

THE HIDDEN CLIMATE THREATS AND COST OF FEEDING THE HUNGRY

A decision support tool developed for UN World Food Programme informing sourcing decisions by presenting environmental impact and environmental sourcing risk indicators for country-crop combinations in Sub-Saharan Africa

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The world's largest humanitarian organisation feeds hundreds of millions of people. Yet until now, they have lacked a structured way to assess how climate change threatens the crops they source, and how those sourcing choices may affect the environment in return. This thesis develops a decision support tool that makes both dimensions visible.

Climate change is one of the leading drivers of global hunger. In 2024, around 307 million people in Africa faced hunger. WFP delivers life-saving food assistance in emergencies where people suffer from conflict, disasters and the impacts of climate change. To do so, they rely on procurement of staple commodities. These agricultural systems are increasingly exposed to environmental sourcing risk that can threaten yields and supply stability. At the same time, crop production has its own environmental footprint.

Working directly with WFP, this thesis develops a tool that evaluates these two components at once. Environmental sourcing risk captures how local conditions such as temperature, water availability and soil quality may threaten crop yields. Environmental impact captures the ecological footprint associated with producing that crop, such as deforestation, biodiversity loss and water use. In short, it shows both how the planet threatens the harvest and how the harvest threatens the planet.

The tool draws on open satellite and agricultural data, mapped crop by crop

across each country, and presents the results through side-by-side radar charts. Each indicator is benchmarked against the African average, allowing buyers to see where a sourcing option performs better or worse than the regional norm. The tool does not collapse the results into a single “green score”, since doing so would hide important trade-offs. Testing it on maize from Benin and Tanzania illustrates this clearly. Benin shows higher soil-related risk and higher emissions per tonne, while Tanzania faces greater rainfall risk and puts more pressure on biodiversity. Neither option is simply “greener” and the preferable choice depends on what WFP decides to prioritise.

The result is a transparent and extendable basis for more environmentally informed procurement. Since it is built on open data and reproducible steps, it can be adapted to other regions, other UN agencies and other large food buyers facing similar sourcing dilemmas. Theoretically, the thesis brings together two perspectives that research has largely kept separate, humanitarian logistics and sustainable supply chain risk management. Methodologically, it is a pragmatic, abductive and multi-method study, developed using Design Science Research together with established methods for developing risk assessment tools. The full study is published as *Environmental Impact and Environmental Sourcing Risks in Humanitarian Supply Chains: A Decision Support Tool for World Food Programme in Sub-Saharan Africa* at the Faculty of Engineering (LTH), Lund University.