ECOLOGICAL FOOTPRINT OF DA NANG AND KIGALI: COMPARISON OF TWO RAPIDLY GROWING CITIES

Motivation

- COP 21: Paris agreement, sustainable development goals
- Earth overshoot day 2017 was on August 2
- Worldwide cities consume more resources than they can produce
- With growing urban population this problem will aggravate in the future
- In addition, huge difference between national and regional ecological footprint.

Ecological Footprint

Ecological footprint is an indicator of comparing lifestyle and consumption against how much the land can provide. Thus, the footprint calculations assess the amount of biologically productive land and marine area required to produce all the resources needed for existing consumption and to absorb all the waste generated.

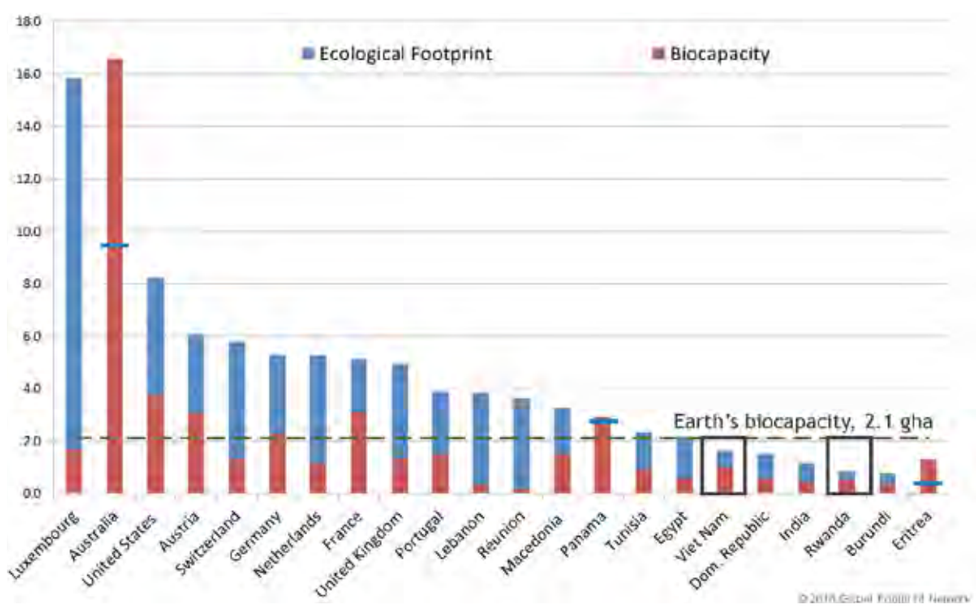
- In 1990, Wackernagel & Rees introduced the concept of measuring the sustainability
- An indicator of comparing consumption against bio-capacity
- Nature's carrying capacity vs productive land

Ecological Footprint around the world

- Like most of the countries around the world, Rwandan and Vietnamese population consume (ecological footprint) more than their land has to offer (biocapacity)
- With increasing standard of living in both countries, this situation will worsen soon

Ecological footprint: interaction between consumer and biocapacity (Adapted from: Global Footprint Network)

Ecological Footprint of chosen countries around the world (Global Footwork Network, 2016)



Case city: Kigali/Rwanda

- Capital city, supports 1/5th of Rwanda's population
- Very few natural resources (landlocked country)
- Rapid economic & population growth
- Focused on increasing average standard of life

Location of the city of Kigali

Case city: Da Nang/Vietnam

- 5th largest city in Vietnam
- Rapid economic and population growth in last decade
- High carbon emissions
- Increasing energy demand

Location of Da Nang city

All above-mentioned categories are converted to global hectare (gha)/tonne

Kigali	0.03	+	0.02	+	0.24	+	0.69	+	0.45	= 1.43
Da Nang	0.04	+	0.08	+	0.42	+	1.81	+	6.89	= 9.25

Global hectare (gha) is a common unit that quantifies the biocapacity of the earth. One global hectare measures the average productivity of all biologically productive areas (measured in hectares) based on different land types on Earth in a given year.

Results

- Rapid urban growth (economic and demographic) has resulted in higher consumption in Kigali and Da Nang
- Food consumption and material demand, especially for construction have the highest share in ecological footprint

Ecological footprint and biocapacity of case cities compared to two megacities

City/ Country	Ecological footprint	Bio-capacity
Kigali	1.43	0.50
Rwanda	0.90	0.50
Da Nang	9.25	1.00
Vietnam	1.70	1.00
London	6.60	1.20
UK	4.90	1.20
Gauteng	4.86	1.15
South Africa	3.30	1.15

Conclusions

- Kigali's population consumes almost threefold its capacity
- Da Nang' ecological is footprint almost ten times its biocapacity (this exorbitant ecological footprint must be treated with caution as due to lack of city specific data, calculations are based on national average data
- Similar to megacities worldwide, such as London and Gauteng, both these cities have higher ecological footprint than theier national average
- Surprisingly, share of construction material and food dominates compared to other cities
  - o Intensive agriculture processes
  - o Rapid construction growth
  - o Low energy related carbon emissions due to high share of biomass
- It allows governments to track their city's demand on natural resources and compare it with the available resources
- Additionally, it helps in understanding the distribution of the demand assessing dependence on imports
- identify opportunities to improve the local quality of life
- It can be used as an indicator for setting targets and tracking progress
- It can be used as a tool to inform strategic decision-making for regional economic development

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