



Health-promoting food and waste management systems in Kwekwe City: Turning waste into assets



The photo on the left shows a stockpile of recovered aluminium cans in Mbizo, I Nhau, 2023. On the right, the photo shows cooking pots made from recycled aluminium cans in Mbizo, I Nhau, 2023.

Waste pickers, mostly women collect aluminium cans from shopping centres and homes and sell them to small-scale smelters based in home industries in Mbizo, Amaveni and other suburbs in Kwekwe. The aluminium scrap sells for between 45-50c (US\$) per kilogram. The aluminium is moulded into useful traditional pots for local sale. Depending on their sizes, the pots sell for between US\$10 to US\$90. This is one of the 'waste-to-asset' recycling activities in Kwekwe City described in this brief.

Key messages

- Harnessing treated wastewater for crop irrigation recycles nutrients and protects the environment.
- The food produced, sold and consumed locally in urban agriculture alleviates poverty, and promotes food security and health.
- Community participation, partnerships and collective decision-making in waste management applies local knowledge and assets for environmental protection and climate justice.
- Using solar energy protects urban environments, reducing dependence on polluting fossil fuels, and reducing the greenhouse gases that contribute to climate change and its negative impacts.
- Circular economic activities promote climate-proofing and inclusive economic development.

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The context and challenges

Kwekwe City was first established in 1898 as a mining town due to the large gold deposits in the area. In 2022, it was ranked as the seventh largest city in Zimbabwe, with an estimated population in 2022 of 119 863, increasing from 100 900 in 2012 (ZimStat, 2022). Over half of the city population is self-employed and engages in gold panning and vending. Households in Kwekwe district, including the rural areas, have nutritional challenges, with a stunting (chronic undernutrition) prevalence of 28%, and with 17% of the city residents identified as food-poor in 2018, 5,6% of whom were children (ZimStat and UNICEF, 2019).

There are also challenges of solid waste management. The Kwekwe City Health Department reports that the city generates approximately 1 100 tonnes of solid waste monthly, or 3kg for each person weekly (Chatsiwa, 2015). Half (51%) of this waste is reported to be organic, with 15% paper, 11% plastic, 5% glass, 4% metal and the rest other materials. The city's Amaveni Dumpsite is the only dumpsite for industrial and domestic waste disposal. Given its sixty-year lifespan, it was decommissioned by the Environmental Management Agency more than 20 years ago but is still operating due to financial constraints to develop a new site. The dumpsite is not lined and has no underground water quality monitoring system. Several informal sector groups and individuals are involved in gathering solid waste from the dumpsite, recovering cans, plastic containers, glass, paper, and cardboard for sale to cycling companies in based Harare and Bulawayo.



Waste picker at Amaveni Dumpsite. They face health risks due to a lack of personal protective equipment and working shelters.
I Nhau, 2023

As another waste issue, the city's Northern Sewage Works treats over 11 mega-litres of the sewage produced daily. Many farmers use this effluent discharge from the treatment works to irrigate urban agriculture, which carries potential risks of microbial contamination if not managed well, but contributes to food security for the growing global population (Loboguerrero et al., 2019). Although Kwekwe City does not have a policy on urban agriculture, the local authority recognises and supports urban and peri-urban farmers through various interventions.

Ensuring food safety and protecting health and the integrity of ecosystems calls for a cross sectoral nexus between food, water, waste, energy, and the environment. Global warming and climate change are leading to a proliferation of pests and diseases, adverse weather conditions, and the destruction of infrastructure, negatively impacting food production and security. Extreme events such as flooding, droughts and extreme heat disrupt food systems (Mbow et al., 2019). Phenomena occurring in one sector are closely related to and affect others (Borowski, 2020). As articulated in the One Health concept, this calls for cross-sectoral co-ordination and action to ensure prevention, detection, preparedness and management responses for local to global health security (WHO, 2021). An [EQUINET conceptual framework](#) outlines the urban responses for food and waste management systems as key entry points to foster innovation, collaboration, accountability, literacy and system-wide change to support healthy people, healthy ecosystems and an inclusive, productive, regenerative and circular urban economy (EQUINET, 2023).

Kwekwe City recognises the potential risks and benefits of the waste challenges it faces. It has an integrated solid waste management plan valid from 2022 to 2023, that is renewed annually. The plan outlines strategies to divert 25% of the waste generated to recycling and revenue generating activities in a cradle to grave approach. This brief outlines selected experiences in implementing the plan.

Areas of intervention and practices implemented

Several activities and initiatives in Kwekwe City on urban food systems, waste management, promotion of renewable energy use and climate change management dovetail with the One Health approach. Reflecting the EQUINET framework, these activities are implemented within an urban circular economy that integrates practices across sectors, actors and systems. Reducing, reusing, and recycling activities, including to reduce non-renewable energy use, are linked also to mitigation and adaptation to climate change in urban food systems, and to protect water resources from environmental pollution.

The next subsections describe the activities relating to solid waste management, wastewater use and solar energy.

Solid waste management initiatives

Solid waste dumping and littering are severe problems in Zimbabwe's urban settings, and can lead to diseases such as watery diarrhoea, rotavirus infection, and respiratory conditions. In 2019, Kwekwe City working with residents and partners took deliberate measures to address these challenges.

Currently, kerbside refuse collection is done by six refuse trucks, once from residential areas, once from industrial areas and daily from the central business district and commercial centres. Refuse dumps develop as a result of dumping by those who either do not have refuse receptacles or fail to take out their bins for municipal collection. In addition to its routine waste collection, therefore, the local authority dedicated tippers and a front-end loader to remove these refuse dumps. Dump removal is done twice weekly, and material is deposited at the Amaveni Dumpsite.

As follow up, while removing the dumps, the health education team invites residents to the area and health inspectors educate residents on proper solid waste management, environmental hygiene, and disease prevention. The cleared dumpsites are then converted into community nutrition gardens involving resident participation as part of the city's partnerships on urban food systems and waste management. The health education team invites residents near the dumpsites to take up the reclaimed land temporarily for farming, and enters the names of those who do in a register to formalise the allocation. Caution is taken to avoid allocating garden spaces at prohibited sites, such as stream banks, roadsides and blind corners.



“Refuse collection is done every Thursday in this area, and the crew always come on time, around 8 am. As you can see, there are no refuse dumps in this suburb. Yes, we have had challenges that emanated from the breakdown of refuse trucks, but our councillor always gives us updates from the Council through social media platforms. So generally, the service we are getting is fair and acceptable.”

Mbizo 4 Kwekwe resident on the actions on dumpsites, October 2023

This has significantly reduced the spaces people can use to dump waste. It has helped to improve the environmental aesthetics and green spaces in the city, eliminating vector breeding sites, preventing communicable diseases, and providing healthy recreational spaces for residents. It has also reduced the crude burning of dumped solid waste and the emission of greenhouse and noxious gases that contribute to global warming and climate change (Sharifi, 2020). Connecting waste management, urban agriculture and environmental greening protects eco-system, equity and circular economy goals as outlined in the EQUINET framework.

Community-based organisations and residents' are involved in the recovery and sale of solid waste materials. Eight CBOs registered by the local authority have been operating at the site for over 20 years, generating revenue from the sale of recovered solid waste. The materials are stockpiled and then crushed to reduce their volume for easy handling. Other recycled materials like metal waste are converted into products like pots and dishes in Kwekwe. Embracing principles of sustainability and equity, this practice provides opportunities for poor and unemployed residents to earn a living by participating in the circular economy. The recovery of plastics, scrap metal, and organic waste helps to protect underground water from pollution and abate the emission of greenhouse gases.



Piles of PET bottles recovered from Amaveni dumpsite, I Nhau, 2023

There is, however, a continuing challenge in the occupational conditions of the community waste pickers, including their lack of adequate personal protective equipment/clothing, dumpsite and waste hazards and exposure to rain, heat and sun that all pose a risk to their health. The response to this calls for further work to improve institutional and infrastructural resources, tools for the waste-pickers, working conditions and capacities and the governance systems to better safeguard waste pickers' health and safety as a key element of the circular economy.

"I have operated at this dumpsite for nearly twenty years, and I specialise in recovering plastic containers I sell in Harare. Although the prizes are not very good, we have managed to sustain our families thus far, and there has never been a day my family slept on empty stomachs. I can afford to buy all the food I want from top supermarkets. I, however, request the Council and companies generating these waste materials to help us by constructing sheds and providing us with baling equipment so that our workplaces are decent and healthy."

Community based organisation member working at the Amaveni Dumpsite, 2023

Governance systems, rules and policies play a key role in transiting towards a circular economy, given that a circular economy is not an idea that is well established within administrative circles and citizen knowledge (Kirchherr et al., 2017). Priyadarshini and Abhilash (2020) observe, for example, that the existing regulations on waste management and renewable energy need to be aligned with sustainable development goals. While the local authority has permitted waste pickers to work at its dumpsite for over 20 years in response to requests from community based organisations and waste pickers, there is no policy or legal framework governing their operations, material conditions or financial support.

As one response, the local authority is engaging partners to build a recovery and recycling facility at the dump site. The facility will be fenced, connected to piped water, and provided with sheds to protect people from weather extremes and to store their materials before transporting them to markets. Kwekwe City also recently signed a memorandum of understanding with Zimbabwe Earthworm Farms, a company piloting the vermicomposting of organic solid waste at a site near Northern Sewage Works. The company will work with residents who have 'Jati composters' built in their households and buy the semi-processed compost from residents for further processing. A Jati composter is a brick structure that makes use of earthworms to convert the biomass into compost. This will promote waste segregation at source and minimise organic waste at the dump site. The company intends to produce lower cost fertilisers commercially, lowering the cost for local farmers and boosting urban agriculture. The initiative will also mitigate climate change by reducing the carbon footprint (Sharifi, 2020).

Using treated wastewater/sewage

Kwekwe has one wastewater treatment plant, the Northern Sewage Works, with a capacity of 15 ML per day. Two treatment units provide effluent to the small-scale farmers in Mbizo's high-density suburb, most of whom grow cereal crops for sale in the council markets and residential areas of the city. The wastewater contains the essential nutrients that plants require, such as phosphates, nitrates, zinc, potassium, and copper. However, it is also contaminated with microorganisms and heavy metals. Harmful algal blooms and death of fish result from a process called eutrophication which occurs when the environment becomes enriched with nutrients, increasing the amount of plant and algae growth in water. Treating raw sewage used for irrigation prevents nutrient enrichment of water bodies and can protect ecosystems (Khan and Mohammad, 2014; Suresh et al., 2023). While treated sewage effluent thus provides beneficial nutrients for urban farming, the area around the treatment plant in Kwekwe has recorded high and endemic levels of helminthiasis (Ngwenya et al, 2023; UCAZ et al., 2023). Council staff thus continuously educate small-scale farmers on healthy ways to handle the water, to avoid growing salad vegetables or plants that are eaten raw to prevent diseases. The local authority has also recently enacted its Water and Waste By-laws to control unsafe practices in the area.

Feeding animals on food waste

The private sector and city residents are contributing through several initiatives to the provision of affordable, safe, nutritious foods. When the grain waste (masese or husks) from brewing and sweepings from malting decompose or are burnt, they produce gases such as carbon, nitrogen or sulphur oxides, and methane that contribute to global warming, climate change, and adverse health and environmental problems. Instead of discarding or burning this waste, some local brewing and malting companies sell food waste to residents and farmers, who then feed it to their poultry, goats, cattle, and pigs.

Residents also use animal excreta, such as chicken droppings and cattle dung as a fertiliser/soil conditioner. This helps to recycle and conserve nutrients rather than losing them. The use of nutrient-rich organic or animal waste instead of mineral fertilizers also makes economic sense for residents, as it improves their profit margins.



"I have been keeping goats for more than 20 years, and currently, I have one hundred and twenty of them. I feed them on spent grain (masese) from a traditional beer brewery in the city, and I consider this to be energy and nutrient conservation. The goats provide meat for my family and workers, and I sell at least five goats monthly. I use goat manure for crop farming and gardening, and you can see that nothing is wasted."

Kwekwe goat farmer, 2023

Goats feeding on spent grain at Allenby Plot, Kwekwe, S Ngwenya, 2023

Using solar powered boreholes for water supply

Partnerships between the local authority, non-governmental organisations (NGOs), and companies have improved the provision of borehole water to city residents. Plan International and ZIMASCO have since 2000 installed twelve communal boreholes in several high-density suburbs and clinics. After some vandalism, the local authority maintains the boreholes and provides security. The borehole water augments potable water supplies, especially during municipal water cuts. It is used for drinking, market gardening, and community projects, contributing to local production of healthy urban foods such as vegetables and maize, improving livelihoods, and using open spaces that would otherwise be used to dump solid waste. Solar-powered street lights have been rolled out on a massive scale in Mbizo, Amaveni, Msasa, Westend, and Newtown and at some Council clinics and offices, providing a backup energy supply and reducing energy bills.

"This area has a perennial problem of municipal water supply, and we had stopped growing vegetables. However, our lives greatly improved when Plan International installed a solar-powered borehole and two storage water tanks. We can afford to grow vegetables to supplement our diet and even sell excess vegetables to earn some money. We have established gardens at some sites formerly used as refuse dumping grounds."

Mbizo 15 resident, 2023.

Mechanisms for consultation, dialogue, co-production and review

Several mechanisms are used to build a whole-of-government approach and sustainable and lasting partnerships with and inclusive participation of stakeholders in these activities. Clean-up campaigns include local authority, government departments and agencies, churches, schools and colleges, Environmental Management Agency, NGOs, and companies. Nationally, the government declared in 2020 a monthly clean-up day. Since then, the local authority has used social media, road shows, and pamphlets to invite and involve the public in meetings co-ordinated by the city health department for the clean-ups and other activities. The Council has also formally engaged and obtained support from companies and development partners to contribute swing bins, tippers, and loaders for the refuse dump removals, and has invited them to participate in clean-up campaigns and local environmental action plan (LEAP) meetings.



Students listen to the Amaveni area councillor on the importance of participating in the national monthly clean-up campaigns. The councillor spoke about environmental and health effects of improper solid waste management.

S Ngwenya, November 2023

Outcomes and future plans

The removal of an average of 5000 tonnes of waste annually from dumps over the last four years has opened up significantly more green spaces in Mbizo and Amaveni residential areas and reduced vector borne disease from flies, mosquitoes, rodents, and other pests breeding in waste dumps. While difficult to make direct attributions, cases reporting to council clinics with watery diarrhoea have decreased by half over the last four years. The reduced level of burning of solid waste has also reduced the level of airborne contaminants such as dioxins, furans, carbon, sulphur, and nitrogen oxides that are harmful to health, and the replacement of dumps by community gardens has created green recreational spaces where residents can rest, play and socialise.

The use of open spaces for farming has improved food security and prevented the ubiquitous dumping of refuse at such sites (Ngwenya et al., 2023). While some residents grow crops at corners and stream banks, obstructing traffic and causing environmental degradation, the Council has engaged residents through their councillors and residents' associations to address these problems.



Kwekwe Community garden in Mbizo 9
S Nyoni, 2023

Partnerships and participation between and by the local authority, recycling companies and waste pickers have enabled the collection, baling and recycling of plastic containers. For waste pickers, the sale of waste plastic to recycling companies has greatly improved their income and food security, while also helping protect the environment.

The participation of community-based organisations and residents in waste recycling has engendered community responsibility and ownership in ensuring environmental hygiene and protection. It has supported the adoption of an emerging paradigm such as the circular economy within environmental management as a critical strategy towards a low-carbon and less-polluting economy (Priyadarshini and Abhilash, 2020). The recovery of solid waste from Amaveni Dumpsite and other areas has significantly helped to reduce the city's carbon footprint, and the greenhouse gases and pollution that come from other waste disposal methods such as burning.

In the future, the local authority plans to revive the use of two currently derelict bio-digesters at the Sewage Works to digest and stabilise sludge and produce methane gas for heating. The bio-reactors (wastewater treatment basins) produce sufficient sludge or biomass from organic matter and dead microorganisms, which can in the future be fed into bio-digesters. This will generate methane for heating and stabilised sludge that can be dried in beds and used to fertilise cereal crops. The local authority is currently scouting for a public-private partner to work with them. Urban renewal projects, such as the creation of green spaces in the central business district will be extended to other areas.

In 2022, Environmental Management Agency also signed a memorandum of understanding with the local authority to develop hazardous and conventional landfills at a 50-hectare site 10 kilometres north of the city. Recycling and waste-to-energy plants will be constructed at the proposed landfill site. This capacitation and partnership initiative will contribute to climate proofing and environment protection. Given the high capital outlay needed to develop a sanitary landfill, the partnership will enable the acquisition of critical but expensive equipment such as tippers, graders, dumpers, front-end loaders, compactors, and rollers. As earlier noted, the local authority is also currently engaging development partners on the planned construction of a recovery and recycling facility at Amaveni Dumpsite.

Areas for shared learning

Capacities, resources and other enablers

The local authority's only dumpsite in Amaveni is generally well-maintained and managed. Council dumpsite attendants operate at the site, and all waste deposited there is manually recorded in a log book since there is no weighbridge. This helps quantify waste deposited on site which informs decision-makers and policy-makers.

Informal waste pickers in the city have the knowledge and experience in differentiating types of materials, which is critical in sorting and selling suitable materials to recyclers. Although waste pickers do not have the right technology and tools to identify specific recovered materials, they can differentiate between plastics such as polyethylene, polyethylene terephthalate, and high-density polyethylene. This helps to reduce the sorting and segregation of plastics by recyclers who purchase the materials, as mixed plastics fetch reduced unit prices.

The local authority has three refuse compactors, three tractors, one skip bin courier, one tipper, one loader, and ten skip bins for solid waste collection, although population growth and the corresponding waste generation rate means that more new refuse compactors, skip bin truck, skip bins, and tippers are needed. The donation of a compactor to the local authority by Zimasco underpins the importance of partnerships and corporate participation in the institutional capacity building required for adaptive change and strategic collective learning.

The local authority has skilled workers, including 3 engineers, 2 civil engineering technicians, 2 planners, 1 draughtsman, 2 electricians, 2 fitters, 1 building technician, 3 building inspectors, and 15 plumbers, to maintain and repair equipment and facilities.

However, financial challenges negatively impact the local authority's capacity to maintain sewerage reticulation system and wastewater treatment plant. The former is weighed down by a network of old and small sewers that no longer adequately serve the increased population. While there have been efforts to revamp and upgrade the sewerage system, more needs to be done, especially in the older suburbs built in the 1960s and 1970s such as Amaveni, Mbizo 1, 2, 3, 6 and 5. These are suburbs that experience frequent sewer blockages.

The use of open spaces for farming has deterred solid waste dumping and provided new green spaces in the city for food production and recreation. Plants in green spaces take up carbon dioxide (greenhouse gas) instead of it escaping into the atmosphere. Urban farming supports food security and eases poverty, but needs to be regulated and supported by local authorities, including by providing land and land rights to reduce farming at undesignated sites. While urban agriculture is enabled in practice, the local authority still needs a policy or by-law to regulate and promote it (Ngwenya et al, 2023).

There has been modest investment and development in the city's clean energy production on an industrial scale. The local authority has licensed several LPG outlets in the city, which helps to reduce the overdependence on ZESA electricity, some of which is partly derived from coal burning in Hwange and Munyati power stations. Companies and residents in the city have installed solar systems, which not only reduce their electricity bills but also reduce the use of dirty energy sources like firewood and paraffin. The use of LPG gas for heating has a direct benefit in climate proofing. The local authority has also initiated several renewable energy projects described earlier that have contributed to reduced energy bills and reduced green house gas emissions from coal-powered generation plants in Hwange and Munyati and their associated global warming.

Challenges, barriers, and responses

While the local authority offers a reliable solid waste collection service for residents, industry and commerce, ubiquitous dumping and littering mainly in residential areas continues to be a problem. The outsourcing of tippers and loaders to remove solid waste in 2021 proved expensive and unsustainable. Consequently, the council bought a dedicated tipper and a loader last year to do the removals. This significantly reduced the removal cost and made removals more efficient than in the past.

Additionally, in the same period, the local authority purchased 12 skip bins for high solid waste generating sites like shopping centres, the central business district and flea and vegetable markets, reducing refuse dumping and littering at such sites. However, re-dumping remains a challenge despite civic education to residents by the local authority health inspectors, and deterrent measures such as fining culprits by the municipal police. A 2022 survey by the health department found that 40% of households do not have proper refuse receptacles. As a result 20 000 household bins were included in this year's budget, but are yet to be procured.

The local authority still needs support to ensure that the wastewater treatment system functions optimally. For example, at the only waste water treatment plant, Northern Sewage Works, sludge digesters, gas holding tanks and sludge drying beds are no longer functional. This treatment system was designed to connect the bio-nutrient reactors to the bio-digesters to ensure the digestion and stabilisation of sludge to manure for agriculture and methane gas for heating. Stabilising the sludge also addresses the problem of endemic helminthiasis. The stabilised sludge from the bio-digester when directed to drying beds kills undesirable organisms, making the sludge less offensive and easier to handle. This system is critical for climate change mitigation because methane, a very potent greenhouse gas, could be harnessed for domestic or industrial heating instead of escaping into the atmosphere.

Regarding water conservation and storage, the local authority has invested in the construction of city water reservoirs to help to ensure that the entire city and nearby town of Redcliff get a consistent potable water supply, sparing residents from outbreaks of water-borne diseases such as cholera and typhoid, which continue to affect neighbouring towns.

While assistance from the central government and development agencies like the United Nations Development Programme and United Nations Children's Fund has supported this in the past, the cost of sustainable maintenance and repairs of most water and sanitation facilities like the sewage treatment works, solid waste disposal sites and even water treatment and reticulation is too high for the local authority to bear on its own, with constrained revenue inflows from residents and ratepayers.

Features and learning for holistic, integrated approaches

Waste management and environmental conditions impact on health outcomes, as do the availability of urban land for local food production and the supply of clean and affordable energy. *Figure 1* below shows the EQUINET conceptual framework, highlighting the areas that Kwekwe’s practices address.

Figure 1: A graphical representation of the EQUINET conceptual framework with areas addressed in Kwekwe

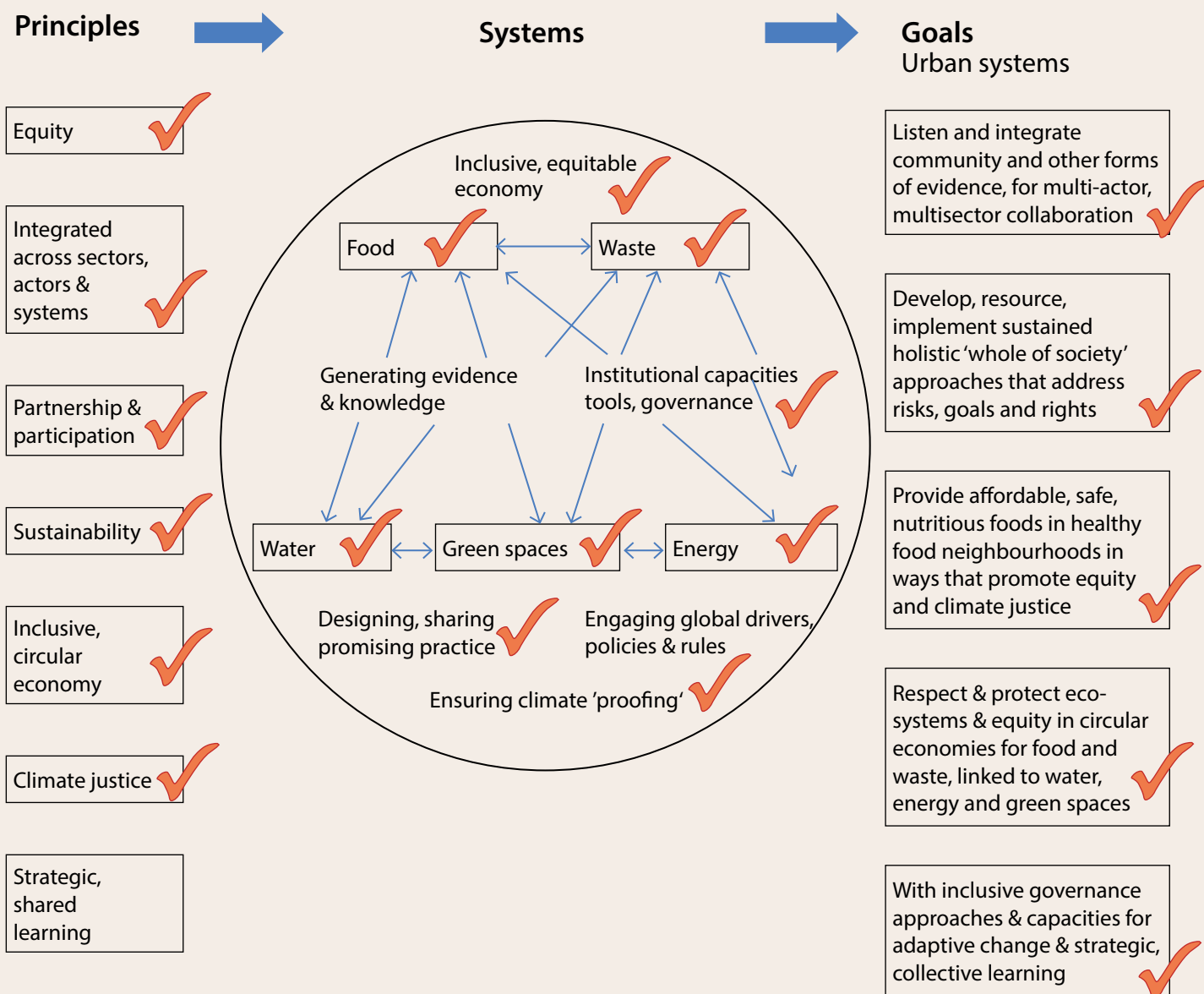


Figure source: EQUINET, 2023

The Kwekwe case study confirms that waste management, energy, environmental and healthy urban food system practices have strong interlinkages and implications for managing climate change. Directly, practices in these areas can strengthen green spaces and possibilities for livelihoods, as demonstrated in the waste dumping to market garden transformations and the opportunities for waste collection and recycling in Kwekwe. Indirectly reducing greenhouse gasses from municipal waste burning and improving green spaces reduces drivers of global warming and climate change, and their negative impacts on extreme weather events and vector borne disease.

Community participation and partnerships in such a circular economy promote equity by integrating the inputs and improving livelihoods of residents, especially of marginalised groups. This is shown in the involvement of and income generated for low income, informal workers in recycling and in urban agriculture, also increasing their commitment to and understanding of participation in clean-up campaigns and waste segregation.

Integrating equity into solid waste management approaches is vital as it ensures that disadvantaged or low-income members are afforded more opportunities to participate in the circular economy, food system and healthy ecosystems (water, energy and climate change). It needs support, such as in the provision of land and solar powered boreholes for urban agriculture, and also policy and legal standards. Whole-of-government and One health approaches are evident in the inclusion of multiple sectors and stakeholders in these activities, and in clean-up campaigns. This enables resource mobilisation, unity of purpose, collaborations, complementarity, and brings ideas for climate mitigation and support within and across institutions and communities.

There are multiple benefits of the partnership and participation in waste management, food systems, and healthy ecosystems were demonstrated in Kwekwe through cooperation and synergistic relations between local authorities, recyclers, informal workers, community-based organisations and residents in the different dimensions of the circular economy described in the case study.

It has led to resource contributions that help to capacitate the local authority to provide critical services and equip community activities. It also brings trust and ownership and understanding to activities. It demands communication, but also formal mechanisms such as memoranda of understanding, policies and laws. This was noted in relation to longer-standing practices such as urban agriculture and recycling, but also new areas such as renewable energy generation.

Promoting solar energy for street lighting and powering boreholes and clinics supports energy sustainability and affordability, but also has upstream and downstream links with recycling, waste management, food production and in job creation in the value chains. Embedding these processes within local circular economies, such as in linking to metal waste to recycled products or local food production and sale, supports local jobs and incomes. Renewable energy is an important driver of the range of changes that support health-promoting ecosystems, *equity in circular economies* and climate justice.

Circular economic activities such as “reduce, reuse and recycle” create the opportunity for a healthier planet. They help to ensure *climate proofing*, *climate justice* and protection of the public health and environment. Waste in refuse dumps can be turned into an opportunity for urban renewal through environmental greening, construction of engineered landfills, use of wastewater for agriculture, use of solar energy for powering boreholes and processing, and for public and street lighting. While implemented locally and creating healthier lives and societies locally, they also support more inclusive economies and healthy ecosystems nationally. They show the potential for and demand for resources for conditions that bring global ideas of climate justice to local level.

References

1. Borowski FP (2020) Nexus between water, energy, food, and climate change as challenges facing the modern global, European, and Polish economy. *AIMS Geosciences*; 6(4): 397–421. <https://doi.org/10.3934/geosci.2020022>
2. Chatsiwa J (2015) Land Pollution and Population Density: The case of Kwekwe City residential areas, Zimbabwe. Master's Thesis submitted to the University of South Africa. <https://www.semanticscholar.org/paper/Land-Pollution-and-Population-Density>
3. EQUINET (2023) A conceptual framework for healthy urban systems for food and waste management in ESA countries, EQUINET, online, <https://equinetafrica.org/sites/default/files/uploads/documents/EQUINET%20conceptual%20framework%20for%20UH%20food%20and%20waste%20systems.pdf>
4. Loboguerrero AM, Campbell BM, Cooper PJM, Hansen JW, Rosenstock T, Wollenberg E (2019) Food and Earth Systems: Priorities for Climate Change Adaptation and Mitigation for Agriculture and Food Systems. *Sustainability*, 11: 1372, 1-26. <https://doi.org/10.3390/su11051372>
5. UCAZ, TARSC, City of Bulawayo, Chegutu Municipality, Harare City Council, Kariba Municipality, Kwekwe City Council, Masvingo City Council, Victoria Falls City Council, MoHCC (2023) Health-promoting urban food systems in selected local authorities in Zimbabwe, EQUINET, Harare
6. Khan MN, Mohammad F (2014) Eutrophication: Challenges and Solutions. Springer Science and Business Media Dordrecht. https://doi.org/10.1007/978-94-007-7814-6_1
7. Kirchherr J, Reike D, Hekkert M (2017) Conceptualizing the circular economy: an analysis of 114 definitions. *Resour, Conser, Recycling*, 127, 221–232. <https://doi.org/10.1016/j.resconrec.2017.09.005>
8. Kwekwe City Council (2022) Integrated Solid Waste Management Plan (ISWMP), Kwekwe
9. Mbow CC, Rosenzweig LG, Barioni TG, Benton M, Herrero M, Krishnapillai M, Liwenga E, Pradhan P, Rivera-Ferre MG, Sapkota T, Tubiello FN, Xu Y (2019) Food Security. In: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystem*. In press
10. Ngwenya S (2023) Case of health-promoting urban food systems in Kwekwe. EQUINET/TARSC.
11. Priyadarshini P, Abhilash PC (2020). Circular economy practices within energy and waste management sectors of India: A meta-analysis. *Bioresource Technology*, 304, 1-7. <https://doi.org/10.1016/j.biortech.2020.123018>
12. Sharifi A. (2020). Co-benefits and synergies between urban climate change mitigation and adaptation measures: A literature review. *Science of the Total Environment*, 750, 141642. <https://doi.org/10.1016/j.scitotenv.2020.141642>
13. Suresh K, Tang T, van Vliet MTH, Bierkens MFP, Stokal M, Sorger-Domenigg, Wada Y (2023) Recent advancement in water quality indicators for eutrophication in global freshwater lakes. *Environmental Research Letters*. 18: 063004. <https://doi.org/10.1088/1748-9326/acd071>
14. ZimStat and UNICEF (2019). Zimbabwe Child Poverty Report 2019. Zimstat, Harare, Zimbabwe.
15. WHO (2021) FAO-OIE-WHO One Health approach to AMR mitigation and safer food in the Asia-Pacific Region. <https://www.who.int/publications/i/item/sea-whe-15>. (Accessed 7 October 2023).
16. ZimStat (2022). Population and Housing Census Report Preliminary Results on Fertility. Zimstat, Harare



City of Kwekwe, TARSC, EQUINET (2024) Health-promoting food and waste management systems in Kwekwe City: Turning waste into assets, EQUINET Brief, EQUINET, Harare