce environmental degradation and enhance human health. Servicing and upgrading through renewable energy alternatives are needed, as are localized awareness raising and disincentives for firewood collection and “debushing”.

Health: City, federations and NGOs are working together to provide sanitation facilities to the settlements, while facing the crisis of the Hepatitis E outbreak. Riverbeds and hill slopes are still used by 73.11% of Windhoek residents for open defecation». If strategies to resolve sanitation issues are integrated with awareness raising efforts highlighting the benefits of having clean, restored riverbeds (such as recreational, psychological, and disaster risk reduction benefits), this may encourage a sea change in residents' use of these green and blue spaces.

Disaster Risk Reduction: Disaster planning should further mainstream green infrastructure (e.g., restoration of riparian vegetation along the riverbeds, swales for filtration) and begin to consider increased temperature, in addition to water scarcity and flash flooding, as a chronic environmental risk for informal settlements. Upgrading plans should enforce flood lines and buffer zones, and the restoration of green riparian vegetation in these zones must be explored.

Governance and awareness: The municipal divisions responsible for managing open spaces (e.g., parks, health and environment) in formal areas must be given a mandate to carry out similar management in informal settlements. At the same time, community-led initiatives must be encouraged through increased awareness of nature's contribution to livelihoods and well-being, and integration of environmental education into local curricula. Piloting is also important, and learning by doing is encouraged to find optimal solutions for Windhoek.

Job creation: There is the potential to provide alternative sources of employment. For example, new, low-skilled labour and employment opportunities lie in the management of riverbeds, slopes, solid and human waste management within informal settlements. Collecting firewood, grasses and tree pods in green spaces provides present livelihoods for informal settlers. However,

this may lead to long-term degradation of the ecosystems and green spaces of the city. Greater support for low-skilled environmentally enhancing livelihood opportunities are needed to curb associated degradation.

Community participation: Presently, Environment Impact Assessments processes are frequently not fully comprehensive, and often lack the necessary input of local community participation. There remains limited CoW Division and NGO input from an explicitly environmental standpoint in informal settlements, leaving land and housing divisions and relevant NGOs attempting to address this gap. New urban policy development and conversations around the flexible land tenure system offer important opportunities to counter existing power and information asymmetries, through new consultative platforms to better consider society, natural environment and ecosystem services in upgrading schemes.

Safeguarding Windhoek's future

In the future, there are many opportunities to leverage urban green infrastructure for climate change adaptation as well as for overall socio-economic resilience and development of the informal settlements. There are some context-specific constraints to overcome as well, but transformative, intentional and innovative leadership, coupled with an involved, informed community, will pave the way for a resilient and positive future trajectory for informal settlements in Windhoek.

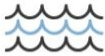
Co-benefits of Ecosystem-based Adaptation (EbA) for Windhoek

Co-benefits are:

The positive effects that a policy or measure aimed at one objective might have on other objectives. (IPCC, 2014)



Creation of sustainable livelihoods



Disaster prevention and mitigation

Water filtration and protection of soil



Food security



Space for recreation



Biodiversity conservation

Stabilization of local climate



Carbon dioxide storage



Air purification



Vegetation in riverbeds (riparian vegetation)



Trees in the settlements



Slope vegetation



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For more information on related projects
<http://www.acdi.uct.ac.za/peri-urban-resilient-ecosystems-pure>
<http://www.acdi.uct.ac.za/green-urban-infrastructure-peri-urban-areas-sub-saharan-africa>

Photos by Valentina Giombini and Amayaa Wijesinghe



