

# INCENTIVISING GREEN CITIES FOR A HEALTHY FUTURE: A CASE STUDY IN NAIROBI

## Introduction

Nairobi, Kenya's capital, is experiencing exponential growth where urbanization is projected to rise from 56% in 2021 to 68% in 2050 (Duncan, 2022). The rapid expansion of urbanization is accompanied by a concerning **decline in green cover**, which intensifies climate-related risks including flooding, pollution, and elevated temperatures. The detrimental effects of urbanization to climate, in turn affect human health (Romanello et al., 2023).



36% of the land experienced severe **drought** in 2022. Droughts and floods resulted in 30,000 deaths due to suboptimal diets in 2020.



**Air pollution** increases risk of respiratory illnesses, cardiovascular diseases, lung cancer, adverse pregnancy, etc. In 2020, 2500 deaths were reported due to small particulates, use of dirty fuels resulted in 56 out of 100,000 in 2020, which is higher than rural.



Between 2013-2022 **temperatures increased** by 0.5 resulting in 5.6 heat wave days per year. Infant and elderly heat related deaths increased, 888 million labor hours and \$269 million were lost.

Improving exposure to urban green spaces is associated with reduction in mortality and cardiovascular diseases; improved mental health; and increase in physical activities (Kondo et al 2018).

A **Climate Action Plan (CAP)** already exists in Nairobi that aims to plant 1 million trees by 2032 in an attempt to reduce emissions by 66% by 2050 (Johnson 2023).

We suggest a combination of monitoring and taxation policies to compliment the realization of the goal.

## Policies

The policy combination consists of a **Green City Incentive Scheme (GCIS)**, a national initiative designed to allocate specific funding and incentives to city municipalities that achieve well-defined objectives in creating green cities. The approach consists of 3 key components:

### 1) Monitoring of Green Spaces:

Employing Normalized Difference Vegetation Index (NDVI) for environmental monitoring and climate change assessments is recommended due to its cost-effectiveness and usability in remote sensing platforms (Pettorelli et al, 2005). NDVI is a satellite-derived index used for monitoring vegetation and land cover changes. We suggest making use of NDVI to periodically monitor green spaces and aim for a citywide increase in Urban Green Space Index (UGSI) and Per Capita Green Space (PCGS). Public disclosure of NDVI maps could lead to transparency and create awareness among individuals on areas in need of attention.



## 2) Tax Incentives for Corporations:

Tax deductions effectively encourage corporations to invest in forestation by reducing their tax burden. Straka and Greene (2004) highlight existent policies where forestation expenses made within the tax year can be deducted. These measures lower the financial barrier to forestation, making it a more attractive and feasible option for businesses and accelerating, thus, the already existent CAP.

## 3) Engagement of the Community:

Findings presented by (Ruseva et al, 2015) illustrate that, for individuals, some policy tools matter more than others. Particularly, subsidized seedlings, which can significantly increase the odds of past and planned tree planting promoting the aim to plant 1 million trees by 2032 in an attempt to reduce emissions by 66% by 2050 (Johnson 2023).

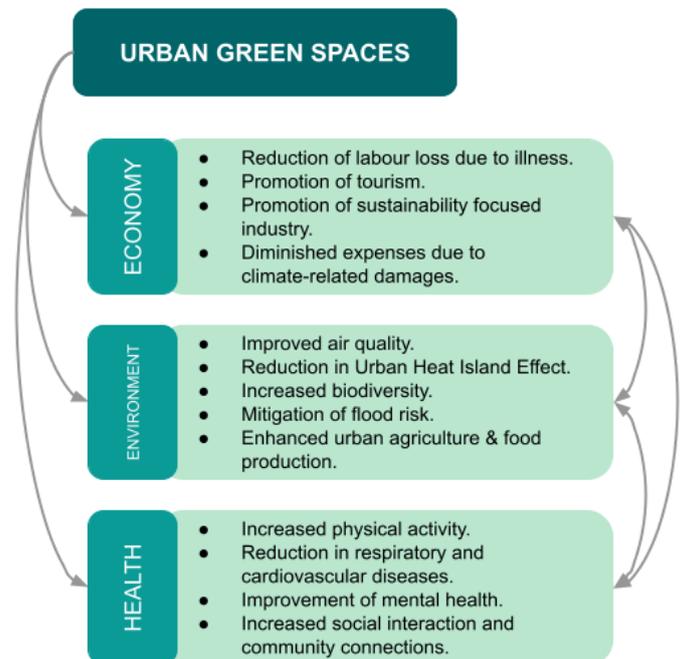
## Outcomes

According to the 2023 IPCC report, net-zero CO<sub>2</sub> emissions must be achieved by 2050, which means the temperature anomaly should stabilize at or below 1.5°C before that year. In terms of Kenya's GDP per capita, the target amount for 2050 (adjusted for inflation and expressed in thousands of 2021 US dollars) would be around USD 6,400, based on the formula and assuming Kenya maintains its average annual growth rate of 4%:

$$2000 \times (1.04)^{29} \approx 6,400 \text{ USD}$$

Following the adjustment of our policy proposals within the FRIDA model, we are able to provide clear evidence that the objective of stabilizing the surface temperature anomaly is secured. Furthermore, we are making substantial progress toward achieving the target GDP per capita.

In addition, as a result of our own research, we have also identified several other key outcomes:



## Challenges

Besides the depth of our research, we must also acknowledge the presence of the GCIS policy limitations that are not fully addressed:

- Gentrification due to increase of property.
- Increased allergies due to increased biodiversity.
- Water shortages due to increased watering needs.
- Inequity in policy-reach.

Additionally, it is important to acknowledge the limitations of the FRIDA model. While it provides insights at the national level (Kenya), our study and policy recommendations are specifically focused on the Nairobi metropolitan area, which may not be fully captured by the model's broader scope.

# Acknowledgments

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