

Youth Review: Water and Energy in Botswana

Introduction

Southern Africa's water and energy structures are filled with variant contexts and ecosystems. Uneven water assets, aridity and climate change are common variants among countries. These impact the quality and accessibility of water (SADC, 2012). Water and energy are interdependent (UNDESA, 2015). Water is for energy provision; from the extraction of crude materials, cooling mechanisms, cleaning forms, harvesting biofuels to controlling turbines. Botswana is a semi-arid, landlocked country with low rainfalls bringing about scant water assets. Drought, pressure on water supply, rapid urbanisation, fracking, and climate change have characterised public discourse on water and energy. State driven water related works include increasing boreholes, development of the North South Carrier Phase 1, dam expansion and desalination of underground water where there is high demand (Centre for Applied Research and Aurecon Botswana, 2013). Energy is critical for water accessibility and utility, from pumping, transportation, treatment to desalination.

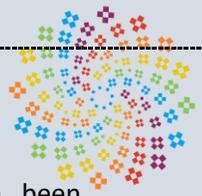
Understanding Access

Gaps remain in universal access to water and energy, differentiated by kind of dwelling, location and economic standing of citizens and residents (Kgosiemang, 2020). A human rights approach to establishing access considers property law and reality (Bourquain, 2008). It acknowledges a possible discord between law and daily experiences. Access is considered as a source of safe drinking water being within one kilometre of one's residence. In 2015, 663 million people did not have improved access to drinking water. These sources were deemed protected from contamination. These include piped water, boreholes, protected wells, and springs (Geere, 2016). A person that owns land surrounding a tidal or static source of water is

considered to have Littoral rights. Riparian rights are applied to ownership of land surrounding a flowing source of water. Both do not give ownership to the water, but rather access for its use (USLegal, 1997). Just as with the water sector, civil society plays a critical role for the energy sector (Smith, 2011). Energy is defined as "a household having reliable and affordable access to both clean cooking facilities and to electricity, which is enough to supply a basic bundle of energy services initially, and then an increasing level of electricity over time to reach the regional average" (IEA, 2019).

Challenges and shortcomings on Water (CDM, 2020)

1. **Reliable Supply:** water interruptions ranging from natural disasters, pipeline damage and repairs can interrupt the water service delivery value chain. How enabling or effective this depends on a sound legislative and policy framework.
2. **Sustainability of Watersheds:** safeguarding watersheds is a global concern. These are not only a source of drinking water, but manufacturing and agriculture sectors. A factor these concerns is land ownership, use and management. Also, urbanisation frameworks under city and town management mechanisms.
3. **Efficiency:** eliminating waste and repurposing water for secondary use should be prioritised. Quality assurance and variant supply approaches need to be reviewed within the context of advanced technology, artificial intelligence, data generation and infrastructural design. This should include procurement, costing in human error and accommodative revenue generation.
4. **User affordability across the value chain:** This includes citizens and the state when



importing water. This widens the scope of availability to payment terms, economic influences such as inflation and productivity and foreign exchange. Options available should enable flexibility in securing and stockpiling water. Guidelines and operating frameworks should be transparent and consistently applied. These should have feedback loops designed for monitoring and evaluation.

5. Social determinants: perceptions are critical of user experience and access. The needs of business, public consumer and government sectors are variant and need to be considered equitably.
6. Climate change is impacting the dissipation of water, even exceeding utility levels (Lange, et al., 2006)

Challenges and shortcomings on Energy

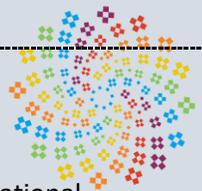
1. As the climate crisis continues, petroleum will become scarce and expensive in future whilst nuclear installations will have reached the end of their useful life (López, 2008). The climate is further impacted by government allowing gas fracking in country.
2. The World Energy Council highlights that the energy sector is in transformation. A transformation with deep implications for political, economic and social shifts (Gray, 2017).
3. The mismatch of high demand and low supply strains production and delivery for businesses and consumers reliant on the national grid.
4. Fuel shortages have occurred in country, with a high reliance on multinational corporations for meeting demand
5. There is high reliance on the national grid and electricity imports, whilst the country has high coal reserves.

Both water and energy sectors have been plagued by corruption scandals, delays in infrastructural development and increases in pricing. This reflects significant gaps in safeguarding access to stable and efficient water and energy sources. Civil society can play a meaningful role in enabling citizen participation, accountability and engagement to ensure equitable and impactful service delivery.

Avenues for Engagement

The United Nations (UN)'s Nexus Agreement is a set of guiding principles that reflect the interdependence of food, water and energy (UN Water, 2014). This provides a framework for advocacy work and engagement with government, development partners and civil society. The African Water Vision 2025 calls for an 'equitable and sustainable use and management of water resources for poverty alleviation, socio economic development, regional cooperation, and the environment'. It includes mainstreaming gender in water resources management and youth inclusion. This is critical for ensuring universal access to water and sanitation (Bouman-Dentener & Devos, 2015). The years 2018-2028 was declared the decade of action on Water for Sustainable Development. This creates a foundation for collaborative work. This, along with commemorations for World Water Day, allow for engaging in various issues and tracking progress, including those of sanitation, health, development and ecological management (United Nations, 2013). By 2030 United Nations Industrial Development Organization (UNIDO) estimates that world will need 40% more water and 50% more energy. Population growth, changing lifestyles and climate change are attributed as factors to these estimates (UNIDO, 2015) (Houngbo, 2019).

The decade of Sustainable Energy for All, ending in 2024, flags the importance of energy in the sustainable development goal (SDG)s. It is critical



to review progress and accelerate any remedial work needed to safeguard universal access of energy. The decade long framework identifies universal access is a critical priority. It aims to help 1.3 billion who currently do not have electricity and 2.6 billion who rely on traditional biomass for cooking and heating (Shepard, 2012). Another notable framework is the Sustainable Energy for All initiative is a multi-stakeholder partnership between governments, the private sector, and civil society. Launched by the UN Secretary-General in 2011 (ECREEE, 2013), it has three interlinked objectives to be achieved by 2030:

- Ensure universal access to modern energy services
- Double the global rate of improvement in energy efficiency.
- Double the share of renewable energy in the global energy mix.

These frameworks and mechanisms provide an opportunity for civil society to track progress and government commitments. It empowers policy makers with platforms for dialogue and solutions building. How effective civil society engagement is depends on political will, resourcing and expertise deployed in partnerships. This requires concerted and meaningful review to better understand the water and energy landscape in Botswana.

Oversight Bodies

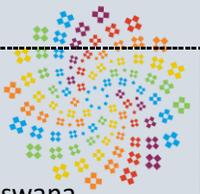
The Water Utilities Corporation is a government-owned organisation providing water and waste management services. Botswana's water policy is based on the Botswana National Water Master Plan (NWMP) of 1991, further reviewed in 2006. The NWMP encompasses water resource monitoring, management and feasibility studies. Unfortunately, it is over twenty years old and needs review. Furthermore, there is no trans-boundary water management framework in

country despite ratifying related international agreements. Rainfall remains unreliable and droughts unabating (CDM, 2020). Any economic productivity and consumer demand growth shall further pressure the country's available assets. The Department of Water Affairs ensures that sufficient water is available from sustainable sources to meet the needs of the economy whilst local level traditional leadership meetings resolve water-related disputes.

The Botswana Energy Regulatory Act of 2016 established the Botswana Energy Regulatory, with operations starting in September 2017 in line with international regulatory practice (Book Binder Business Law, 2018/19). Its mandate includes oversight of oil based goods, coal, common gas, bio energy and other sustainable sources of power (BERA, 2018). New licences issued will contribute an additional daily power production of 827 MW (Sejabosigo, 2020). The Botswana Power Corporation is largely responsible for delivering to the national grid. This including importing from neighbouring countries. Although significant expertise is required to understand influences and mechanisms of the energy sector. It does not mean civil society oversight and accountability cannot be strengthened. Public spending, public health and public consumption are all impacted by the energy sector. Thus, more meaningful avenues for engagement are needed in Botswana.

Vulnerable Groups

Water borne diseases such as diarrhea and skin disease impact rural and poor communities (Act Alliance, 2002), Limited infrastructure means communities rely on local sources such as wells, hand pumps and river water, which can be contaminated (UNESCO, 2019). Those in multi-residentials, settlements, slum-like settlements or poor urbanisation areas are not always recognised or provided with adequate services (The World Bank, 2015). The SDGs safeguard



water to include ‘safely managed’ sanitation. (S.Sinharoy, et al., 2019), This commits Botswana to ensuring that all dwellings, areas or residence, rural or not; are adequately provided for. This is important even on the energy front as affordability is often an issue. Most notably in larger cities and towns, where multi-residentials would be the more affordable dwellings for blue collar workers, unemployed family members, migrant labourers, underemployed youth and the elderly on social protection programmes. Even if modern energy services such as connected electricity and safe cooking systems are available, they would be costly (Butera, et al., 2015).

Electricity access in Botswana was registered at 77% of the population in urban areas, while only 37% in rural areas (SE4all, 2015). Although there has been a gradual increase since then, dependence on traditional fuels remains prevalent. Many poor and multi-residential dwellers cannot participate in formal institutional service delivery. As they do not have a legal address, proof of residence or stable forms of income, they often do not qualify to independently secure connection or register for sourcing from the national grid. Even with modern energy alternatives, affordability is an impediment (Butera, et al., 2015). This is similar to the plight of refugees placed at the Dukwi Refugee Camp. The regional well field is a critical source of portable water in the area. However, not sufficient, government allocated P10million for revamping the water pipeline (Williams, 2015). This reflects an increase in population and demand on the area (Legadiko, 2015). On the energy front, refugees in have not had experiences similar to other countries such as Iraq. Where unstable grids result in depending on costly diesel generators. Similarly those In Ethiopia, where standalone solar systems with battery banks cushion the impact of voltage fluctuations (HEDON, 2016). These alternates

where needed, can be replicated for Botswana (IRENA, 2019).

Women are care givers, most notably in single parent households; women endure additional responsibilities when water is scarce. Whether in needing resources to pay, having to walk great distances or wait in queues for water that might not be safe (water.org, 2020). The SADC Gender Protocol notes the importance of accommodating all women, including those in rural areas and those widowed. This is importance to eliminating water disparities (Pouramin, et al., 2020). Similarly with the energy sector, inclusion in decision making is critical for all levels of governance (Danielsen, 2018), This is because of the inherent risks of care work. Where cooking, heating and other household needs are gendered. Inefficient energy sources further disproportionately impact women. (UNIDO, 2009). The more affordable kinds of energy such as traditional biofuels used in households increases the risk of pneumonia by 80% whilst doubling lung disease and lung cancer for women and children (Energypedia, 2019).

Indigenous groups are reliant on essential service delivery from governments. These are dependent on relationship building and trust between the government and community (Jackson, et al., 2018). Public discourse has dominated the inability for indigenous people to secure their socioeconomic rights. Various court petitions have been made seeking for better service delivery of water since being forcibly moved from their ancestral lands in the Central Kgalagadi Game Reserve. Queer individuals are more likely to be concerned about the environment, water sustainability and energy conservation (Marketing Charts, 2010). Research on Queer African perspectives is yet to be established. Although subject to systemic stigma and discrimination, queer civil society have not had reported instances of inadequate



service provision for water or energy. It does not mean other issues of affordability, access or quality of experience at service points are ideal.

Innovating Water Supply

Some innovations worth exploring include the below:

- WaterSeer: a device that absorbs water from the atmosphere and stores underground.
- Fog catchers: vast mesh nets that collect moisture from fog, dripping into collection trays after condensation.
- Solar Crop: groundwater pumps for farming crops where excess energy can be sold back to the national grid.

Alternative Energy

Alternative energy is wide reaching, including non-renewable energy sources such as hydrogen. The oil crisis in the 1970s influenced increased research and development of alternate energy. Although there has been progress in use, generating alternative energy requires significant investments in sophisticated technology and processes. Technology can also leverage cost against maximum production to achieve grid parity (Vyas, 2019).

Micro grids reconfigure existing service delivery modes, sourcing from the national grid but can be self-reliant when there might be issues with the national grid (Nicholas, 2019). Artificial intelligence is key in successfully using micro grids.

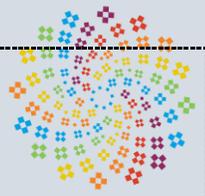
Renewable Energy

Independence from prevalent energy sources such as coal, firewood and oil, country economic growth, and environmental sustainability require the use of renewable energy sources. Most renewable energy uses the sun directly or indirectly through:

- Burning plants that lived by photosynthesis (biomass);
- Capturing the air currents that are created when the sun heats parts of the atmosphere differently (wind power); or
- Channeling flows of water that are created through the sun-driven cycle of evaporation, condensation, and rain (hydropower).

Conclusion

Collaborative multi-stakeholder systems are needed to improve the country governance framework for water and energy. This should enable clarity and accountability in universal, stable and equitable access for all citizens and residents. Further research should assess the impact of shortages, feasibility in the use of innovative methods and technologies for vulnerable groups. Better solutions are needed for progressive means of consumption and affordability. Given the dated frameworks in country. Civil society should establish avenues for engaging government at all levels. This will be critical to establishing pathways for meaningful engagement of citizens and residents alike. Allowing for a culture of transparency, accountability and solutions building in line with the SDGs, international law and the country's Vision 2036.



References

Act Alliance, 2002. *Act Alliance*. [Online]

Available at: <https://actalliance.org/about/member-news/access-to-clean-water-in-rural-village-communities/#:~:text=Only%2032%25%20of%20the%20population,fully%20participate%20in%20their%20communities.>

[Accessed 19 July 2020].

Book Binder Business Law, 2018/19. *BBL*. [Online]

Available at: https://bookbinderlaw.co.bw/botswana-energy-regulatory-authority/?utm_source=rss&utm_medium=rss&utm_campaign=botswana-energy-regulatory-authority

[Accessed 16 July 2020].

Bourquain, K., 2008. *Freshwater Access from a Human Rights Perspective*. s.l.:s.n.

Butera, F. M., Caputo, P., Adhikari, R. & Facchini, A., 2015. *Analysis of energy consumption and energy efficiency in informal settlements of developing countries*, s.l.: UN-Habitat.

CDM, 2020. *DDM Smith*. [Online]

Available at: <https://cdmsmith.com/en/Client-Solutions/Insights/6-Water-Supply-Threats>

[Accessed 11 July 2020].

Centre for Applied Research and Aurecon Botswana, 2013. *Botswana Integrated Water Resources Management & Water Efficiency Plan*, Gaborone: Government of Botswana.

Danielsen, K., 2018. *Gender equality, women's rights and access to energy services*, s.l.: Ministry of Foreign Affairs of Denmark.

ECREEE, 2013. *ECOWAS Center for Renewable Energy and Energy Efficiencies*. [Online]

Available at: <http://www.ecreee.org/page/sustainable-energy-all-se4all-initiative>

[Accessed 11 July 2020].

Energypedia, 2019. *Energypedia*. [Online]

Available at: https://energypedia.info/wiki/Gender_Impacts_of_Energy_Access

[Accessed 19 July 2020].

Gray, R., 2017. *BBC News*. [Online]

Available at: <https://www.bbc.com/future/article/20170313-the-biggest-energy-challenges-facing-humanity>

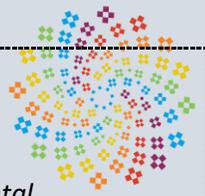
[Accessed 16 July 2020].

HEDON, 2016. *Boiling point*, s.l.: HEDON.

Houngbo, G. F., 2019. *The United Nations World Water Development Report*, Paris: UNESCO.

IRENA, 2019. *Sustainable energy access in humanitarian situations*, s.l.: IRENA.

Jackson, M. et al., 2018. *Collaborating for Sustainable Water and Energy Management: Assessment and Categorisation of Indigenous involvement in remote Australian communities*, s.l.: s.n.



Lange, G.-M. et al., 2006. *The Economics of Water Management in Southern Africa: An Environmental Approach*. 1 ed. s.l.:Edward Elgar Publishing..

Legadiko, O. D., 2015. *Characterisation and groundwater flow remodelling*, Gaborone: University of Botswana.

López, C., 2008. *Open Mind*. [Online]

Available at: <https://www.bbvaopenmind.com/en/articles/current-challenges-in-energy/>
[Accessed 16 July 2020].

Lumen, 2013. *Lumen*. [Online]

Available at: <https://courses.lumenlearning.com/sociology/chapter/theoretical-perspectives-on-government-and-power/>
[Accessed 10 July 2020].

Marketing Charts, 2010. *Marketing Charts*. [Online]

Available at: <https://www.marketingcharts.com/industries/government-and-politics-15407>
[Accessed 11 July 2020].

Nicholas, M. R., 2019. *Schooled by science*. [Online]

Available at: <https://schooledbyscience.com/how-will-ai-improve-microgrid-energy-efficiency/>
[Accessed 16 July 2020].

Pouramin, P., Nagabhatla, N. & Miletto, M., 2020. *A Systematic Review of Water and Gender Interlinkages: Assessing the Intersection With Health*, s.l.: Frontiers in water.

S.Sinharoy, S., Pittluck, R. & Clasen, T., 2019. *Review of drivers and barriers of water and sanitation policies for urban informal settlements in low-income and middle-income countries*, s.l.: Elsevier.

SADC, 2012. *SADC*. [Online]

Available at: <https://www.sadc.int/themes/natural-resources/water/>
[Accessed 10 July 2020].

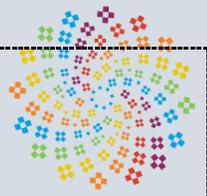
SE4all, 2015. *Sustainable Energy For All*. [Online]

Available at: <https://www.se4all-africa.org/seforall-in-africa/country-data/botswana/#:~:text=At%20a%20glance,to%2037%25%2C%20although%20increasing.&text=Renewable%20energy%20resources%20for%20Botswana,include%20biofuels%20and%20biomass%20wastes%20>
0.
[Accessed 19 July 2020].

Shepard, D., 2012. *UN Press*. [Online]

Available at:
<https://www.un.org/press/en/2012/ga11333.doc.htm#:~:text=The%20United%20Nations%20General%20Assembly,the%20post%2D2015%20development%20agenda.>
[Accessed 11 July 2020].

The World Bank, 2015. *Unsettled: Water and Sanitation in Urban Settlement Communities of the Pacific*, s.l.: World Bank.



UN Water, 2014. *Partnerships for improving water and energy access, efficiency and sustainability*, Zaragoza: UN.

UNDESA, 2015. *United Nations*. [Online]

Available at: https://www.un.org/waterforlifedecade/water_and_energy.shtml#:~:text=Africa-Water%20and%20Energy,for%20biofuels%2C%20and%20powering%20turbines.

[Accessed 10 July 2020].

UNESCO, 2019. *UNESCO*. [Online]

Available at: <https://en.unesco.org/themes/water-security/hydrology/water-human-settlements/rural-development>

[Accessed 19 July 2020].

UNIDO, 2009. *Increasing access to energy services in rural areas*, s.l.: UNDP.

UNIDO, 2015. *United Nations Industrial Development Organisation*. [Online]

Available at: <https://www.unido.org/news/heineken-unido-partnership-supports-sustainability-developing-markets>

[Accessed 11 July 2020].

United Nations, 2013. *UN.org*. [Online]

Available at: <https://www.un.org/en/observances/water-day>

[Accessed 11 July 2020].

Vyas, K., 2019. *Interesting Engineering*. [Online]

Available at: <https://interestingengineering.com/7-energy-efficiency-innovations-changing-the-game>

[Accessed 2020 July 2020].

water.org, 2020. *Water.org*. [Online]

Available at: <https://water.org/our-impact/water-crisis/womens-crisis/>

[Accessed 19 July 2020].

Williams, G., 2015. *Daily News*. [Online]

Available at: <http://www.dailynews.gov.bw/news-details.php?nid=17633>

[Accessed 11 February 2020].