

Using urine to make sub-Saharan city region food systems more sustainable

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Installing urine collection systems in sub-Saharan city regions would make those conurbations more sustainable. This was demonstrated by a study by four researchers from CIRAD, IRD, Boubakar Bâ University of Tillabéri (Niger) and Joseph Ki-Zerbo University, Ouagadougou (Burkina Faso), published on 3 May 2023 in the journal *Regional Environmental Change*. For their study, the researchers analysed nitrogen flows in waste in two sub-Saharan cities: Maradi (Niger) and Ouagadougou. The study was a first, and showed that urine was the main source of nitrogen losses. Collecting that urine could provide valuable fertilizer suitable for local agricultural use, and thus serve to make city region food systems more sustainable.

Current urban development trajectories in sub-Saharan Africa are not sustainable. Fast-growing cities constitute nutrient sinks relying on nutrient-poor hinterlands. Those sinks, and the degradation and draining of nutrients in hinterlands, have significant environmental and health impacts. This runs counter to The UN Sustainable Development Goal 11, which aims to “make cities and human settlements inclusive, safe, resilient and sustainable”.

To give the authorities a cross-sectoral view of a city’s nutrient sink status, the researchers identified and analysed a range of waste flows. Their approach distinguished four nested spatial levels: the urban area; the potential territorial recycling system; the country and the international level. Based on that analysis, the researchers focused on the origin and fate of those nutrient-containing waste flows. The method was applied to nitrogen in Maradi and Ouagadougou, to determine whether and to what extent those city regions could progress towards sustainable urban food systems. The fact of focusing on the nitrogen in waste rather than on waste flows themselves enabled a systemic understanding useful to the local authorities.

The study showed that Maradi was a nitrogen sink, albeit at the heart of a still relatively sustainable urban food system. However, it could well evolve towards a situation similar to that of Ouagadougou: a large nitrogen sink with no significant city-hinterland recycling. Although of contrasting size, currently around 400 000 and 2 800 000 inhabitants respectively, these two cities evolve in highly similar biophysical, climatic, agricultural and socioeconomic settings. Their respective results may thus be considered an approximate illustration of a development trajectory.

The study provided the first overview of waste-contained nitrogen flows in sub-Saharan cities. Existing reports so far provided only partial, sectoral assessments, focusing either on waste management, on sanitation, or on agriculture, while this study showed that nitrogen losses through sanitation and waste management largely exceeded other waste-contained nitrogen flows in these cities. Urine is therefore the main source of nitrogen loss. Urine collection initiatives to enable its use as a fertilizer would make urban systems more independent and resilient. This would improve regional food provision and reduce sanitation-induced urban water pollution, making urban systems more sustainable. The researchers consider that addressing the potential for urine recycling would be a worthwhile follow-up to this study.

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Reference

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[The nutrient metabolism of growing sub-Saharan cities and their prospect for shifting from regional sinks to sustainable city-region food systems](#), *Regional Environmental Change*, May 3, 2023. DOI: 10.1007/s10113-023-02070-x

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About Cirad

Cirad is the French agricultural research and international cooperation organization working for the sustainable development of tropical and Mediterranean regions. It works with its partners to build knowledge and solutions for resilient farming systems in a more sustainable, inclusive world. It mobilizes science, innovation and training in order to achieve the Sustainable Development Goals. Its expertise supports the entire range of stakeholders, from producers to public policymakers, to foster biodiversity protection, agroecological transitions, food system sustainability, health (of plants, animals and ecosystems), sustainable development of rural territories, and their resilience to climate change. CIRAD works in some fifty countries on every continent, thanks to the expertise of its 1700 staff members, including 1140 scientists, backed by a global network of some 200 partners. It also supports French scientific diplomacy operations.

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IRD is a multidisciplinary French public research organization committed to equitable partnerships with countries in the Global South and in the French overseas territories for nearly 80 years. As a contributor to the achievement of the international development agenda, its priorities are aligned with the implementation of the Sustainable Development Goals (SDGs). Together, scientists and the Institute's partners propose concrete solutions to the global challenges facing societies and the planet. This win-win relationship makes science and innovation major levers for development.

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