

Towards a Method of Participatory Planning in an Emerging Metropolitan Delta in the Context of Climate Change.*

The Case of Lower Paraná Delta, Argentina.

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The dissertation is focused on the study of the complexity of self-organising processes that emerge in metropolitan areas located in (or near) delta territories, in order to link climate adaptation with urban development from an actor-oriented perspective. For that purpose, the research aims to develop and implement a **method of participatory design of spatial plans** that can be applied at the local level, to generate an impact at other scales. The method designed in the research also includes the development of **interactive and participatory scenarios** to think about possible future events and reflect on the necessary policy and actions to make the system respond to changes in a more adaptive way.

The case study analysed in this thesis is the **Paraná Delta** (located in Argentina), which drains the second major catchment area of South America: La Plata Basin. This large and heterogeneous delta presents many conflicts along its extension, regarding the coexistence of metropolitan and natural dynamics, in a context of high vulnerability to the effects of climate change and complex political and institutional framework.

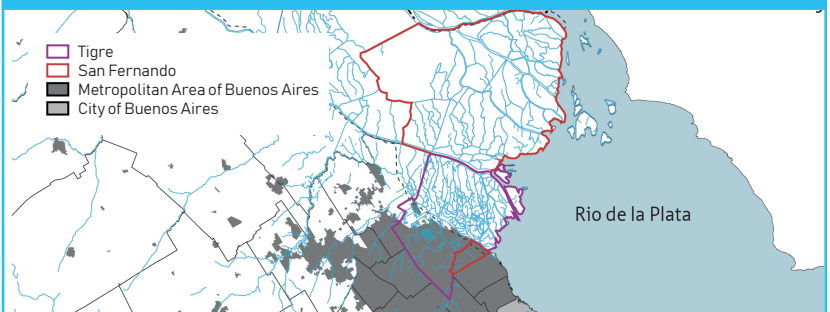
In particular, the thesis focuses on the strained situation between unbalanced metropolitan growth and changing natural dynamics that can be seen in the **municipalities of Tigre and San Fernando, located in the Lower Delta**, which must deal with this dichotomy, with a high vulnerability to intense climatic events due to their coastal condition.

The Paraná Delta



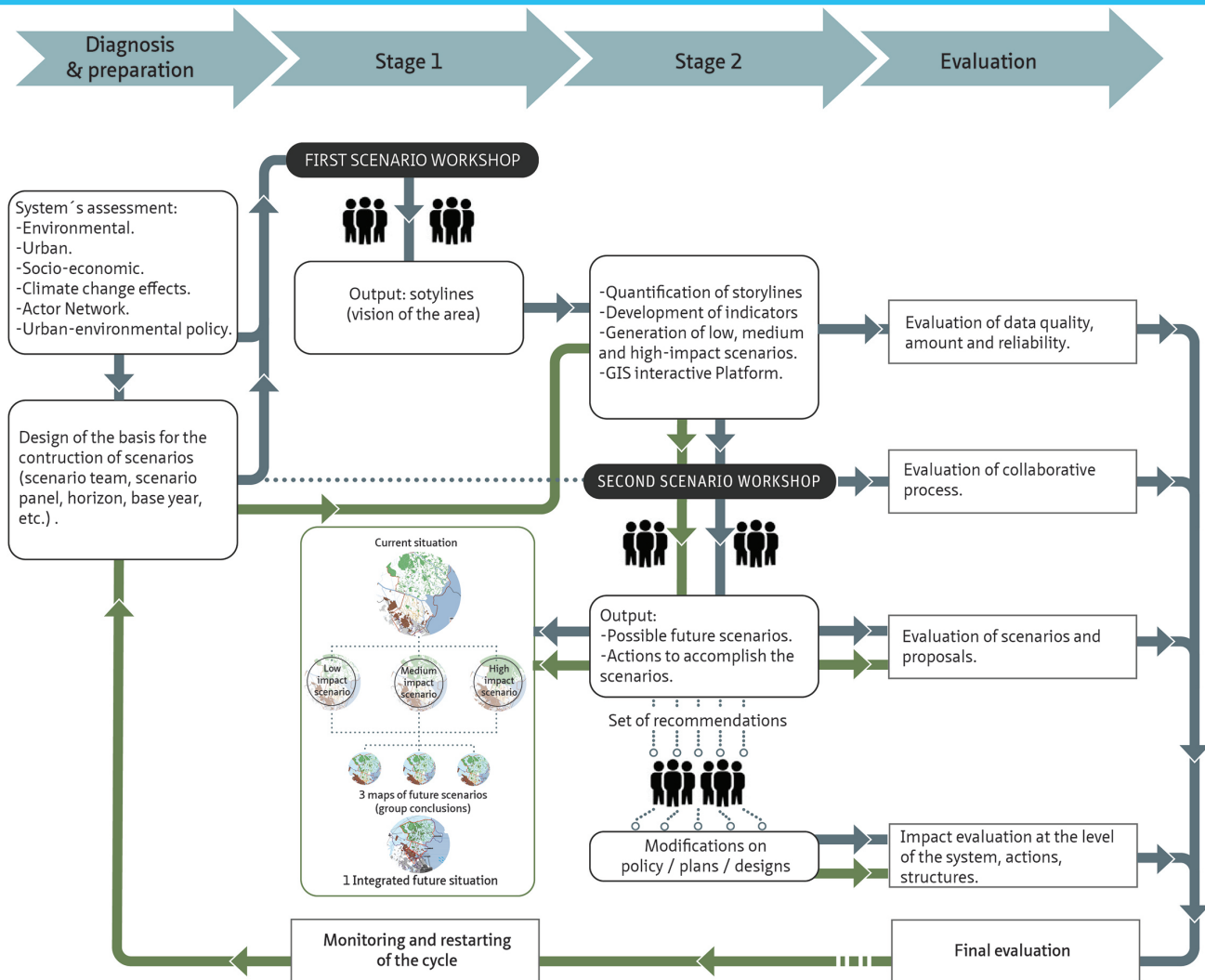
Paraná River length: 2.570 km
 River discharge: 18.000 m³/sec
 Sedimentation rate: 160 Mt/yr
 Paraná Delta Basin area: 22.587 km²
 Paraná Delta Islands and Pre-delta area: 17.400 km²
 Delta length: 320km
 Delta width: 18-100 km
 Major conurbation: Metropolitan Area of Buenos Aires
 Population (major conurbation): 12.8 million
 Population (delta islands): 23.641
 Delta area growth rate: 2.37 km²/yr

Lower Paraná Delta: main conflicts



- +**Coexistence of metropolitan and natural dynamics:** the delta grows towards Rio de la Plata, while the Metropolitan area of Buenos Aires exerts pressure towards the delta. Complex political and economical framework.
- +**Land use changes:** in the mainland, for residential purposes. In the islands: for commercial forestry, livestock production.
- +**Floods** caused by the combination of precipitations, rivers' streamflow, south-eastern winds that increase Rio de la Plata's level. Pulses of floods and droughts of the Delta: a threat for cities.
- +**Tigre:** spatial polarisation in the mainland due to the unplanned coexistence of the traditional city with gated communities (for the high-income sectors) and informal settlements (low-income sectors). Touristic development of the islands (increase of population).
- +**San Fernando:** compact urban fringe in the mainland. Loss of productivity of the islands and limited connectivity with the continent, which leads to a decrease in population.

The Scenario Method



The Scenario Method aimed to link climate adaptation and urban development from an actor-oriented perspective. It was a pilot experience that has never been applied in this context. It consisted of four stages: **Diagnosis and preparation** (assessment of the area and the actor-network, etc.); **Stage 1** (participatory development of the indicators to develop the scenarios); **Stage 2** (mapping of the indicators and participatory development of the scenarios); and **Evaluation** (analysis of the results).

The method was applied at the municipal level paying primary attention to the interactions among the different stakeholders within the system at the local scale. Nevertheless, actors of provincial and national scales were also convened to generate bottom-up impacts in the properties of the system at higher scales. One advantage of this method is that its variables are defined from the beginning by the actors, as well as the scenarios, and the possible solutions for the expected future conflicts. This characteristic turns it possible to be replicated not only in other areas of the Paraná Delta but also in other deltas, with minor adjustments.

Results

- +It developed an exchange platform between knowledge-oriented and practice-oriented stakeholders to generate knowledge and synergy between them.
- +It encouraged the participation of groups that are not usually represented in the decision-making process.
- +It convened actors of municipal, provincial and national scales to guarantee a bottom-up effect.
- +It contributed to the visualisation of the spatial implications of urban development and climate change through interactive maps and scenarios.
- +Stakeholders proposed the replication of the method in other areas of the delta, and authorities identified changes to apply in the legislation.