Session 5: Presentation of City Action Plans

- Mendoza, Argentina
- Ningbo, China
- Anápolis, Brazil
- Kigali, Rwanda
Action Plan
Natural Capital Accounting (NCA)
MENDOZA CITY _ ARGENTINA

María Marta Ontanilla
Introduction to the city

LOCATION
Introduction to the city

LOCATION

CITY OF MENDOZA
Introduction to the city

Mendoza Province

GEOGRAPHY

• Precordillera
• Foothill (Piedemonte)
• Plateau

City of Mendoza
Introduction to the city

The foothill (piedemonte) is a transition unit between the mountain range and the plateau with an eastern slope.

The City urban area settles among the foothill (piedemonte) and the plateau towards East.
Introduction to the city

Mendoza Province has the biggest urban cluster in the Cuyo region

Mendoza Province Population
1.738.929 inhabitants in 148.827 sq.km with a density of 11,7 inhabitants per sq.km

City of Mendoza
115.041 inhabitants in 106,07 sq.km with a density of 1,085 inhabitants per sq.km
Vision and strategy of the city

Overall city vision

35 sq/m per inhabitant
Vision and strategy of the city / Project

- Preserve piedmont territory in order to become useful to tourists and recreation for local resident
- Preserve regulating services by making a greenbelt
Vision and strategy of the city / PIEDMONT
Vision and strategy of the city / Problems

- Expansion of informal settlements
- Informal urbanization blocks access to piedmont
- Poor infrastructure (working with World Bank)
Vision and strategy of the city

- Green strategy
  • Bring concept of ‘oasis city’ to piedmont but in a climate-resilient way

- Land use planning process
  • Territorial Plan – 2019-2030
Natural assets in Piedmont projects

1. Piedmont – native flora

2. Water - Canals stemming from Mendoza River though the Mountains
Ecosystem Services

- Irrigation of trees
- Tourism
- Recreation, jogging and cycling
Threats to services

- Main threat is informal urbanization

- Flood risk: the land phelps to absorb the water that comes for the mountain and the storm. (Natural Mitigation)

- Water: possible contamination, climate change

- Unlock access to piedmont for tourism, Recreation and sport activities like ciclyng

- Inability to visit nature reserve and connection with other sites in city.
Benefits and purposes for the city to undertake NCA

1. Map services provided by piedmont
2. Construct urbanization scenarios
   a. ‘unsustainable’ scenario: if informal settlement happen on piedmont
   b. Sustainable: if We can stop the expansión of informal settlements and improve infrastructure to existing informal
3. Compare costs and benefits
   - Benefits: look at tourism values / bring in tourists to piedmont /potential to create jobs
   - Costs : compare with other policies of providing clean water supply/ better infrastructure (roads) to informal residents that also has extra environmental benefits and unlocks access
Constraints and challenges to undertake NCA

1. Lack of experience in modelling ecosystem services (currently have land use map to define natural assets, but can’t go next step in modelling environmental benefits)

2. Lack experience in valuing environmental benefits.
Actions to be taken to conduct NCA

- Learn from other cities best practice / Investigate of other cities who have implemented similar policies.
- Acquire technical experience in environmental modelling and economic modelling
- Work with the community.
Leveraging NCA to support green urban development

- With the support of local and provincial and National Government
- Working with experts in different science but interdisciplinary
- Using Land planning process
- Incorporating this concepts at the beginning of all the projects
- Territorial Plan – 2019-2030 - NCA could help make better economic case for plan
Ningbo City, CHINA

Action Plan: Natural Capital Accounting (NCA)

Huining ZHOU senior officer
Ningbo Housing and Urban-rural
Development Bureau

James Patterson-Waterson
Head of Cities and Infrastructure
Vivid Economics
Layout of river network in the urban area

Green spaces in urban area
Drivers for economic growth:
Private economy and foreign trade

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>population</td>
<td>8.20 million</td>
</tr>
<tr>
<td>Land area</td>
<td>9365.58 km$^2$</td>
</tr>
<tr>
<td>Sea area</td>
<td>8355.8 km$^2$</td>
</tr>
<tr>
<td>Mountain area</td>
<td>4811.92 km$^2$</td>
</tr>
<tr>
<td>Water area</td>
<td>598.82 km$^2$</td>
</tr>
<tr>
<td>Length of the river</td>
<td>16,366.78 km</td>
</tr>
<tr>
<td>Built up area</td>
<td>524 km$^2$</td>
</tr>
<tr>
<td>Urbanization rate</td>
<td>72.9%</td>
</tr>
<tr>
<td>Percent of green space</td>
<td>36.5%</td>
</tr>
</tbody>
</table>
Case study 1.

Greenery option with high maintenance

IN SUMMER

IN WINTER
Case study 2.

Greenery planning with space to improve compared to Singapore’s ABC water programme

- A-active
- B-beautiful
- C-clean
VISION AND GREEN STRATEGY

1. To thick plant ecological basis, anchoring ecological framework of “two mountains, three bays and multiple corridors”.
2. To shift from passive protection to active use by developing 8 regional parks, 9 urban country parks and 10 wetland parks.
3. To replenish urban green space and establish an intensive green space system.

A global gateway city that is open, innovative and livable
What we have done?

Green roof

Nature-based solution

China sponge cities Ningbo pilot

Habitat corridor

Greenways

Nature

Natural capital accounting
Green roof

- Save land area and increase urban greening rate
- Cost effective with significant energy saving
- Absorb and purify rainwater

Since 2017, all new public buildings below 50 meters in Ningbo must be constructed with green roofs.
China’s Sponge Cities-Ningbo Pilot

Water Resources + Water Environment + Water Ecology + Water Safety

- By 2030, 80% of built area will serve as a “sponge”
- Capturing 70% of storm water runoff
Ningbo Greenways

1. Forming a "three vertical, three rivers, two rings" greenways network in the whole city
2. Versatile, tailored to local conditions
3. High public participation

By the end of 2018, a total of 1,000 kilometers of greenways were built.
Diversity conservation and natural capital accounting

1. An ecological protection red line of biodiversity conservation was delineated in the citywide.

2. Three districts and counties completed the preparation of the 2016 natural balance sheet
Key natural assets and ecosystem services essential for Ningbo city

- **Small-built features**: green roof/wall, green corridors, street trees, greenspace, water features;
- **Medium spaces**: public/domestic gardens;
- **Urban parks**: local parks, regional or national parks;
- **Natural areas**: wetlands, rivers, lakes and woodlands.
## Stock of natural assets

<table>
<thead>
<tr>
<th>Parks</th>
<th>Waterbodies</th>
<th>Street trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow of services</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Provisioning services</th>
<th>Regulating services</th>
<th>Habitat services</th>
<th>Cultural services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>Climate stability</td>
<td>Habitat for species</td>
<td>Opportunities for recreational activity</td>
</tr>
<tr>
<td>Timber</td>
<td>Temperature</td>
<td>Genetic and species biodiversity</td>
<td>Tourism</td>
</tr>
<tr>
<td>Biomass fuel</td>
<td>Flood water</td>
<td>Pollinators for agriculture</td>
<td>Aesthetic quality</td>
</tr>
<tr>
<td>Hydroelectricity</td>
<td>Air and water quality</td>
<td></td>
<td>Place-making</td>
</tr>
<tr>
<td>Clean water</td>
<td>Soil nutrient cycling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Value of services

Benefits to people, business and society
Threats to these key assets and ecosystem services

1. Ningbo population is estimated to grow with 3 million in 2049. This can be both a threat and opportunity and it depends on the growth pattern Ningbo will choose;

2. Ningbo faces extreme weather including flooding and urban heat wave;

3. How to create city’s harmony and improve wellbeing of Ningbo citizens.
What are the benefits and purpose for cities to undertake Natural Capital Accounting (NCA)

1. Integrate multiple GEF interventions in Ningbo as an overall approach (measure the impact in individual project level and government performance level);

2. Establish the baseline data to enable informed decision making;

3. Raise the awareness for the value of green space and promote education for citizens and developers
Constraints and challenges to undertake NCA

1. People have insufficient understanding of the importance of natural capital accounting;
2. Data collection of natural assets is difficult, and data held by various departments is not uniform;
3. At present, the natural capital accounting that Ningbo is carrying out is only for the physical quantity measurement of wild nature, and the value quantity lacks a common standard.
4. The property rights and accountability system of natural assets are difficult to determine
What are the actions needed to be taken to conduct NCA? How can we leverage NCA to support green urban?

1. Identify the needs from asset list;
2. Establish data inventory
3. Collect missing data and ‘hotspots’ – areas of special interest/biodiversity;
4. Conduct NCA and create optimized scenario
5. Diagnose the underutilized assets (and identify attributes of high performance) and enhance the efficiency of land use.
How to use the results of NCA for city?

1. Protecting natural assets within the ecological red line;

2. Extend the city in an orderly manner in the form of GOD (green-oriented development);

3. To enhance city's natural assets and ecosystem service through the greening of infrastructure and management in the built area;

4. Help influence a revised planning guidance document and development requirements

5. Develop a baseline to monitor future performance
# Land use planning process of Ningbo City

## Preparation
- **Organization**
- **Terms of reference**
- **Data collection**

## Research
- **Land use status**
- **Land use potential**
- **Land demand forecast**
- **Identify planning goals**

## Planning
- **Land use strategy research**
- **Preparation of planning options**
- **Land use strategy research**
- **Preparation of planning options**
- **Daft the land use plan**

## Approval
- **Review meeting**
- **Improve and finalize the land use plan**
- **Submit to the State Council**
- **Approved by the State Council**
- **Released by Ningbo government**
THANK YOU
PROJETO PRÓ ÁGUA
Andes, Amazon and Pantanal in one beautiful foto (Decolonial Atlas).
SUPERFICIAL EROSIONS

SEDIMENTATION

DEEP EROSION

FLOODING

DESTRUCTIONS

DESTRUCTIONS
Systems

Partnerships with enterprises and communities

TECHNICAL  LEGALLY  FINANCIALLY
250.000 trees planted in total.

123 springs and ciliary forests restored.

Production in partnerships of 450.000 seedlings.

Tertiary treatment of municipal sewage.

Prediction of new basic plan of sanitation with percolative drenage.

Creation of the protection area in the s´ring that supplies the city.
NBS – Technics of rural & urban infiltration

- SWALES
- TERRACING
- INFILTRATION TRENCH
- INFILTRATION BASSIN
- RAIN GARDEN
- BIO ENGINEERING
European Garden
“Little Brazilian leafs”
Urban and rural diversity
A strong strategical partnership

Mais informações:

https://www.giz.de/en/worldwide/72977.html
Pilot projects in local level

5 municipalities

ANDUS
SUPPORT TO THE BRAZILIAN NATIONAL AGENDA FOR SUSTAINABLE URBAN DEVELOPMENT
City’s goals and priorities

- Consideration of urban expansion with green infrastructure
- Sustainable flood water drainage
- Plant 1 million trees for residents benefits in 2 years
- Encourage native fruits production within the city
- Encourage environmental education in the community
- Encourage biodiversity in the city
- Encourage community engagement and civic harmony
Action Plan

Actions to be undertaken in the next year before the mayoral elections:

• **Action 1:** Collection of baseline data on natural assets
• **Action 2:** Bring together all stakeholders (mayor, air force, businesses, universities, businesses, religious institutions, judiciary)
• **Action 3:** Create a list of policies with the stakeholders using baseline data for the urban and rural areas
• **Action 4:** Create a business plan for policy implementation (timeline, funding, stakeholders, monitoring)
• **Action 5:** Legislate and integrate into the city master plan
• **Action 6:** Celebrate!!!
Thank you for your attention!
Kigali Biodiversity and Natural Capital assets

By
John KALISA

Kigali, Rwanda
Kigali Profile vs Rwanda

“Kigali City, a green, clean and secure City in Africa”

<table>
<thead>
<tr>
<th>Rwanda</th>
<th>Kigali</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area: 26,338 km²</td>
<td>Area: 730 Km²</td>
</tr>
<tr>
<td>Population: 12M</td>
<td>Population: 1,3M</td>
</tr>
<tr>
<td>Density: 435/Km² (29th and 1st in Africa)</td>
<td>3 Districts into 35 Sectors, 161 Cells</td>
</tr>
<tr>
<td>History: Genocide against Tutsi of 1994</td>
<td>70% rural while ¾ of its population are urban dwellers.</td>
</tr>
<tr>
<td>Economy: GDP 2012: $7.103 billion, $ 619 per capita</td>
<td>Growth rate of city is 10.7%</td>
</tr>
</tbody>
</table>
Kigali Overview

• The goal of the City of Kigali is to be:
  ✓ A City of character, vibrant economy and diversity
  ✓ A City of green transport
  ✓ A City of affordable homes
  ✓ A City of enchanting nature & biodiversity
  ✓ A City of sustainable resource management
  ✓ A City of Endearing character & unique local identity
Kigali Location
Kigali Development
Current Kigali Assets

KIGALI
PRESENT

731 km²
Kigali City Area

1.3 million
Household Size: 4.8

3 districts
Nyarugenge
Gasabo
Kicukiro

1,778 p/km²
Population Density

0.5 million
Kigali Development Process

KIGALI CONCEPTUAL MASTER PLAN

City Concept Plan
- Kigali City Concept Plan provides a long-term ‘Vision’ for the City

City Master Plan
- Detailed Master Plan translates the broad long-term strategies of the Concept Plan into detailed land use plans to guide the urban development.

City Zoning Plan
- A Zoning Plan is a gazetted plan translated from the Detailed Master Plan to regulate the development of each land parcel within the City.
Kigali Facts and Figures

- Total Area: 731 km²
- City Pop.: 1.3 million (2011)
- Household size: 4.7
- Gross Density: 1778 p/km²

- Rwanda
  - Area: 26338 Km²
  - Pop: 11.7 mil

- Gasabo
  - Area: 430 Km²
  - Pop: 595,000

- Nyarugenge
  - Area: 134 Km²
  - Pop: 350,000

- Kicukiro
  - Area: 167 Km²
  - Pop: 350,000

- 83% Natural/Rural
- 17% Urban area
- 7% Unplanned areas
Kigali Biodiversity and Capital assets

- Kigali Urban wetlands covers 10.6%, from reduction of 14% in Kigali Master Plan 2013.
- 50% of Kigali Wetlands have lost their ecological character
- Kigali City wetlands Potential areas for agriculture is 12.5%
- High Population density put pressure on Agriculture productivity and Urban wetlands wise use
# Kigali Bio vs Natural Activities

<table>
<thead>
<tr>
<th>S/N</th>
<th>Land use type</th>
<th>Perimeter (km)</th>
<th>Area (Ha)</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Built-up area</td>
<td>2</td>
<td>9.06</td>
<td>3.3</td>
</tr>
<tr>
<td>2</td>
<td>Cash crop (Rice – Sugar cane - green house agriculture)</td>
<td>12.7</td>
<td>82.50</td>
<td>29.7</td>
</tr>
<tr>
<td>3</td>
<td>Natural vegetation (Shrub+Papyrus)</td>
<td>6.3</td>
<td>117.80</td>
<td>42.4</td>
</tr>
<tr>
<td>4</td>
<td>Mixed crop (Perennial+ Seasonal)</td>
<td>8.5</td>
<td>41.44</td>
<td>14.9</td>
</tr>
<tr>
<td>5</td>
<td>Cattle farming</td>
<td>2.6</td>
<td>10.00</td>
<td>3.6</td>
</tr>
<tr>
<td>6</td>
<td>Perennial crop</td>
<td>2.3</td>
<td>3.69</td>
<td>1.3</td>
</tr>
<tr>
<td>7</td>
<td>Recreation Zone</td>
<td>1.5</td>
<td>13.34</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>278</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>
Case Study areas

Study Area: Nyabugogo Wetland

Legend
- Rivers
- Wetland
- Landuse
  - Rice
  - Other Crops
  - Pasture
  - Papyrus
  - Type_Main_roads

Case study
The region is bordered by the great marshy Nyabarongo River to the west and south and the Lake Muhazi to the north;

The eastern boundary of the Kigali is marked by a series of streams including the Rugende, Isumo and Rusasa that drain into the Nyabarongo;

The Kigali City region is mainly drained by the Nyabugogo River, a main tributary of the Nyabarongo, which is fed by the Lake Muhazi outflow, the Kaguhu and several smaller streams;

The Nyabugogo River begins at the confluence of the Lake Muhazi outflow and the Kaguhu stream in the north-east of the study area;

The Nyabugogo flows south to the Kigali main city area where it is joined by other smaller streams and turns south-west to join the Nyabarongo River.

The river skirts the Kigali main city area marking the southern boundary of the study area, eventually turning south joining with the Akanyaru River to form the great Akagera River that flows into Lake Victoria.
Urban wetlands use

- Fig 2

- Over grazing
- Use of agriculture inputs
- Clearing vegetation
- Over exploitation of the wetland
- Fish harvesting
Urban wetlands - NBS Projects
Potential projects

Kigali Urban Environmental restoration: GEF 7, Nyabugogo upstream, Nyandungu Wetlands ecotourism park, Nduba Waste Management, Mpazi Drainage, Rwampala up&down, Nyabarongo Urban wet, etc.
Kinyinya Green City Develop
Nyandungu Urban Wetland Ecotourism park
NCA Head up

**National Level**
- Land Account
- Water Account
- Mineral Account
- Ecosystems Services
- Energy?
- Current Status

**Leading Institutions**
- Ministry responsible for Natural resources and environment (Land, Water, Forest, Mining)
- Ministry responsible for Finance and Economic Planning
- Statistics Bureau
Agricultural Land - Use categories in Wetlands
Challenges and Gaps in Urban Wetlands Governance

**Challenges**
- Conflicting policies and laws (Weak institutions)
- Weak enforcement tools
- Lack of compliance at local level

**Gaps**
- Weak coordination and cooperation
- Low institutional capacity
- Political interference
Drivers for changes and balance - Rwanda

- Political commitment
- Strong institutional set up: Natural resources Authority in 3: (Forest & Water, Land Management & Mining Board - then Water B)

  - Water and Wetlands hanging.....then Board establishment (Nov. 2018);
  - Organic law are being repealed: Conflict between environment and development: Irrigation vs conservation?

Challenges ahead
Drivers for Urban wetlands Wise use

- Political Interest
- National Interest
- Geo-politics and Geo-economics (Regional & International Integration)- Regional Water conservation: Think locally and react globally (Funding)!
- Dealing with Inconsistency-Incoherence-inefficiency
- Promoting wise use of wetlands through nature based solutions

Next steps- Decentralizing the concept
AHSANTE SANA!