Scenario development for reaching urban and environmental planning integration in the context of climate change*.

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INTRODUCTION

Scientific evidence of global climate change leads to predictions of increases in the recurrence and severity of extreme hydrological events, one of the main causes of flooding and other negative impacts over the territory and the communities. Urban development, especially in coastal cities, faces the challenges of continue growing in a planned way while guaranteeing a certain level of security against future events. Since the level of uncertainty remains high, is possible to find some innovative strategies able to help decision makers to guide future expansion and design adaptation actions? The challenge in developing regions is extensive so:

*How to link development perspectives and strategic adaptation to climate change actions?*

A search for synergy within planning accords

_risk management + development= dynamic adaptation for developing economies_
0. - Towards a planning adaptation method to phase the governance challenges on development within a recognize climate change assessment at Lower Parana delta.

1. - The context:
- The lower Parana delta and its metropolisation condition
- Scales of the delta system/complexity on diverse governance actors/and developing challenges
- The Physical risks associated to climate change are defined as rising and dynamic, the societal vulnerability associated to this need to be consider in an integral way linking social economic and environment challenges. There is a clear need to **aligned developmental visions** within a more scientifically base but within and **informed and active actors**
SCALES OF THE PROBLEM

01

REGIONAL SCALE:
Complete Delta Area
Complex situations
Diversity of pressures
Diversity of actors involved

Radius: 200 Km

SCALES OF THE PROBLEM

02

METROPOLITAN SCALE:
Lower Parana Delta
Pressure on water and land related to Metropolitan expansion and new & old dynamics

Radius: 130 Km
LOCAL SCALE
Municipalities of Tigre and San Fernando

LOCAL SCALE – MUNICIPALITIES OF TIGRE AND SAN FERNANDO

Pressure on the Delta related to private urbanizations (mainly in the continental area)
Growing trend of private urbanizations in the islands as a result of the metropolitan dynamics
II. THE CONTEXT UNDER THE PERSPECTIVE OF ASSESSING DEVELOPMENT AND CLIMATE CHANGE RISK

2. - The current state of arts

Some key conflicts- development v/s climate change adaptation

- Non integration on goals-rules and actions at the diverse governance levels
- The current power deviation to Municipal level, provoke a shift to competitiveness-diminishing the long term action require to phase risk and integrate informal development
- The diverse development pressure for a un balance power and interaction of stakeholder exacerbate the problem and define contradicted actions

So the risk related to climate change and the social vulnerability are exponentially related

III. THEORETICAL FRAMEWORK

The role of planning framework into the adaptation to climate change considerations and strategies as a way to reduce risks and capitalize opportunities associated to the diverse actors and scales(from Global to local)- Fussel 2007

The role of information and knowledge networks are essential to define a more robust decision- making to face the climate change challenge on mitigation and adaptation(Jasanoff 1997)

Planning perspective-Recognizing and linking the complexity of deltaic dynamic processes and inclusive development

- An strategic relational approaches (Jessop2000)
- A actor relational approaches (L Boelens2010)
- Mix scanning approach )Etzioni 1986) vs. rational comprehensive Planning model.
1. THE Proposed approach and METHODOLOGY

- Through stakeholder interaction, scenarios were designed following a process of strategic foresight, adopting the SAS (Story-and-Simulation) approach to scenario development.

- The participatory process included the preliminary recognition of the main actors according to their role in the system (governmental agencies, NGOs, Universities, producers, inhabitants, etc.),

- The construction of the first scenarios (represented as storylines) and the quantification of the storylines for mapping. The maps were developed using GIS (Geographical Information System) as a flexible and interactive tool for revisiting the possible future progressions in the fields of urban expansion (including changes in typologies and densities), environmental conservation, productive system and socio economic indicators.

In this paper, a reflection on participatory processes is presented to address the potential of scenario development as a tool for integrating urban and environmental dimensions while withstanding the uncertainty of future climate changes and metropolitan growth.

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THE METHODOLOGY

STRATEGIC PROSPECTIVE AS A METHOD FOR BUILDING SCENARIOS

• “Rather than unveil some prefabricated future, it offers an approach that helps us build the future.”
  (De Jouvenel, 2000)

• **Pluridisciplinary** approach to capture realities in their totality considering the phenomenon regarding all the factors and their interrelations.

• Phases on Strategic prospective:
  1. Defining the problem and choosing the horizon.
  2. Constructing the system and identifying the key variables.
  4. Exploring possible futures.
  5. Outlining strategic choices.
  (De Jouvenel, 2000)

• **Strategic simulation tools**: models and **scenarios**.

THE METHODOLOGY – SCENARIOS WITHIN A STRATEGIC PROSPECTIVE PROCESS

**EXPLORATIVE**
Explore a range of possible. Groundwork:

*What would happen?*

**NORMATIVE**
Start at a goal in the future as a point of departure travelling backwards to define actions and measures to achieve the objective.

*What could be done?*

**MULTI ACTOR (or MULTI AGENT) APPROACHES**

“**Scenarios perform a crucial function as a bridge between environmental science and policy. They are effective tools for summarising and synthesising scientific knowledge in a shape that can be used by policy-makers to develop policies.**”

(Alcamo, 2001)

**Process of JOINT FACT FINDING (JFF)**

Diverse stakeholders with different backgrounds, interests and perspectives gather to produce information to facilitate decision-making.

(Pel et al., 2013; Ehrmann and Stinson, 1999).
### STAGES OF THE PROCESS. STORY AND SIMULATION APPROACH (SAS)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Establishing the scenario team and scenario panel. Coordination of the process design of the scenarios (stakeholders).</td>
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<tr>
<td>02</td>
<td>Designing the scenario framework. Definition of goals and time horizons. Methodology for understanding the context: Layer Approach or Lagrange Interpolating.</td>
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<td>03</td>
<td>Workshop #1: Development of the first story lines. Also: explanatory and narrative scenarios. Narrative descriptions of the scenarios which explain the most relevant features and their relations with the driving forces.</td>
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<td>05</td>
<td>Workshop #2: Revisiting the story lines. Establishing parameters to develop the final scenarios. Preparation for the final workshop.</td>
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<tr>
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#### SAS (STORY AND SIMULATION APPROACH) TO SCENARIO BUILDING

Developed by Alcamo (2001), it provides a general guideline to scenario building rather than a fixed protocol. It was used as a basis for designing the process taking into consideration the local conditions.

#### Knowledge-oriented actors + Practice-oriented actors

**Primary stakeholders:**
- (i) members of institutions and NGOs which work with the local governments on the development of environmental and urban plans

**Secondary stakeholders:**
- (i) academic members of different national and international Universities that are working on the area from the fields of architecture, ecology, politics and urbanism;
- (ii) members of associations of professionals from the field of architecture and urbanism who actively participate in assessments for the governments; and
- (iii) other independent stakeholders related to production, navigation, and also inhabitants of the islands.
STAGES OF THE PROCESS. STORY AND SIMULATION APPROACH (SAS)

01 Establishing the scenario task and scenario panel
- Coordination of the process
- Design of the scenarios (stakeholders)

02 Designing the scenario framework
- Definition of goals and time horizons

03 Workshop #1
- Development of the first story lines
- Narrative descriptions of the scenarios which explain the most relevant factors and their relations with the driving forces.
- They can also combine qualitative and quantitative information and translate trends into communicational stories able to be interpreted by the community.

04 PSS Planning Support System
- Quantification of the first story lines
- Development of indicators for the area.
- Generation of a GIS model

05 Workshop #2
- Revisiting the story lines
- Establishing parameters to develop the final scenarios.
- Preparation for the final workshop

06 PARTICIPATORY SCENARIOS

Horizon: 20/30 years

Area of study: Delta Front (Local level, Municipalities of Tigre and San Fernando)

Topics and Layers:
- Conceptual idea of the Delta
  - Substratum
  - Networks
  - Occupation
- Climate Change related impacts and responses
- Planning and policy
**STAGES OF THE PROCESS. STORY AND SIMULATION APPROACH (SAS)**

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**QUANTIFICATION OF STORY LINES (example)**

Combination of environmental and urban development variables to build an indicator

Climate Change-related impacts and responses

**SL** - The drainage system of the urban fringe is/is not capable to respond to regular pulses of droughts and floods coming from the Parana River and also to Extreme Hydrological Events (Sudestadas).

**Indicators to combine:**
- Recurrence of Extreme Hydrological Events.
- Amount of precipitations.
- Variations on River streamflow.
- Flooded areas.
- Population growth.
- Extension of drainage system.

**DEVELOPMENT OF GIS INTERACTIVE MODEL**

Input of the indicators into a GIS model for the development of the immersive scenarios

**2nd and 3rd WORKSHOPS** Developing of immersive simulations with the help of GIS technology. Stakeholders are aware of the spatial implications of climate variables and urban dynamics.
3. RESULTS

Development of a **participatory spatial planning exercise** that could be replicated throughout the Delta by replacing the variables according to the pressures of each area (scalar recognition on diverse actors and diverse pressures & Interactions).

Possibility to integrate **environmental and urban developing variables** and develop indicators for the area taking into account the singularities of each zone.

In a context of a not systematic/rational planning system, the experiment with **innovative tools** for supporting decision making process and improving citizen participation arises as a way to increase governance.

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Thank you!

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