MEGATRENDS IN AFRICA

FELM – Suomen Lähetysseura
Time for Nature: Working together to Mitigate Climate Crisis
WORLD ENVIRONMENT DAY 2020

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Taita Research Station, Kenya

UNIVERSITY OF HELSINKI

- One of the top universities in Europe (ranks 50-80th)
- Helsinki Institute of Sustainability Science, 2017
- MoUs with many African universities
- Africa strategy, 2020
- Faculty of Science high in global rankings: Atmospheric Sciences (11th), Remote Sensing (33rd) and Geography (51-75th)
- Institute for Atmospheric and Earth System Research (INAR), 2018
- ECHOLAB – Earth Change Observation Laboratory
- Taita Research Station in Kenya, 2011

EARTH CHANGE OBSERVATION LABORATORY

- Petri Pellikka, professor of geoinformatics
- Environmental change, climate change and sustainability in Africa
- Funding: Development research programme of the Academy of Finland, Ministry for Foreign Affairs of Finland
- Education and capacity building in use of geospatial data in environmental analysis and spatial planning
- DeSIRA project of EC DG Development Cooperation, 2020: *Earth observation and environmental sensing for climate-smart sustainable agropastoral ecosystem transformation in East Africa*
- Main focus: Kenya, Ethiopia, Eritrea
- https://www.helsinki.fi/en/researchgroups/earth-change-observation-laboratory

https://www.helsinki.fi/taita-research-station

TAITA RESEARCH STATION

- Multidisciplinary research station in SE Kenya since 2011
- Land cover, land use and climate change
- Sustainability, food security, botany, virology, forestry, environmental physics
- Since 2003 more than 75 MSc and 25 PhD theses
- Kenyan staff, electricity, internet, safety, good food and sauna
- Collaboration with county and Kenyan administration and science collaborators since 2003

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MINISTRY FOR FOREIGN AFFAIRS OF FINLAND

- Commisioned a report about Megatrends in Africa in 2019
- Leena Vastapuu, Tampere Peace Research Institute.
  - population growth, migration, technology
- Mikael Mattlin, University of Turku
  - democratic process
- Emma Hakala, Finnish Institute of International Affairs
  - urbanization
- Petri Pellikka, University of Helsinki, climate change

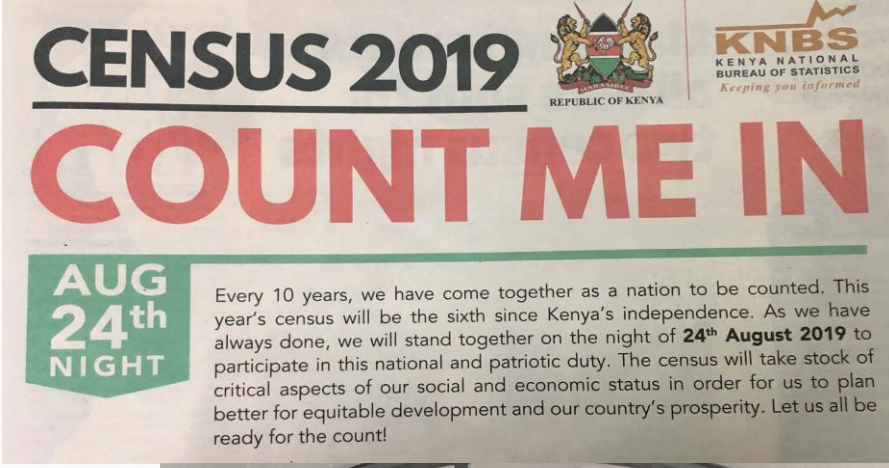
WHAT ARE MEGATRENDS?

- *Megatrends are great global forces that impact businesses, economies, societies, culture and our personal lives* (Copenhagen Institute of Future Studies)
- List and number of megatrends varies depending on the focus
- Commissioned for Megatrends in Africa
  - Climate change,
  - Population growth, Migration,
  - Urbanization, Technological development, Democratic development
- Megatrends cannot be studied as single trends
- They are interlinked and have causal relationships and feedbacks
- Climate change and population growth as mega-megatrends

POPULATION GROWTH

- Africa’s population will significantly increase in the 21st century even if fertility rates would suddenly fall
- By 2050, Africa will host the largest number of young people (0-24 years) in the world
- Positive: majority of the global labor force growth is in Africa

POPULATION GROWTH



- By 2050, the population will double in sub-Saharan Africa
- Globally, 50% of the projected 2.0 billion increase are from sub-Saharan Africa
- The average lifetime has increased by 12 years during last 30 years
- Francophone West Africa is the fastest-growing region world-wide
- Niger has the highest fertility rate (7.2 children per woman)
- Massive challenge = High fertility levels + rapid decline in mortality + poverty

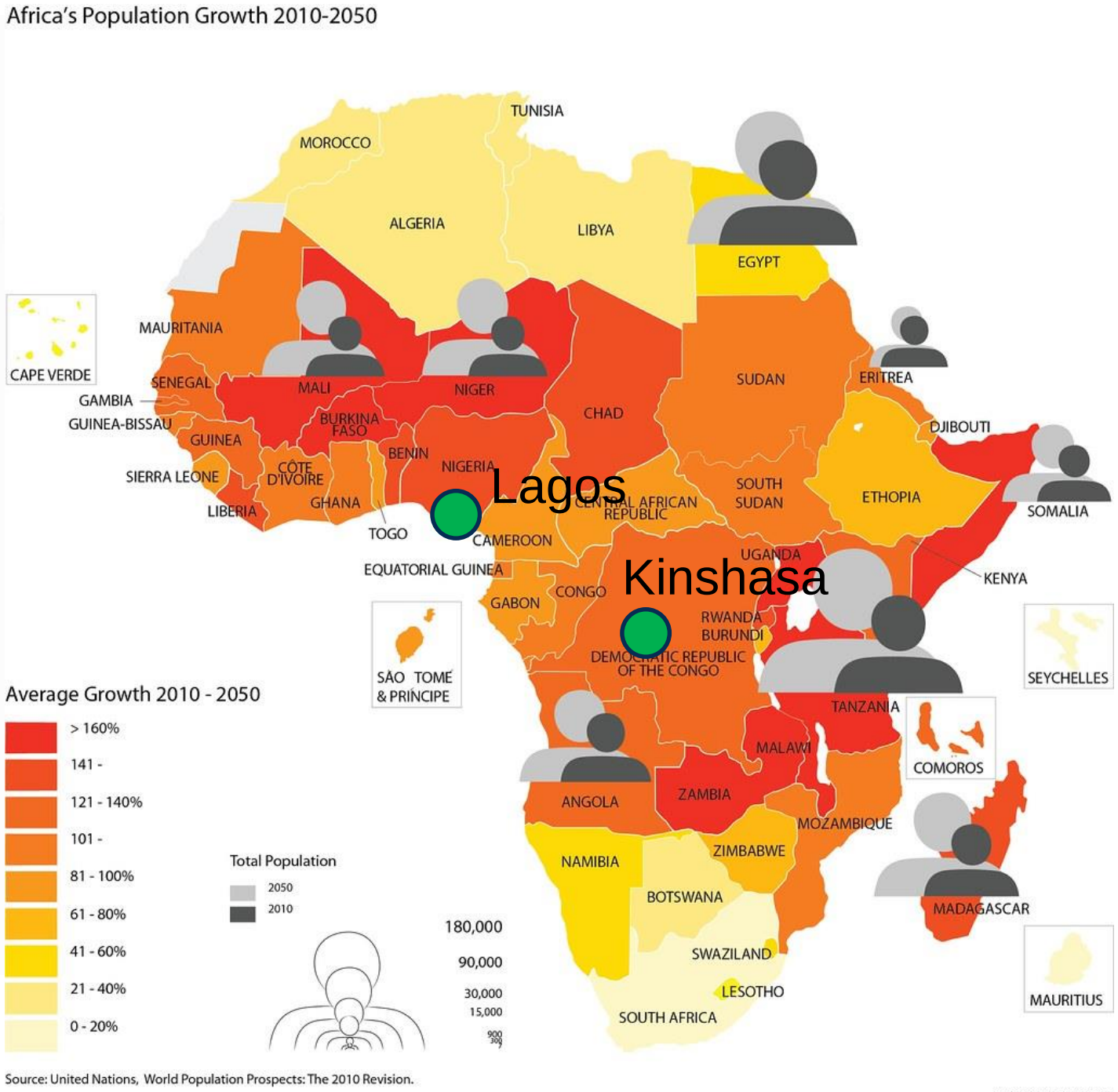
Highest population growth in West Africa

Less growth in fast developing Ethiopia and Kenya

Even less growth in North Africa and Southern Africa

Majority of the largest cities in the world in 2050 will be in Africa

e.g. Lagos, Kinshasa

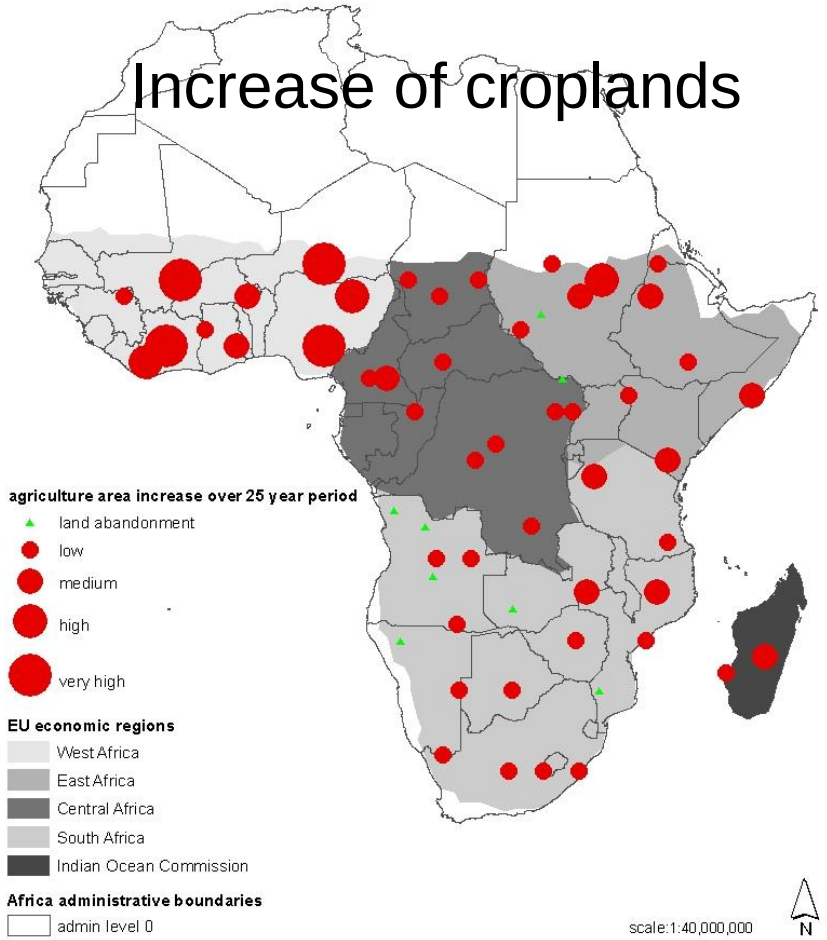


POPULATION GROWTH - MITIGATION

- **Highly sensitive topic personally and politically**
  - Contextual sensitivity, tailored programs, best practices
  - The inclusion of boys and men is crucial
- Secondary education of females decreases population growth
  - Several policies are needed to support the optimal age structure
  - Education opportunities, jobs, basic social security (= future prospects)

CLIMATE CHANGE – LAND CHANGE

- Land cover change is the 2nd important driver for increased CO_2 emissions after the use of fossil fuels.
- 12 % of anthropogenic CO_2 emissions from last decades
- Expansion of agricultural land, pastoralism, urbanization
- Since 1975 croplands expanded more than 60 %
- Use of bioenergy (fuelwood, charcoal, crop straw and manure) reduces carbon stocks and releases GHGs



Brink, A.B., Eva, H.D., 2008. Monitoring 25 years of land cover change dynamics in Africa: A sample based remote sensing approach. Applied Geography.

IMPACTS OF LAND CHANGE

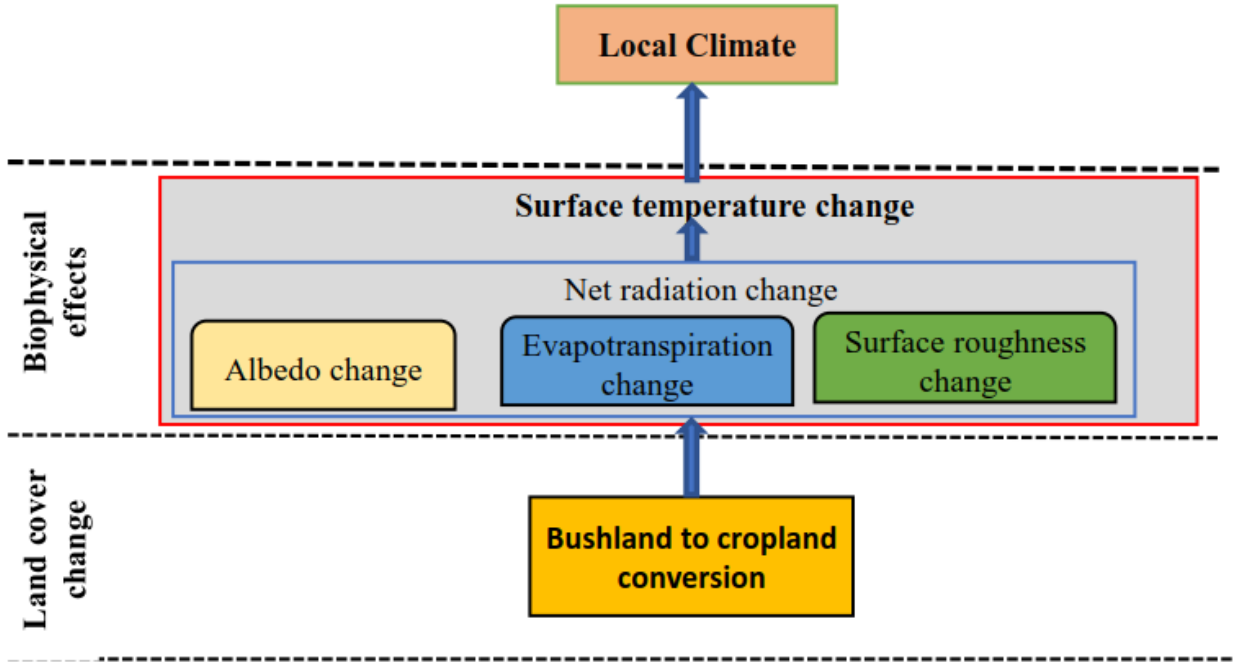
Abera et al., 2020. Climatic impacts of bushland to cropland conversion in Eastern Africa. *Science of the Total Environment*

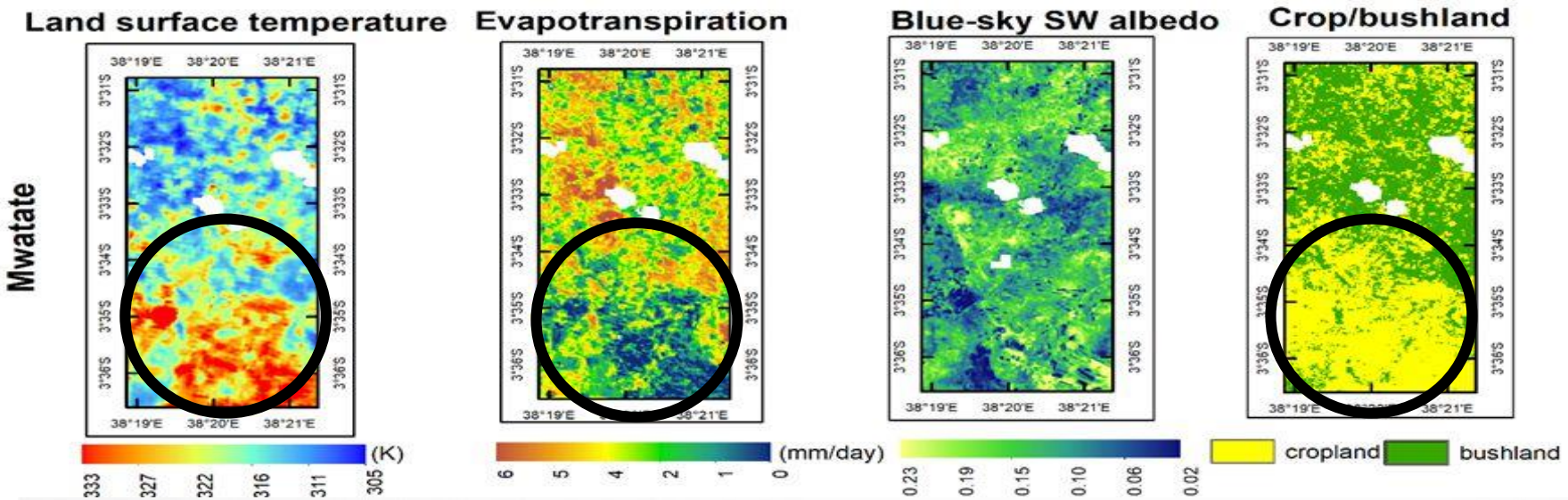
Biogeochemical effect

- Less carbon sequestrated to above ground vegetation
- Release of carbon during land preparation for agriculture
- More carbon in the atmosphere, greenhouse gas, climate change

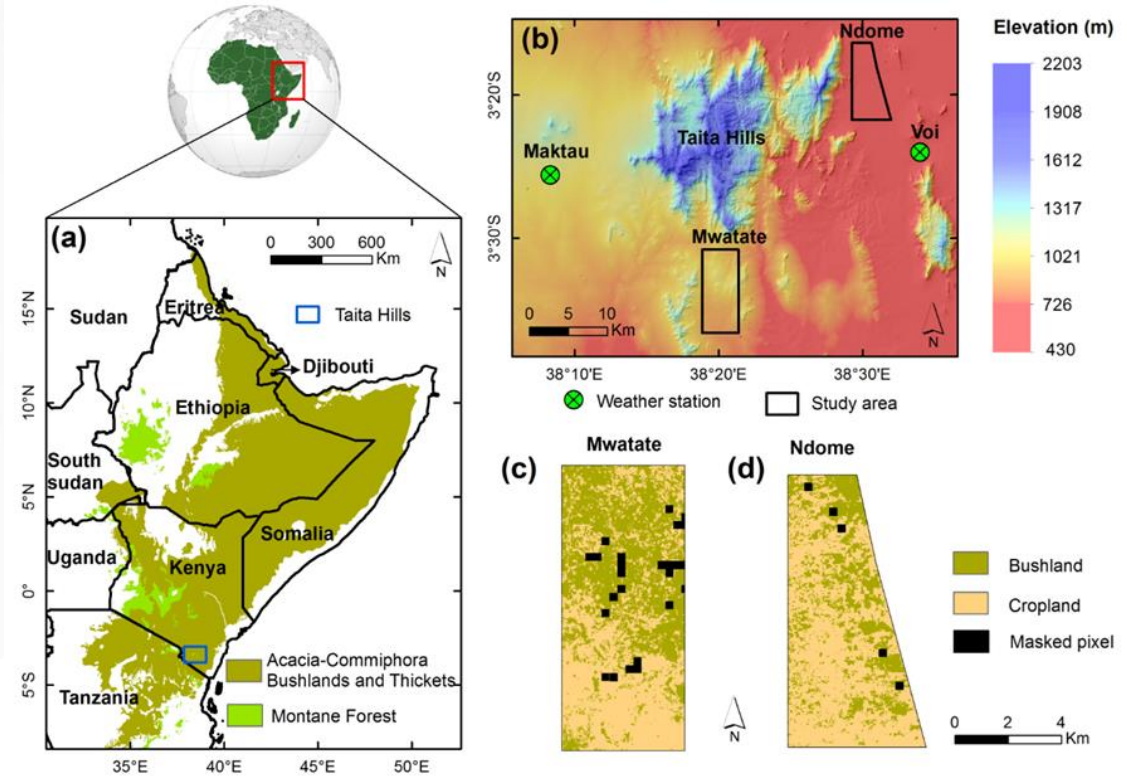
Biogeophysical effect

- Increased albedo (reflectivity)
- Increased land surface temperature
- Decreased water storage and evapotranspiration





Taita Hills, Kenya



Loss of bushlands (more open land surface) causes:

Higher land surface temperature

Lower evapotranspiration

Higher reflectivity

As a result, microclimate, local climate and regional climate changes

Consequences on continental and global scale

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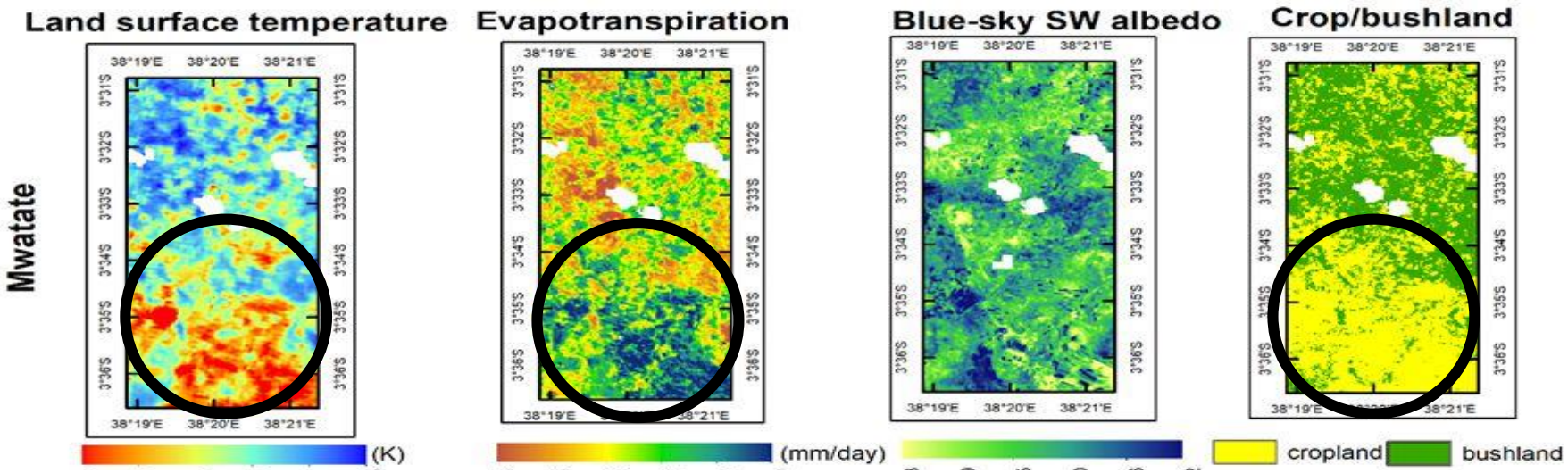

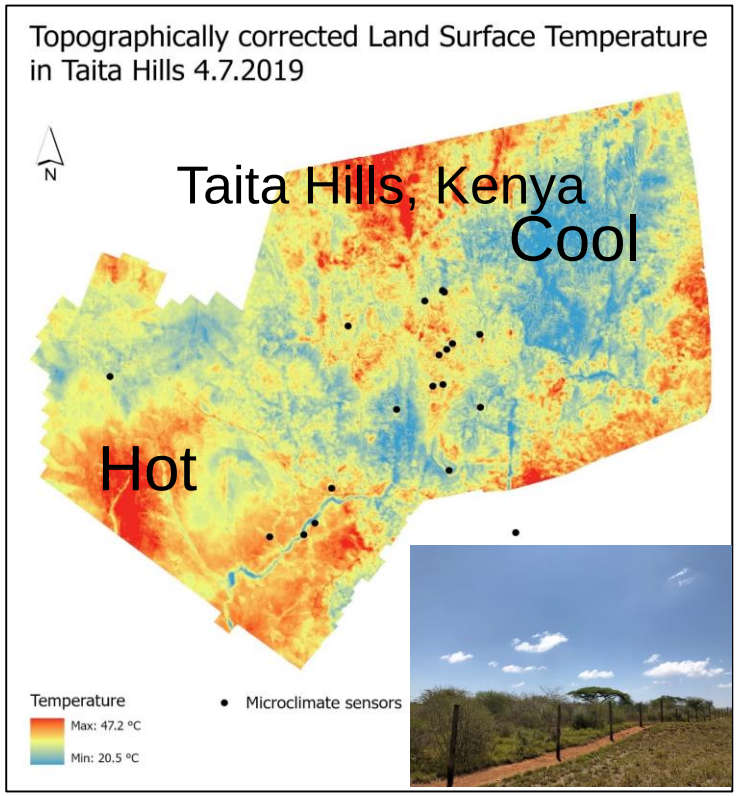

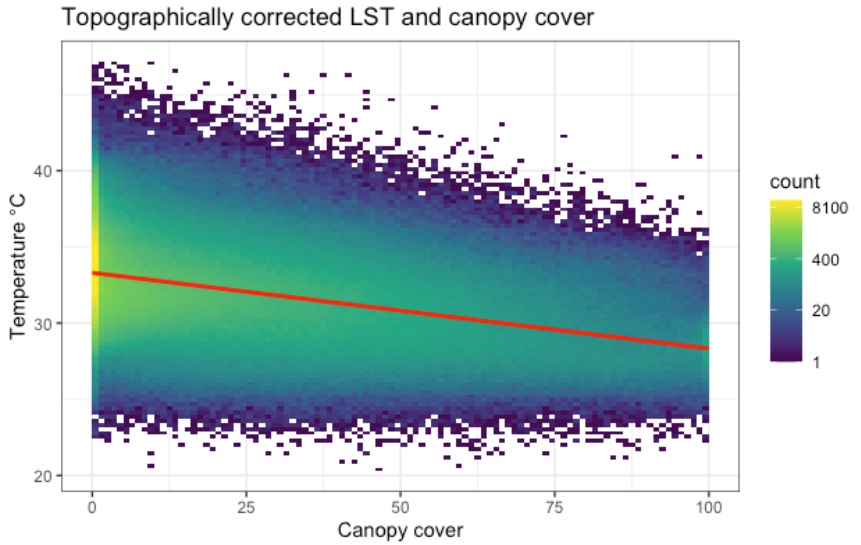

Decrease of land surface temperature by increasing vegetation canopy cover

Aalto, 2020. Assessing the cooling impact of tree canopies in an intensively modified tropical landscape. MSc thesis, University of Helsinki

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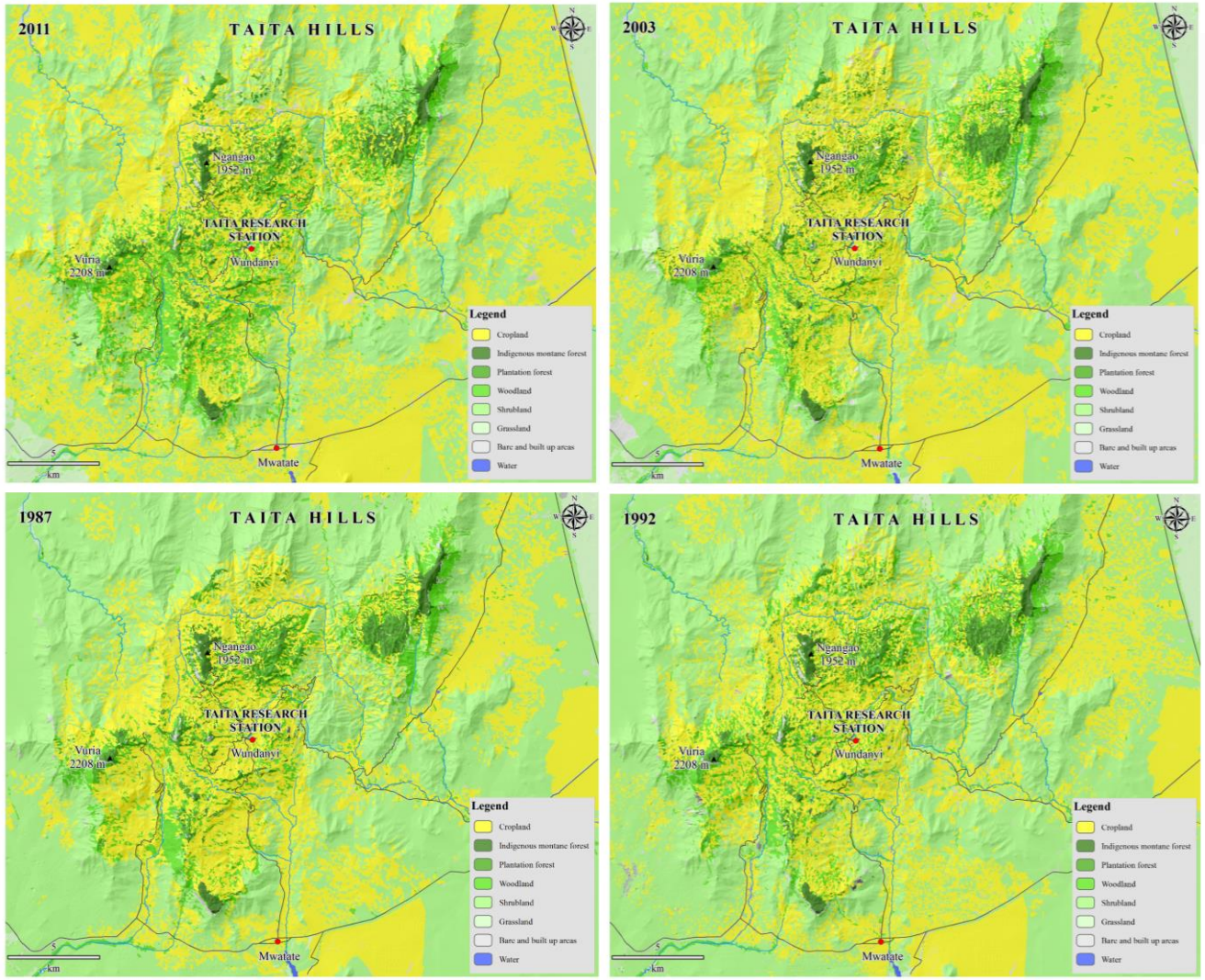
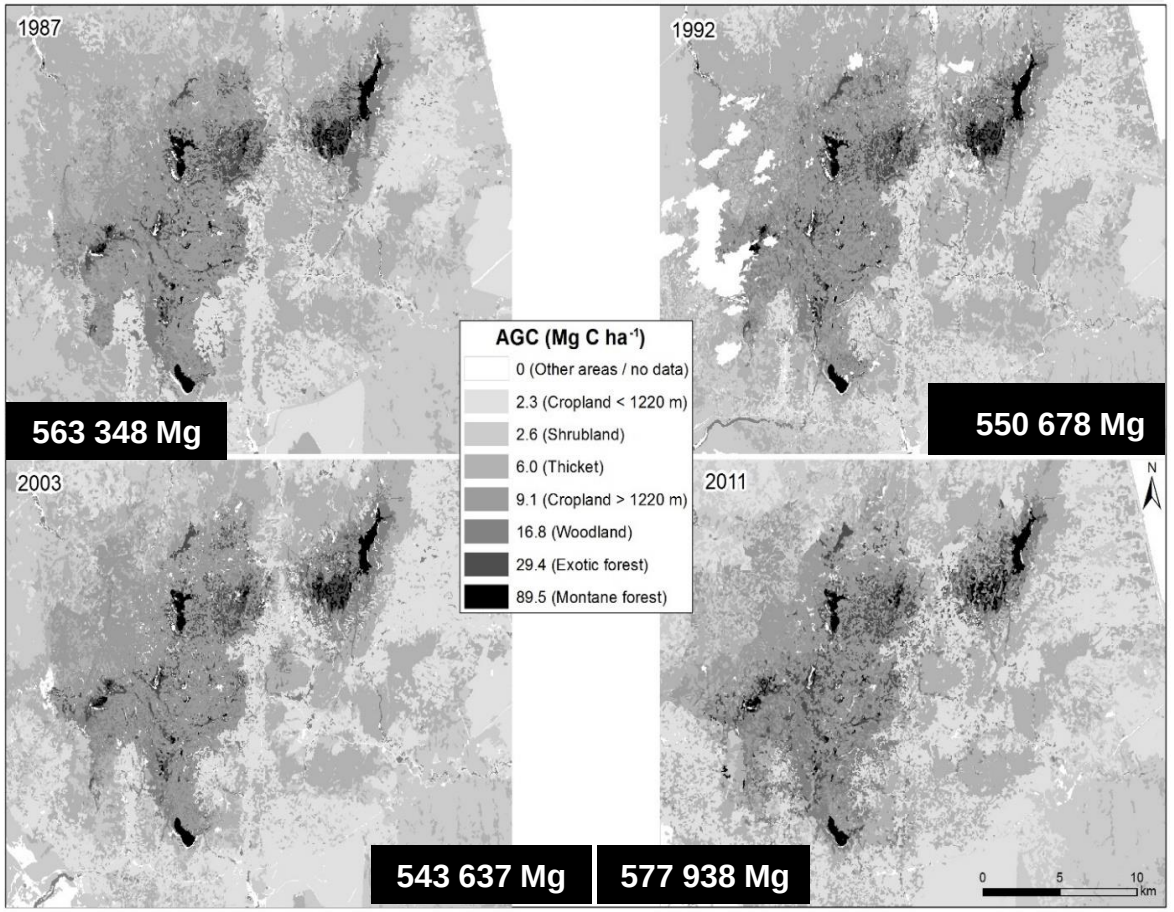
LAND COVER CHANGE (1987–2011)





Taita Hills, Kenya

Total C stock was decreasing up to 2003, but has been increasing till 2011

Increase in woodlands, agroforestry and forest (forest transition model)

25/06/2020

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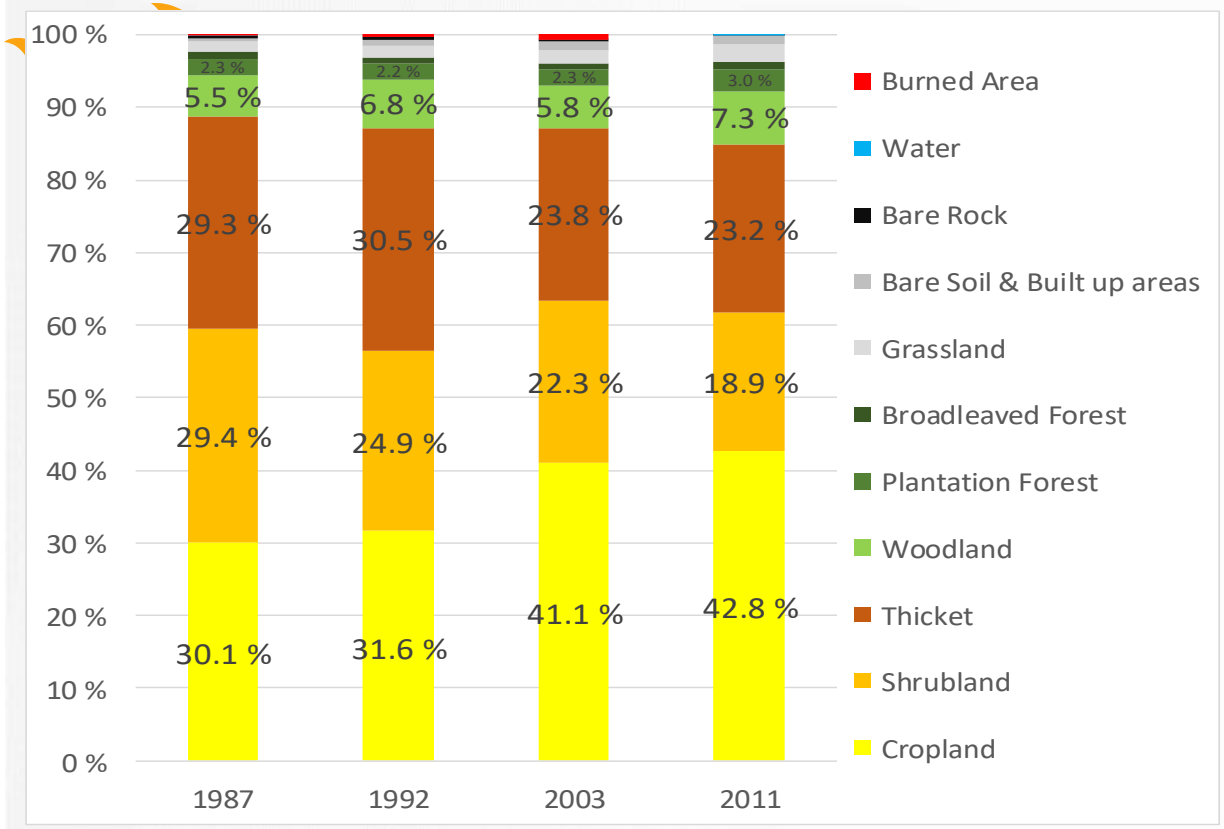

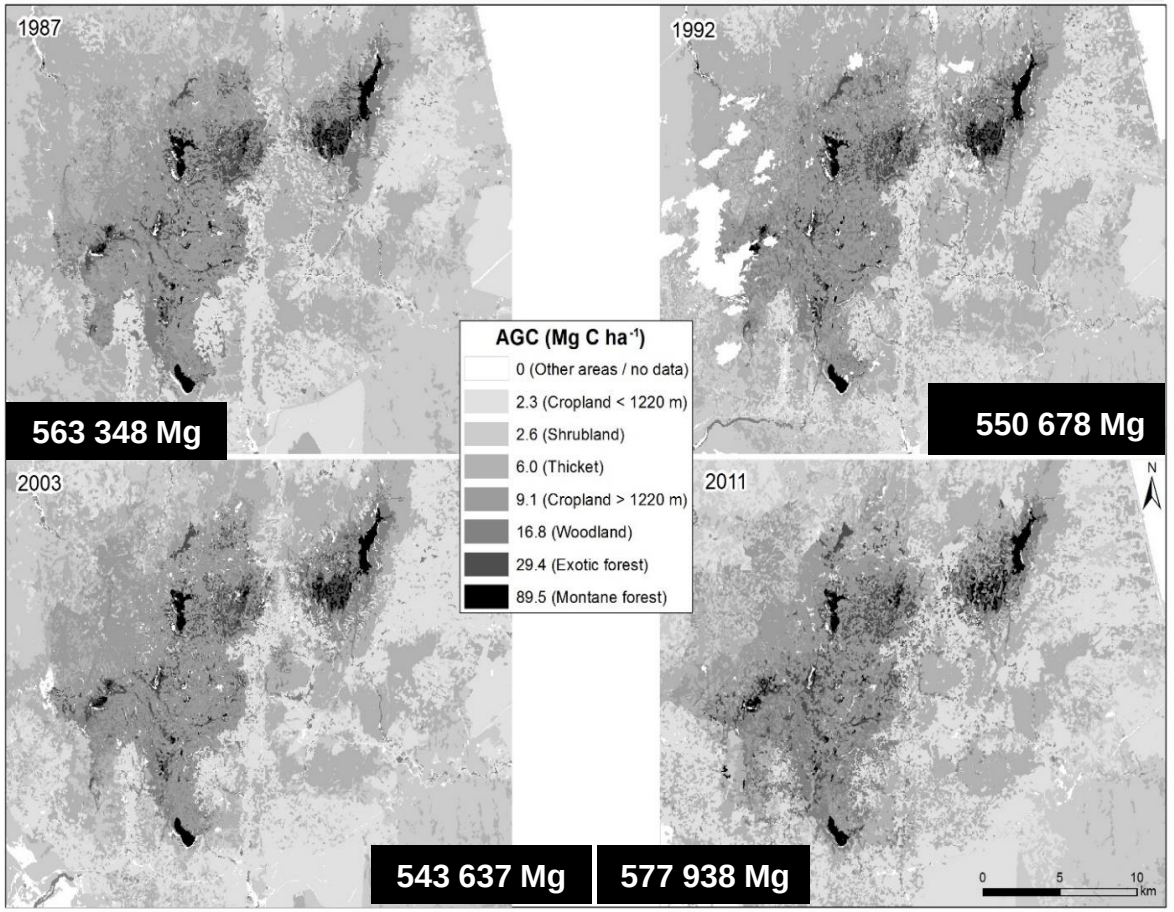

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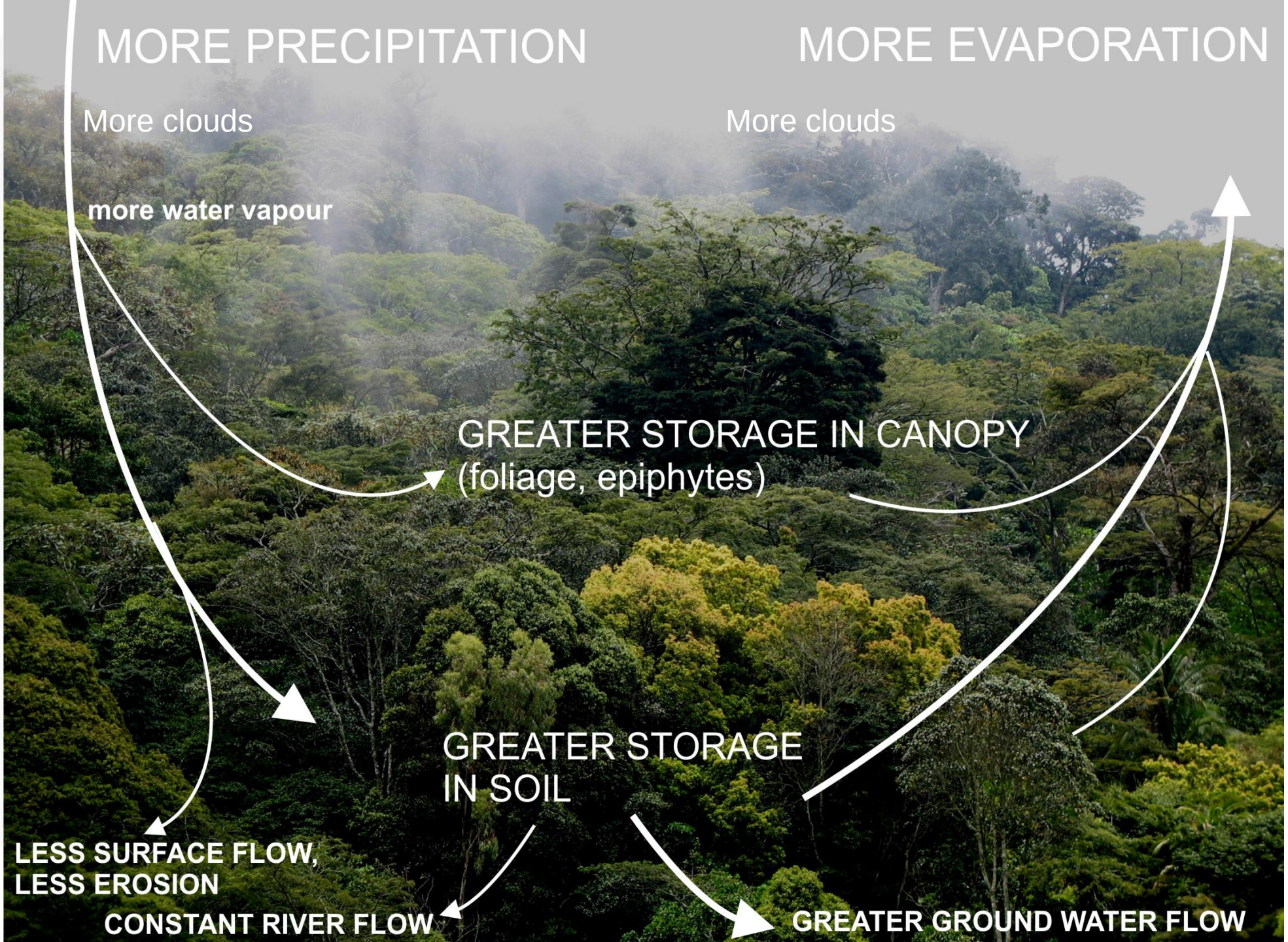
25/06/2020

Forests to capture moisture from air (fog deposit)
- 20% addition

Forests to improve water filtration to the soil → improvement in ground water

Forest to evaporate water to air → rainfall

Forests to cool land surface temperature (as seen before)



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CLIMATE CHANGE - EMISSIONS

- Africa produces only 3% of global emissions
- Africa has the world's 2nd highest growth rate in emissions from transport
- Road vehicles produce 80% of fossil fuel emissions
- Wildfires, also cause increased CO_2 levels.
- Energy consumption is growing
  - Population increase
  - Growing middle-class
  - Improvement of infrastructure

CLIMATE CHANGE - FOOD

- Warming trend
- Decrease in precipitation in North and South Africa, but increase in East African highlands
  - Risk for intensified soil erosion due to decreased vegetation cover
- Yield losses by 2050 from 15 to 22% in sub-Saharan Africa
- Cattle suffers from heat and lack of water
- Shift in ecosystem zones (to higher elevations)
- Increase of pests and diseases
  - Locusts, rift valley fever, COVID--19

Maize stem borer

CLIMATE CHANGE - HAZARDS

- Intensified and more frequent storms
- Drought periods
- Poor weather and hazard observation infrastructure and systems
- Poor infrastructure for dissemination
- Poor road and house infrastructure in cities and rural areas
- Storm in Africa causes much more damage
- Need to develop of climate services

Dipole of the Indian Ocean 2019, most severe in 60 years, Taita Hills, Kenya

MITIGATION – ENERGY SECTOR

- Further warming is a fact as the process cannot be stopped even if greenhouse gas emissions ceased today
- Need for resilience in critical sectors such as water, energy and agriculture
- Wind, solar, ocean waves as an energy source
- Water and land management and governance more effective
- Climate change education

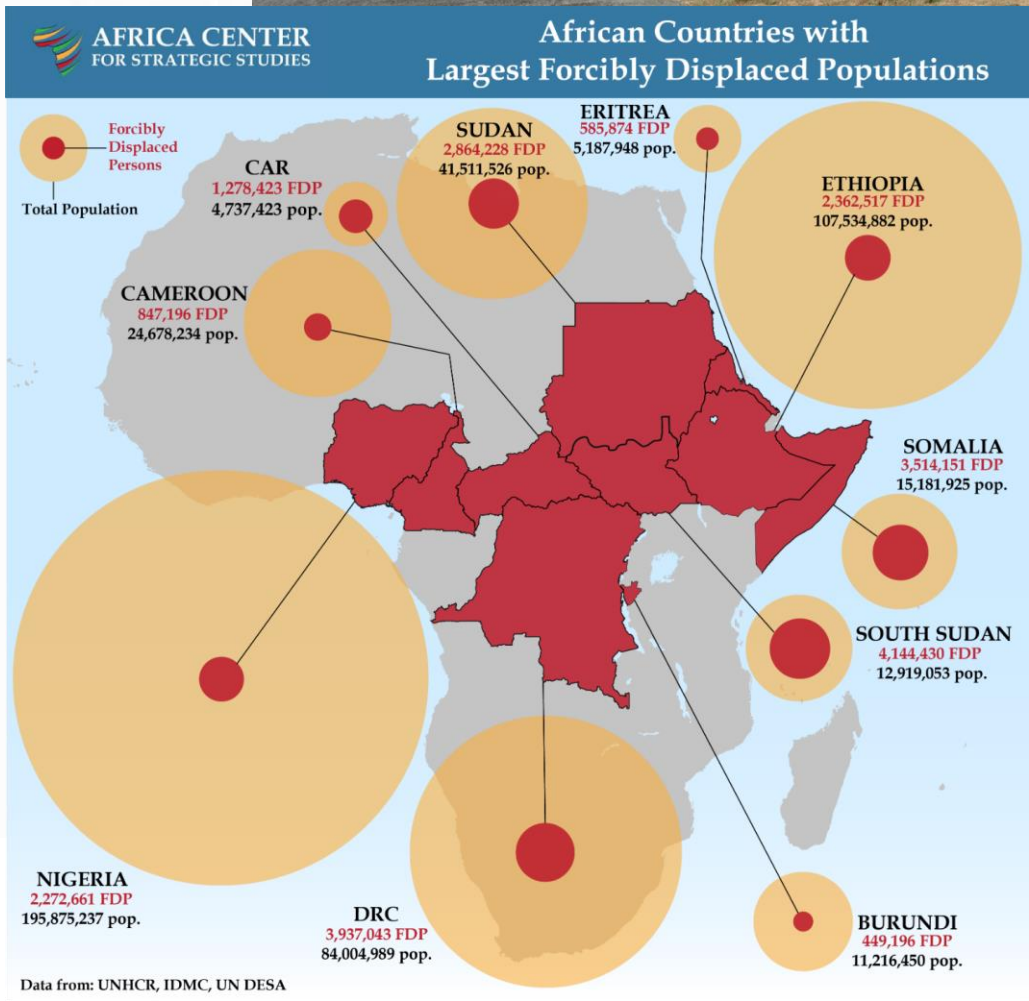
Windmills in Turkana, Kenya, Finnfund

MITIGATION – CLIMATE SMART LANDSCAPE

- Agroforestry (climate smart agriculture), trees on fields
  - Carbon sequestration, water delivery, protection against zoonotic diseases, biodiversity conservation, habitats for pollinators, soil fertility
- Transformational adaptation in pastoralism systems
  - Improving tree cover by alternative income choices, such as beekeeping or production of gums and resin
- Increase of tree cover

MIGRATION

- Forced, voluntary – domestic, cross-border
- About 80% of African migration occurs within the continent
- Most Africans migrate for family reasons, work or studies
- Roughly 86% of African cross-border migration is not because of conflict
- Africa hosts about 25% of the world's refugees
- Sub-Saharan Africa experiences most internal displacement in the world



MIGRATION MOVEMENTS - MITIGATION

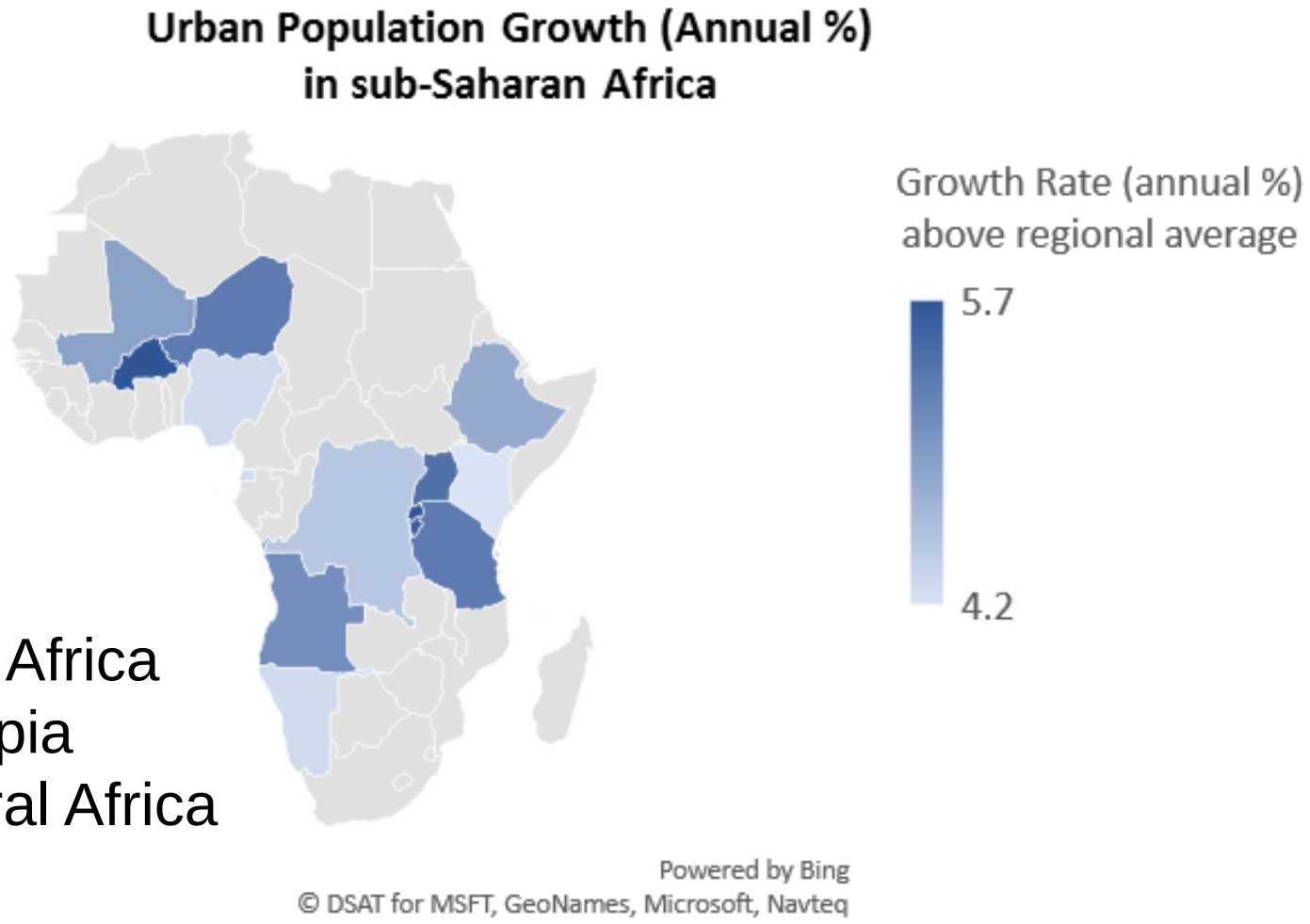
- **More data is urgently needed**
  - Two basic questions: why do people migrate and how far do they migrate?
  - Data collection should be systematised and harmonised
- **African Union: Freeing the movement of persons has to continue**
- **Climate change and population growth as push factors**
  - Droughts, heatwaves, desertification, sea level rise, flooding, extreme weather events, conflicts
  - Massive displacements are forecast → the majority are internally displaced people
  - By 2050, there will be 86 million internal “climate migrants” in SSA
- **More legal pathways to migration**
  - The most efficient way to tackle smuggling, human trafficing and other adverse effects of irregular migration

URBANIZATION - FACTS

- **The rate of urbanization in Africa is the highest in the world**
  - Urban population will be 60% by 2050
  - Urbanization is focused on medium-size cities, not just megacities
- **Differences in the course of development in Africa**
  - No straightforward link between structural (economic) transition and urbanization in Africa
  - Urbanization takes place also in countries with low economic growth and high fertility rates
- **Facts**
  - Cities depend on surrounding rural area e.g. in terms of food and labour
  - Urban employment is often informal, insecure and low-income
  - Urban poverty also growing

Voi, Kenya

Nairobi, Kenya



West Africa
Ethiopia
Central Africa

Source: World Bank 2017 indicators: “Sub-Saharan Africa”; “Urban Population Growth Rate.”

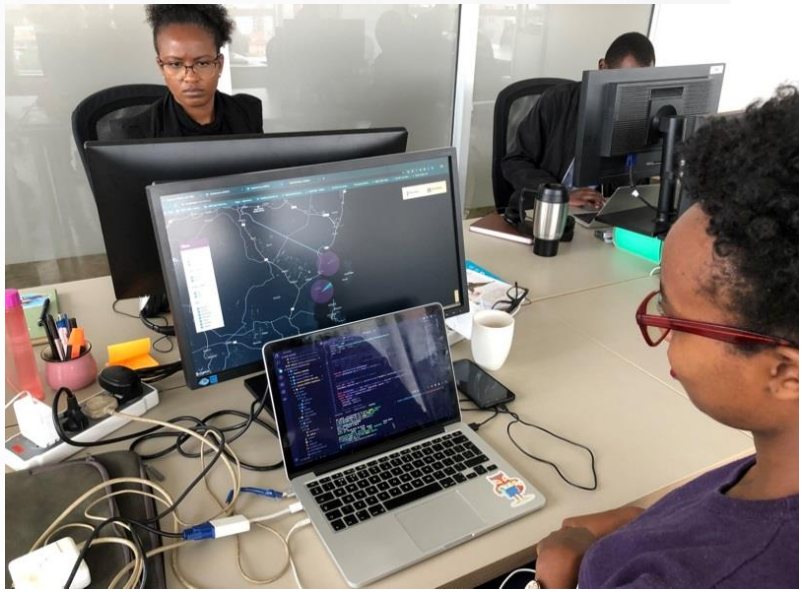
Addis Abeba

Cairo

By 2040, 9 megacities with 10 million people
Kinshasa (35), Lagos (32), Cairo (24)

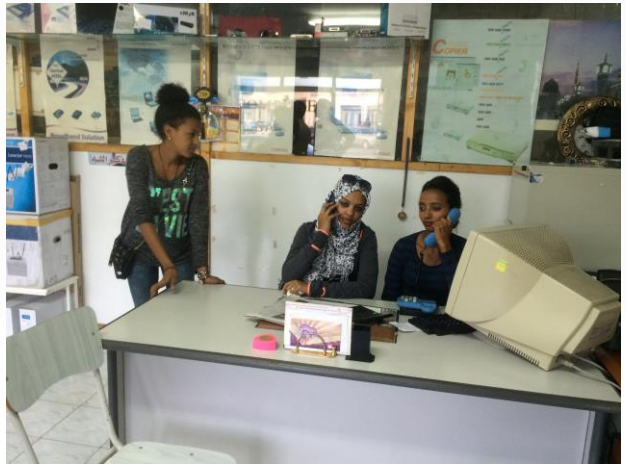
URBANIZATION - IMPACTS

- **Fast and uncontrolled urbanization causes <u>risks:</u>**
  - Growing informal sector, insecure livelihoods
  - Lack of opportunities especially for young people
  - Increasing inequality and poverty
  - Growing slum areas
  - Deteriorating infrastructure and services
  - Worsening environmental impacts & climate risks
- **With strategic planning, urbanization also yields <u>opportunities</u>:**
  - Better/higher education
  - Digitalisation, new services and employment
  - Carbon-neutral and climate-smart solutions



TECHNOLOGY DEVELOPMENT: FACTS

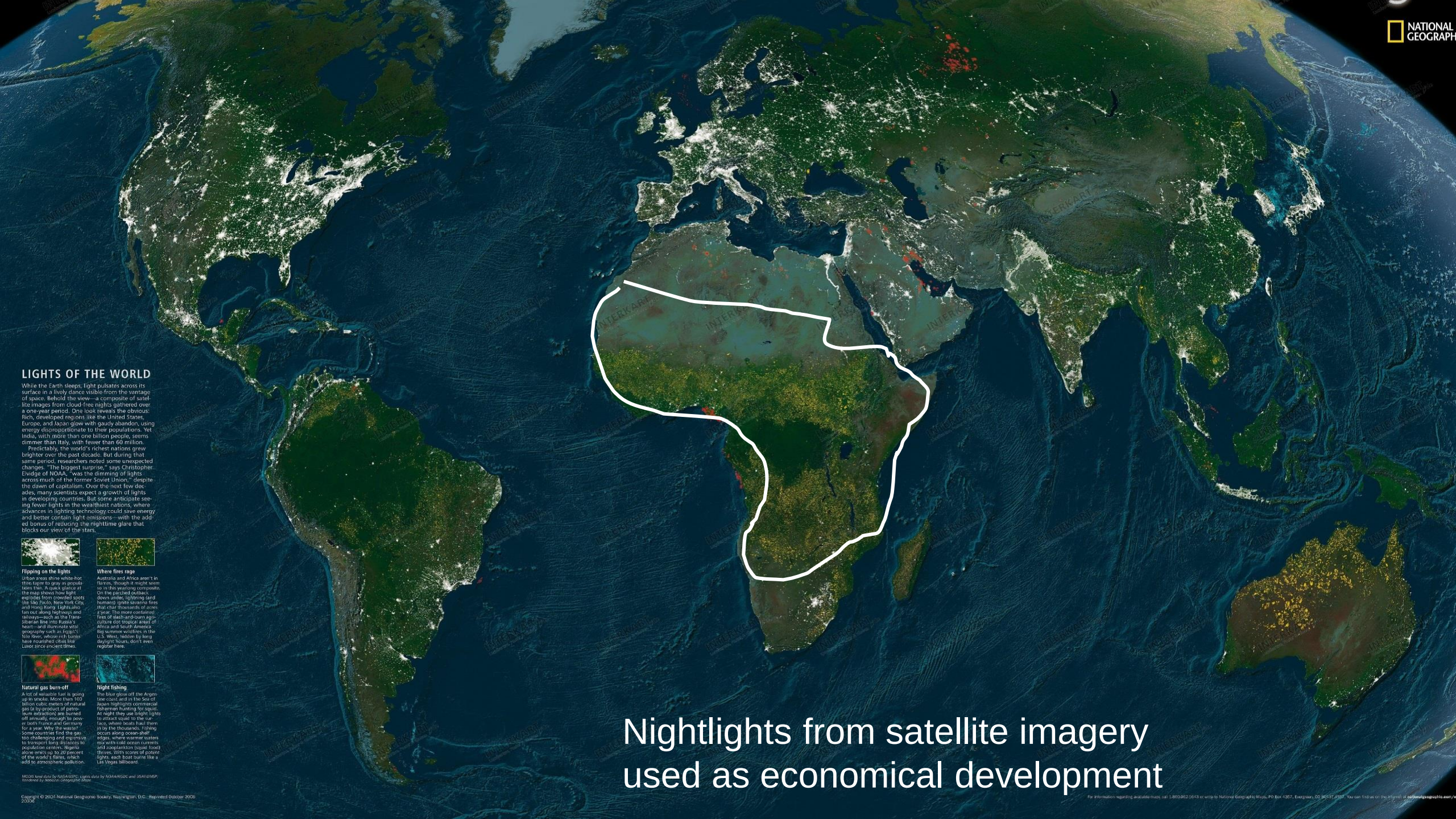
- **Huge expectations for ICT in Africa**
  - Spread of mobile phones
  - In 2000, only 1% of Africans had a mobile phone,
  - In 2019, 44% in sub-Saharan Africa alone
  - Mobile data usage is expected to grow 7-fold by 2024
  - Africa is at the global forefront in mobile phone-based money transfer and banking services
- **Other promising areas**
  - Sustainable energy solutions
  - Drones
  - 3D printing
  - Citizen science



TECHNOLOGY DEVELOPMENT – MITIGATION

- **Leapfrogging past industrial phase**
  - Not a good idea, because Africa accounts for just 1 % of the global manufacturing
- **The China factor**
  - Risks involving unpayable debts, technological security and dependencies
- **Essentialities**
  - Investments in traditional physical infrastructure (roads, bridges, ports, railways, telecommunication)
  - Basic education
  - Tackling corruption, functioning institutions

Still: the basic technological infrastructure, such as electricity and water service is missing from many



Nightlights from satellite imagery used as economical development

DEMOCRATIC DEVELOPMENT - FACTS

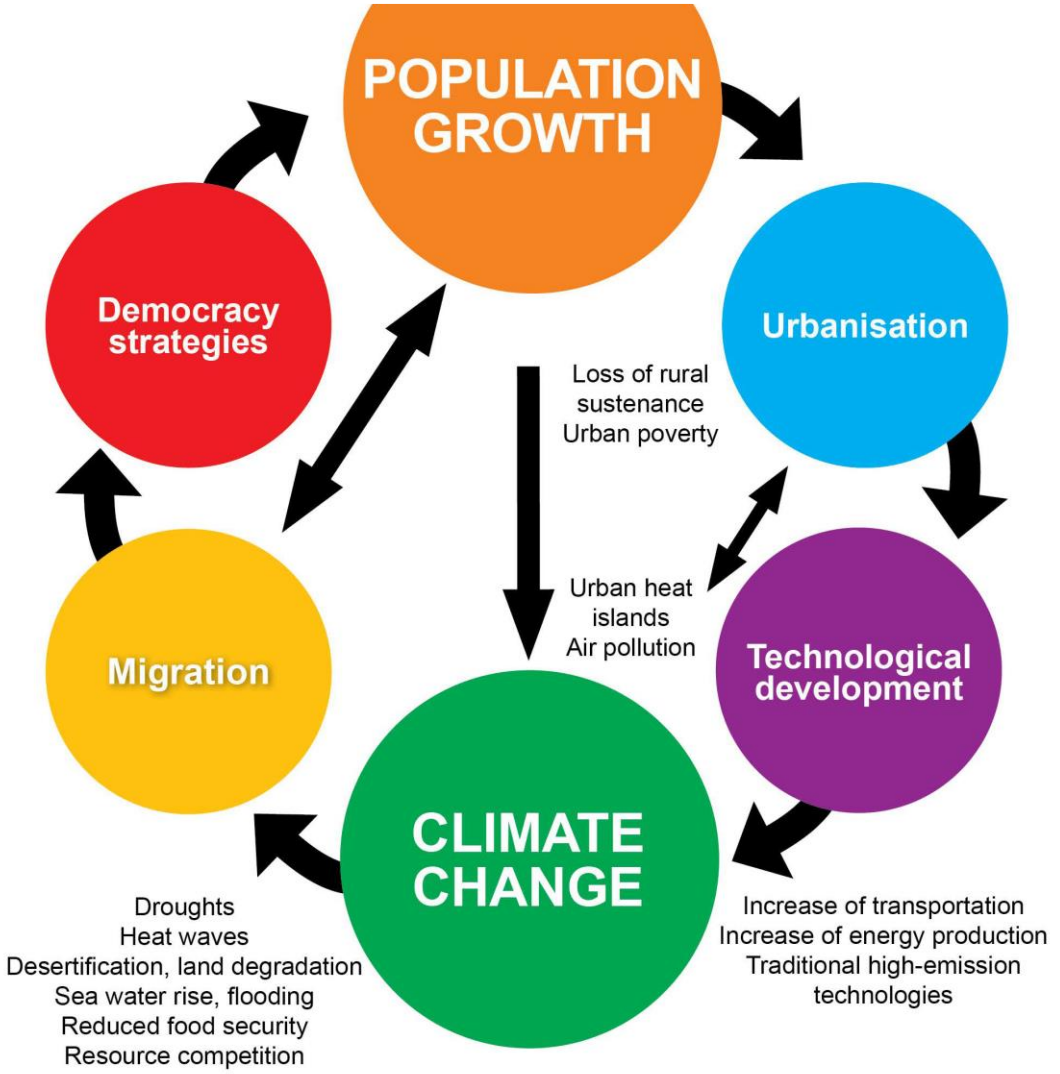
- **African democratic development has been on**
  - A trend of quantitative stagnation and slow qualitative deterioration
- **Positive trends:**
  - The institutional and legal framework for democracy is better institutionalized
  - Empowerment of women and civil society actors in politics
  - Military coups less accepted by the African community
  - Media freedom situation better than elsewhere in Global South
- **Negative trends:**
  - Endemic corruption in large parts of the continent
  - Rollback of democratic reforms in some countries
  - Ethnic voting and political violence still common

DEMOCRATIC DEVELOPMENT - IMPACTS

- Efforts to combat corruption, fertility, and peaceful power-transfers
- However, 3 most stable democratic systems (Botswana, Namibia and South Africa) have all been ruled by the same political party for decades
- Current Western ambivalence on global democratization is a further challenge for deepening democratization
- Competition on governance ideas (e.g. from China) has provided African governments with more leverage
- **MITIGATION**
  - Developing institutional constraints on corruption fighting, tolerance of freer media
  - Showing restraint towards opponents, e.g. relinquishing power in due course after lost elections

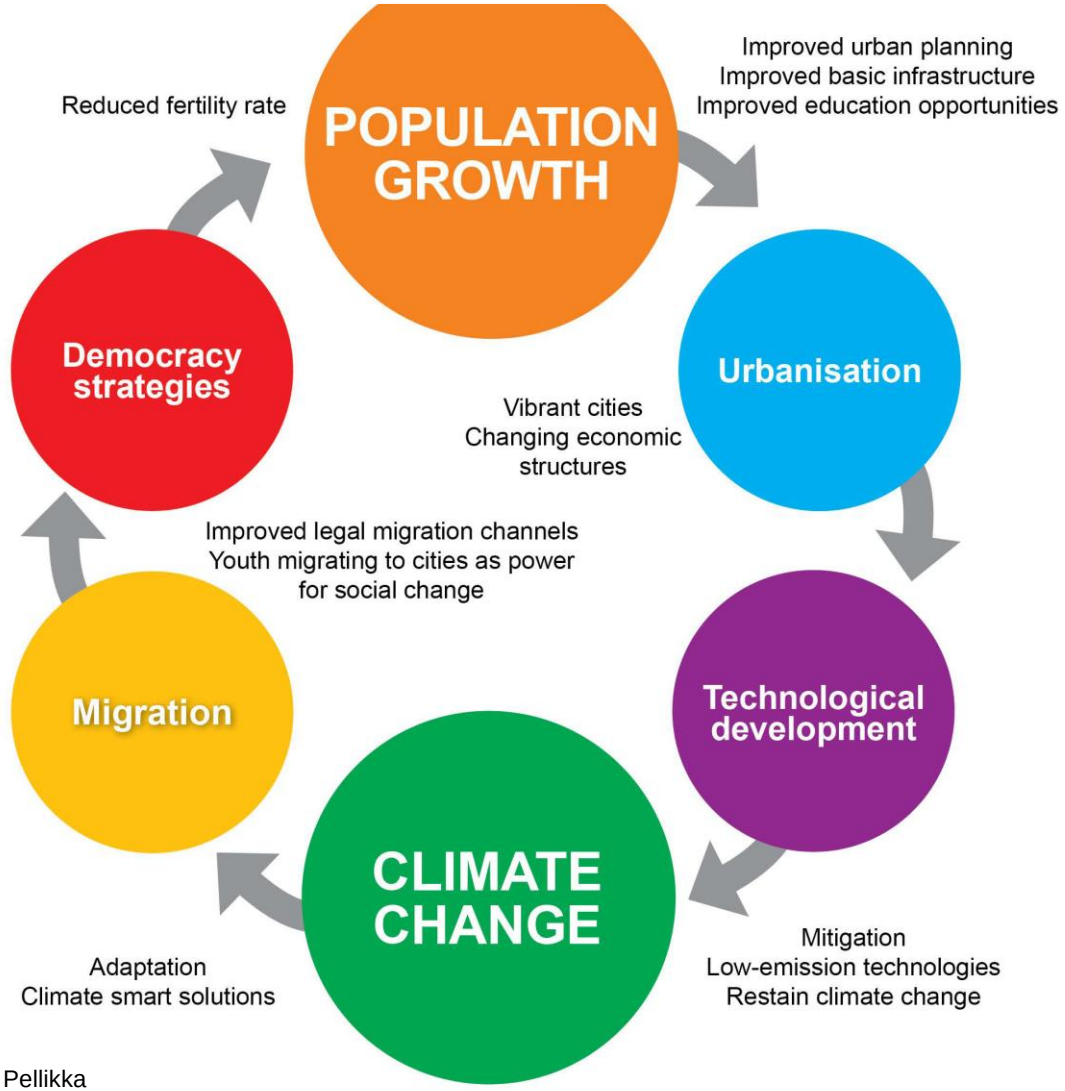
VICIOUS NEGATIVE TREND CYCLE

1. Fast population growth leads to uncontrolled urbanisation and climate change.
2. Use of high emission technology speeds up climate change.
3. Climate change and population growth will impact African migration
4. Climate change induces conflicts over natural resources
5. Human population displacements due to conflicts and climate crisis
6. Livelihoods in rural areas are hampered by climate change generating migration to cities and abroad.
7. Poor urbanisation patterns increases the vulnerability of livelihoods and urban poverty
8. It would be surprising if this would boost democracy.



1. Urbanisation with lower population growth, structural societal change, industrialisation & economic growth
2. Sustainable course by urban planning, improved basic infrastructure and better schooling
3. This contributes to lower population growth
4. Vibrant cities, functioning infrastructure and educated youth contribute to technological development & economic structures.
5. Low emission technology has mitigating impacts on climate change
6. IT provides smart-city apps, disseminate climate services
7. Climate services & climate-smart agriculture in rural areas improve livelihoods and decrease migration
8. Legal migration channels enable educated youth to migrate to cities as force for change with demands for greater political participation.
9. Democratisation would ameliorate the adverse effects of population growth

VIRTUOUS POSITIVE TREND CYCLE



Megatrends in Africa

- https://um.fi/publications/-/asset_publisher/TVOLgBmLyZvu/content/kehityspoliittinen-tilausselvitys-afrikan-megatrendit-v-c3-a4est-c3-b6nkasvu-ilmastonmuutos-kaupungistuminen-muuttoliike-teknologian-kehitys-ja-demokr

THANK YOU

More information:

Petri Pellikka, Leena Vastapuu, Mikael Mattlin, Emma Hakala

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