ALTAMIRA BEYOND BELO MONTE

Gaps and opportunities for promoting sustainable development in a new energy landscape

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ALTAMIRA BEYOND BELO MONTE

Gaps and opportunities for promoting sustainable development in a new energy landscape

Boys playing in a flooded tree

@ Aaron Vincent Elkaim
“An energy landscape is a landscape whose images and functions (be they natural, productive, residential, recreational, cultural, etc.) have been significantly affected by energy development.”

(Frantál et al., 2014)
A view from Altamira
@ Dario Bosio
The Belo Monte dam
@ Betto Silva

3rd largest hydroelectric powerplant in the world

A view from Altamira
@ Dario Bosio
Over past 10 years, the local municipality estimates the population inflated from 100,000 to 140,000 inhabitants.
Altamira, Belo Monte, Xingu river and the Transamazonica highway
@ Landsat 8 (Sep. 2017)
Altamira, Belo Monte, Xingu river and the Transamazonica highway
@ Landsat 8 (Sep. 2017)
Indigenous leader puts a knife in the face of Belo Monte’s chief engineer, in a public hearing in the 1970’s

@ Paulo Jares
Informal settlements in the Altamira stream
@ Lalo de Almeida

Construction of new resettlement neighborhoods
@ Lalo de Almeida
Local fishermen, traditional practices
@ Lalo de Almeida

New neighborhoods, located on the outskirts
@ Marizilda Cruppe
**CONTEXT**

Spread of waste over the city  
@ Taylor Weidman

Provision of waste treatment infrastructure  
@ Lalo de Almeida
Increased violence in Altamira  
@ Tommaso Protti

Inflated jobs opportunities  
@ Dario Bosio
Considering the **new development dynamic** of Altamira, is the model created by the compensation and mitigation guidelines resilient, capable of accommodating future transformations and **promoting sustainable development**?
RESEARCH STRUCTURE

Altamira

Belo Monte

... before ...

... with ...

... beyond ...

uncertain / controversial
THEORETICAL FRAMEWORK

CONTEXT

STRUCTURE

THEORETICAL FRAMEWORK

KEY FACTORS

CASE STUDIES

CRITERIA DEFINITION

SPATIAL- AND SCENARIO ANALYSIS

SYNOPSIS

STRATEGIC VISION PLAN

1

2

3

4

5

6
THEORETICAL FRAMEWORK

definition of [4] key factors

01. Population

migration and population figures
urban fabric & growth
neighborhoods & typologies

a crowd in the streets
@ Tommaso Protti
THEORETICAL FRAMEWORK

definition of [4] key factors

01. Population

migration and population figures
urban fabric & growth
neighborhoods & typologies

02. Public Resources

GDP variations
governance & management
infrastructure & public space

a crowd in the streets
@ Tommaso Protti

indigenous tribe participates in public hearing
@ Aaron Vincent Elkaim
THEORETICAL FRAMEWORK

definition of [4] key factors

01. Population
- migration and population figures
  - urban fabric & growth
  - neighborhoods & typologies

02. Public Resources
- GDP variations
  - governance & management
  - infrastructure & public space

03. Jobs & Income
- employment & economic activities
  - land use & real estate
  - property & typologies

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local inhabitants fishing
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01. Population
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employment & economic activities
land use & real estate
property & typologies

04. Health & Education
public equipment
accessibility

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@ Aaron Vincent Elkaim

local inhabitants fishing
@ Aaron Vincent Elkaim

school in indigenous tribe
@ Betto Silva
THEORETICAL FRAMEWORK

case studies
THEORETICAL FRAMEWORK

case studies
SPATIAL AND SCENARIO ANALYSIS
socio-spatial transformations in Altamira
SPATIAL AND SCENARIO ANALYSIS
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SPATIAL AND SCENARIO ANALYSIS
socio-spatial transformations in Altamira

Population Principles
SPATIAL AND SCENARIO ANALYSIS
socio-spatial transformations in Altamira
Public Res. + Health & Edu. Principles

- proposed waterfront road network
- private occupation hampering waterfront accessibility
- delimitation of parks and preserved areas
- roundabouts and primary connections across the transamazonica highway
- interruption of secondary connections to the transamazonica
- new and reinforced axis for connected city
SPATIAL AND SCENARIO ANALYSIS
socio-spatial transformations in Altamira

Jobs & Income Principles

- Preservation and revitalization of the historical city center
- Medium density | mixed use occupation.
- Low density occupation | residential predominance.
- Consolidation of marginal typologies.
- Densification around structural avenues
- Clusters of commercial, service and small scale industrial use
- Heavy industries
- Definition of a new harbour, facilitating transport of goods
- Delimitation of special interventions
- New institutional areas
- Parks and preserved areas

Scale: 0 500 1000 1500 2000 m
1. Intensity of the construction process and migratory flows

@ Lalo de Almeida
1. Intensity of the construction process and migratory flows
   @ Lalo de Almeida

2. The natural environment and productive practices
   @ Aaron Vincent Elkaim
SYNOPSIS

[5] issues to be tackled

1. Intensity of the construction process and migratory flows
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3. Land-use and urban expansion
   @ Betto Silva
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4. Society, local communities and inclusiveness
   @ Aaron Vincent Elkaim

5. Governance and public management
   @ Lalo de Almeida
Up to what extent is the current dynamic of development, promoted by the construction of the Belo Monte dam and mitigation guidelines, resulting in a resilient model for Altamira, capable of promoting sustainable development ...
SYNOPSIS

current planning approach

PROBLEM FIELD
(IMPACTS)

A.

B.

C.

D.

E.

F.

SOLUTIONS
(PROGRAMS & PROJECTS)

A.

B.

C.

D.

E.

F.
SYNOPSIS
proposed planning approach

NEW URBAN CHALLENGES

VISION
(Putting Principles)

STRATEGIES
(Cross-Related Programs)

1A.
1B.
2A.
3A.
3B.
4A.
... how can strategies and policies be used to further explore the economic potential generated, stimulating growth while minimizing possible risks?
STRATEGIC VISION PLAN
one vision, four strategies

**problem definition**

- *continuous urban sprawl*
- *pressure on natural landscape*
- *fragmentation & segregation*
- *lack of housing programs*

- *little integration and connect.*
- *poor accessibility*
- *Transamazonica avenue*
- *challenged public management*
- *plans x execution*

- *dependency on Belo Monte*
- *volatility of job market*
- *little diversity of land-use*
- *low occupation rate*

**inclusive, green, growth**

**vision**

**strategies**

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Vegetation condition next to the Transamazonica highway
@ Coen Wubbels
**Riparian Vegetation**
Vegetation next to streams and rivers, inside the APP's (protected areas).

**Ivy and Bryophytes**
Dense embrophillus forest. Large biodiversity.

**Regeneration Landscape**
Reestablishment of vegetation or increase tree cover through natural or assisted processes.

**Agriculture Land**
Productive fields surrounding the urban areas. Some might considered degraded lands.

**Parks & Leisure**
Designed landscape for public use of the population of Almatyr.
**riparian vegetation**
Vegetation next to streams and river, inside the APP's (protected areas).

**ivy and cly vegetation**
Dense embrophylic forest. Large biodiversity.

**regeneration landscape**
Reestablishment of vegetation or increase tree cover through natural or assisted processes.

**agriculture land**
Productive fields surrounding the urban areas. Some might considered degraded lands.

**parks & leisure**
Designed landscape for public use of the population of Altamira

**non-productive vegetation**
Preserved and protected areas, without human extraction and activities.

**extractivism**
Extraction and use of natural resources produced in the forest in small scale practices. Also ensures preservation and maintenance of the vegetation.

**wood agroforestry**
Production system integrating crop and forest components through a combination of tree species. Products imply a reduction (temporary) of forest biomass.

**non-wood agroforestry**
Production system integrating crop and forest components through a combination of agricultural crops. Products do not affect the standing forest. Focus on native species.

**rotative agriculture**
Combination of permanent and temporary crops, ensuring rotativity of production and nutrients, preserving the fertility of the soil.

**production centers**
Community centers for maintenance, gathering, selecting, connecting, learning, preserving and so on...
strategy 2

ALTAMIRA & PUBLIC LIFE

the Xingu river, distant and isolated by private properties

@ the author
Legend:

- structural avenues and interventions, including new waterfront system
- primary roads, connecting multiple neighborhoods
- secondary roads, between different neighborhoods
- local interventions, for improving local connectivity
- new roads and connections, to be constructed

C Transamazonica nodes & intersections

- Cul-de-sac, limiting connections to the Transamazonica highway
- informal occupations along the Transamazonica, to be regularized
- possible site for heavy industry, along the Transamazonica highway
**STRATEGIC VISION PLAN**

**S2 | New marginal avenues**

**current waterfront occupation and land-use**
private properties and urban allotments bordering protected areas

**proposed waterfront roads and occupation**
public roads in the boundaries between private allotments and preserved areas, ensuring access to the waterfront
STRATEGIC VISION PLAN

S2 | New marginal avenues
New “parks” of Altamira

@ the author
strategy 3

ALTAMIRA, LIVE & WORK

Government financed housing project
@ the author
1. Administration of resources and housing stock
2. Financing projects and establishing new PPPs
3. Information and technical support for population

Informal settlements along the Transamazonica highway
*Photo credit: author*
STRATEGIC VISION PLAN

S3 | Current zoning approach

AVERAGE CITY BLOCK [2:1 : 3:1]
CURRENT ZONING STRATEGIES

AVERAGE URBAN PLOT [10M X 25M]

AVERAGE CITY BLOCK [2:1 : 3:1]
PROPOSED ZONING STRATEGIES

MULTIPLE PLOT SIZES

[ SINGLE-FAMILY] SOCIAL HOUSING
[ SINGLE-FAMILY] RESIDENTIAL PLOTS
[ LOCAL SCALE] COMMERCIAL SIZED PLOTS

[ SOCIAL HOUSING] [ MULTI-FAMILY]
[ RESIDENTIAL | MIXED USE] [ MULTI-FAMILY]
[ COMMERCIAL | LARGE SCALE]
1. expanding
   a. urban allotments  b. private allotments

2. densifying
1. Expanding
   a. Urban allotments
   b. Private allotments

2. Densifying

Low density residential typology

- Single-family social units: Housing projects financed by federal housing programs. Municipal and ownership. Use concession.
- Single-family housing units: Housing projects, private ownership. Percentage of social units is encouraged. Limitation of constructive potentials and heights, according to neighborhood.
- Pluri-family social units: Housing projects developed by municipality and/or public-private partnerships. Municipal and ownership.
- Pluri-family housing units: Housing projects, private ownership. Percentage of social units is encouraged. Limitation of constructive potentials and heights, according to neighborhood.

Medium density mixed-use typology

- Mixed-use/office buildings: High-density social housing projects. Financial and constructed by municipality and public-private partnerships.
- Pluri-family housing units: Housing projects, private ownership. Percentage of social units is encouraged. Limitation of constructive potentials and heights, according to neighborhood.
- Commercial buildings: Local scale stores, markets, restaurants of bars to supply street or neighborhood elements.
- Larger social housing projects: Bringing new jobs to the neighborhood.

Medium density commercial typology

- Household per block (avg): 60 - 70 h / block
- Estimated density in typology: 200 - 250 inhabitants / ha

Legend:
- Single-family units
- Pluri-family unit, medium density
- Pluri-family unit, large structures
- Single-family units
- Pluri-family unit, medium density
- Pluri-family unit, large structures
- Local market and stores
- Neighborhood-scale commercial use and offices
- Larger structures, city and region scales
- Local industry, low impact
- Heavy industry
1. expanding
   a. urban allotments
   b. private allotments

2. densifying

possible sustainable occupation pattern of the allotments

Urban Typologies

Rural occupation typology

single-family residential units
Many of them already existing. Small density occupation, likely (but not necessarily) associated with the agricultural production.

small scale commercial units
Local markets for processing and distributing production. Possible bars and restaurants, pharmacies and other goods associated to the daily life of the community.

agricultural occupation of the plots
Rotative crops, varying between small- and medium- cycles of production according to proximity to urban centers.

empty plots, for low density occupation
The typology does not exclude further housing expansion. It simply prioritizes productive activities, focusing urban growth and densification in the selected areas while promoting income generating activities for the local community.

household per block (avg.): < 20 hh / block
estimated density in typology: 50 inhabitants / ha

legend:
- Single-family units
- Pluri-family unit, medium density
- Pluri-family unit, large structures
- Single-family units
- Pluri-family unit, medium density
- Pluri-family unit, large structures
- Local market and stores
- Neighborhood-scale commercial use and offices
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- Local industry, low impact
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1. expanding
   a. urban allotments
   b. private allotments

2. densifying

Axial densification typology

- Verticalization of the edges
- Empty plots and vacant buildings
- Height limit for special projects
- Up to 25m height limit for multi-family buildings
- Verticalization of the crossings

- Buildings of public interest, such as schools, universities, hospitals, museums, institutions, could be built up to 25m height.
- Buildings are allowed to be retained, with housing units.

Waterfront densification typology

- Height limit for single-family units
- Height limit for multi-family units
- Verticalization of the edges
- Empty lots and vacant buildings

- Buildings of public interest, such as schools, universities, hospitals, museums, institutions, could be built up to 25m height.
- Buildings are allowed to be retained, with housing units.

Legend:
- Existing typology (mixed-use, low density)
- Proposed densification pattern
- Height limit for single-family projects
- Height limit for multi-family projects
- Verticalization of the crossings

- Estimated density in typology:
  - 250 - 300 inhabitants / ha

- Household per block (avg): 60 - 80 hh / block
strategy 4

SPECIAL PROJECTS

‘Marginal’ road
@ the author
STRATEGIC VISION PLAN

S4 | Site conditions

Legend:
- Water equipment
- Private occupation of the waterfront
- Vacant private lots in the waterfront
- Evicted properties, municipal owned land
- Empty lots
- Public access to waterfront
- Parks
- Commercial axis
- HOPECA (hotels, restaurants, cafes)
- Institutional and educational
STRATEGIC VISION PLAN

S4 | Proposed development

1. production center
   Proximity to APA, to be recovered and preserved; existing north-south, availability of empty lots, and visibility makes an ideal site for the implementation of a production center.

2. tourism cluster
   Availability of land owned by the municipality could be used as leverage for promoting a tourism cluster with hotels and agencies, while financing the construction of a small park for tourist boats, a park, and the riverfront boulevard.

3. student housing
   Diversification of needs by encouraging the development of affordable housing stock for students, partnerships between municipality, educational institutions, and developers.

4. housing cluster
   Large availability of land owned by the municipality could be the trigger for the implementation of a housing program. Proximity to central activities and existing infrastructure make it an ideal site. Could also work as an extension of the tourism cluster.

Legend:
- **water equipment**
- **private occupation of the waterfront**
- **vacant private lots in the waterfront**
- **evicted properties, municipal owned land**
- **empty lots**
- **public access to waterfront**
- **parks**
- **commercial axis**
- **HOReCA (hotels, restaurants, cafes)**
- **institutional and educational**
Worker and brick fabrication
@ Dario Bosio
STRATEGIC VISION PLAN

Action Plan

**Processes**

1. Mobilize Stakeholders
2. Design & Develop City Strategy
3. Implement
4. Evaluate & Review

**Collaborative Approach**

**Actors**

**Actions**

**Awareness & Motivation**
Highlighting the plan and its benefits, articulating and engaging with all of the stakeholders.

**Institutions & Management**
Defining new roles and responsibilities amongst governments, the private sector and civic society. Aligning and communicating policies, ensuring a collaborative approach.

**Spatial Planning & Evaluation**
Monitoring and evaluating development, ensuring proper implementation of programs and supporting the decision making process.

**Research & Development**
Investing in research and knowledge building, promoting efficiency and innovation.
## Strategies

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<th>Strategies</th>
<th>Projects</th>
<th>Key Actors</th>
<th>Description</th>
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</thead>
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<tr>
<td><strong>ALTAMIRA &amp; THE NATURAL LANDSCAPE</strong></td>
<td>1a.</td>
<td>! ! ! ! !</td>
<td>The public sector plays an important role in creating policies and facilitating the implementation process. The private sector is fundamental for the financial feasibility and sustainability of the strategy. Civic society, especially local communities, carry the know-how and are empowered with the proposal.</td>
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<td>1b.</td>
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<td>1c.</td>
<td>! ! ! ! !</td>
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<tr>
<td><strong>ALTAMIRA &amp; PUBLIC LIFE</strong></td>
<td>2a.</td>
<td>! ! ! ! !</td>
<td>Again the public sector holds some responsibility of facilitating the implementation, even though the ‘productive city’ program could also be decentralized. The private sector and Belo Monte dam have a great interest in the economic potential of the strategy. Different groups of the civic society play a role in the proposal and the participation and support of institutions is fundamental.</td>
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<td><strong>ALTAMIRA, LIVE &amp; WORK</strong></td>
<td>3a.</td>
<td>! ! ! ! !</td>
<td>High dependency on the public sector. The private sector is engaged through PPP’s, aiming to assist in the financing of the projects. Institutions are important for articulating (and including) the civic society with the public and private sectors. Knowledge building is vital for a successful implementation.</td>
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<tr>
<td><strong>SPECIAL PROJECTS</strong></td>
<td>4a.</td>
<td>! ! ! ! !</td>
<td>The final strategy relies on the engagement with- and participation of the private sector. Both public sectors and institutions are responsible for evaluating and monitoring the process, ensuring the inclusiveness and accessibility of the promoted development.</td>
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### Symbology

- **Municipality**
- **Belo Monte (NE)**
- **State**
- **National Government**
- **Urban & Rural Pop.**
- **Indigenous / ‘Ribeiros’**
- **Primary Sector**
- **Secondary Sector**
- **Tertiary Sector**
- **Local and Int. NGOs**
- **Education & Research**

- ! Key Responsibility
- ! Fundamental Input
- ! Significant Output
LONG-TERM | ENDURING
(SELF SUFFICIENT)

GUIDED DEVELOPMENT
(FLEXIBLE TO SCENARIOS)
STRATEGIC VISION PLAN

Action Plan

STRATEGIES
1. Natural Landscape
2. Public Life
3. Live & Work
4. Special Projects

ACTIVE ADAPTIVE PLANNING

MOBILIZING AND MOTIVATING
STAKEHOLDERS

RESEARCH & DESIGN

NEGOTIATING & PLANNING

SHORT-TERM INTERVENTIONS

LONGL-TERM PROGRAMS

2040

2038

2036

2024
CONCLUSIONS
THANK YOU
@ the author