

# AQUATIC PRIORITY AREAS FOR THE CONSERVATION AND MANAGEMENT OF THE ECOLOGICAL INTEGRITY OF THE RIO DE LA PLATA AND ITS MARITIME FRONT

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## EXECUTIVE SUMMARY

The Río de la Plata and its Maritime Front (RPMF) comprises a region of about 260,000 km<sup>2</sup>, known as the coastal eco-region “Uruguay-Buenos Aires Shelf” (34°- 41° S), or “Transitional zone”, that is ascribed to the Argentine Biogeographical Province. It is a particular area characterized by a high diversity of fishes and invertebrates, and numerous colonies of sea mammals and birds, both from South Brazilian and subantarctic origin.

Taking into account the high conservation values of the RPMF, the absence of integrated plans for management and conservation of its ecological integrity, the main objective of this report was to **integrate the ecological and environmental information compiled and generated by the FREPLATA Project, in order to identify the Aquatic Priority Areas for the conservation and management of the ecological integrity of the Río de la Plata and its Maritime Front**. Secondly, we presented for the highest aquatic priority areas detected, its critical information gaps and research needs.

## METHODOLOGICAL APPROACH

The employed methods include identifying and mapping in a Geographic Information System (GIS), all the distinct aquatic ecological systems, and compiling and analyzing the most up-to-date species (charismatic species, engineering species, and fish, molluscs, and copepods species richness), populations (reproductive and nursery grounds for fishes and birds), ecosystem processes (phyto and zooplankton standing stocks) and habitats information (substratum types, oceanographic environments, wetlands). In addition, the document provides environmental threats (contamination, biological invasion, harmful algal blooms, habitat destruction), and data reliability for each conservation area, as well as the GIS data used in the analyses and results of the experts reviews of available data.

Once identified the Aquatic Priority Areas (APA's), by overlapping the criteria selected for the ecological assessment (species richness, focal species, and population and ecosystem processes), with the information of potential risks, it will be obtained the Critical Aquatic Priority Areas (CAPA's), which allow to rank areas regarding environmental threats and to drive environmental policies. This information and the analyses described in this report are intended to facilitate a coordinated approach to Aquatic Protection by identifying a suite of conservation areas around which governments can prioritize their future work, supporting the development of multi-site strategies and moreover, provide for the first time a baseline data set for future assessments of conservation actions.

## AQUATIC PRIORITY AREAS

Eight (8) mayor areas, distributed in the freshwater, mixohaline, coastal, oceanic platforms and shelf break environments, emerged from this procedure: (1) Buenos Aires, (2) Ortiz Bank, (3) Turbidity Front, (4) Salinity Front, (5) Uruguayan Atlantic Coast, (6) Mussel beds and Rocky Reefs, (7) Shelf Break Front and (8) Argentinean Atlantic coast. The spatial resolution of the data allowed in some cases to identify sectors with specific attributes inside the areas. In the Turbidity Front, 4 nucleus could be distinguished: (3.1) Central Area, (3.2) Santa Lucía river mouth, (3.3) Samborombón Bay and (3.4) La Tuna – Piriápolis fringe. In the Uruguayan Atlantic Coast, two sectors were isolated, (5.1) Punta del Este – Isla de Lobos and (5.2) Cabo Polonio. Inside the Mussel Beds area, as well as in the Shelf Break, south (6.1, 7.1) and north sectors (6.2, 7.2) could be identified.

By defining the APA's, the areas of ecological significance for the proper functioning of the system were substantially reduced to 102.000 km<sup>2</sup>, almost 39 % of the original surface. Anyway, APA's in the mixohaline and marine environments are still very large regions in which environmental protection policies may be impractical to implement. However, nucleus of high ecological significance have been identified in several of them, having a surface area of about 8 % of the total Project area.

## **BIODIVERSITY THREAT ANALYSIS**

The Biodiversity Threat Analysis revealed that Buenos Aires, Ortiz Bank and the Turbidity and Salinity Fronts were the APA's affected by more threats categories. Harmful algal blooms, benthic habitat alteration and contamination, affected the 3 APA's, while biological invasions were restricted to Buenos Aires and Turbidity Front. The coast, continental shelf and shelf-break were the environments less jeopardized, according with the present analysis. However, it is important to take into account that fishing was not included in the assessment. In these environments, fishing activities (overfishing, by catch) are surely the most serious threats for marine biodiversity.

## **IDENTIFICATION OF CRITICAL AREAS**

It was evident that the Turbidity front, Buenos Aires zone and Ortiz bank could be classified as the highest critical areas, because they have both functional relevance for the fluvio-marine ecosystem and important environmental risks. In the mixohaline zone, the salinity front and the coastal fringe La Tuna-Piriápolis have medium critical level, as well as the South Mussel Beds and North Shelf Break.

## **CONCLUDING REMARKS**

**The spatial distribution of scientific knowledge is highly heterogeneous.** Knowledge on Biodiversity and Ecological Processes is far to be balanced between the 5 bio-physical environments of the region. The fluvio-marine environment is the most studied region, followed by the coastal and continental shelf. The shelf-break has been poorly studied, and the freshwater environment, despite its closeness to the capitals and big cities of Uruguay and Argentina is the most poorly studied region.

**Lack of scientific knowledge on the freshwater environment is especially serious.** Regarding the high and diverse anthropogenic impacts in the area, the ecological ignorance of this ecosystem is especially grave. Basic knowledge on the ecological functioning of the system is essential to design effective environmental policies to reduce or mitigate human impacts.

**Mussel beds and rocky reefs represent very important habitats in the coastal environment.** These relatively small hard substrata habitats, sustain high species richness and seem to be important for life cycles closure of certain species. Though nowadays they may be considered as under low environmental risk, it is important to note that mussel banks were intensively exploited until 1976, reaching almost local disappearance of mussels in the two exploited banks.

**Patagonian scallop grounds are important habitats in the deep shelf.** In the continental shelf environment, patagonian scallops seem to play a similar role to that of the mussel grounds in the coastal environment. This scallop is under commercial

exploitation and the effects on habitat destruction by fishing constitute an important environmental issue.

**The biodiversity of deep waters near the shelf-break could be under risk in the near future.** Though presently they are not under human pressure, it must be taken into account that long life span, slow growth and low reproductive output make deep waters species extremely vulnerable to exploitation. Fishery industry worldwide tendencies are to move towards deeper waters as traditional fishing grounds become depleted. Ecological knowledge on these species would be generated before fishing pressure focus on them, in order to adequately manage the deep waters biological resources.

**The trophic ecology of the region is in general poorly understood.** With some exceptions (notably anchovy and hake) trophic ecology of the species is poorly understood. Energy paths across the ecosystems remain largely unknown, making difficult to predict the impact of human activities on different communities components.

**Without baseline studies it was impossible to assess the biodiversity loss.** The occurrence of several environmental risks, such as invasive species, pollutants in water, sediment and biota, etc, has been documented. However, species richness in a more pristine condition of the system is unknown, and consequently it is hard or impossible to assess the effects of those threats on biodiversity nowadays.

**The RPF region sustain a diverse biota but without endemisms.** Within the biogeographic context of the Southwest Atlantic, the FREPLATA region sustains a high biodiversity, but without endemisms reported, probably due to the fact that the region constitutes a transitional zone between warm and cold-waters. A total of 146 species of demersal fishes, 757 species of benthic invertebrates and 534 species of zooplankton, were reported for the area accordingly with our review. The absolute species richness is surely underestimated due to scarce sampling effort, particularly in the freshwater and shelf-break zones. However, available information allowed characterizing the general spatial patterns of diversity in the area.

**Frontal zones are key habitats for the biodiversity and functional integrity of the ecosystem.** Aquatic Priority Areas (excepting those in the freshwater environment) locate as bands parallel to bathymetry, and roughly coincide with the boundaries between the Bio-physical Environments. This is mainly due to the fact that APA's are related to fronts in the area (Turbidity Front, Salinity Front, Shelf-break Front). The enhanced productivity and concentration of aquatic life in these fronts make the associated communities particularly vulnerable to exploitation. Moreover, human impacts which might be concentrated in these areas such as pollution incidents, industrial and domestic waste, and accumulation of aquatic litter in the vicinity of fronts, may have a disproportionate impact because of the focus of aquatic life around fronts.

**The identification of Aquatic Priority Areas allowed to reduce about 60% the area of attention for the conservation the RPF region.** The total area the FREPLATA project is almost twice the surface area of Uruguay. By defining the APA's, the areas of ecological significance for the proper functioning of the system were substantially reduced to 39 % of the original surface.

**The identification of nucleus inside the APA's allowed to reduce about 90% the area of attention for the conservation the RPF region.** Anyway, APA's in the fluvio-marine and marine environments are still very large regions in which environmental protection policies may be impractical to implement. However, nuclei of high ecological significance (in terms of biodiversity, ecosystem processes and

charismatic species) have been identified in several of them, having a surface area of about 8% of the total Project area.

**Critical APA's represent about 6% of the area.** Moreover, by presenting the critical APA's, the most threatened sectors are located in the fluvial and mixohaline part of the system. These smaller areas, with higher risk level represent no more than 5,6 % of the total Project area (that is roughly 15.500 km<sup>2</sup>) that could be the focus of proper and urgent environmental regulations.

## **RECOMMENDATIONS AND PRORITY ACTIONS**

**Research Needs.** Biodiversity and ecology of the freshwater environment. Delimitation and ecology of rocky reefs, and mussel and scallops beds, specially fishing effects. Biodiversity and ecology of the continental shelf break. Energy paths across the ecosystem.

**Integrate the socio-economic perspective in the identification of APA's.** Combine the socio-economics and ecological perspective (ecological relevance) in the procedure of APA identification.

**Elaborate management proposes for each APA.** Determine the proper conservation and/or restoration tools for each APA detected, starting by the critical ones.

**Promote the use of the Ecological Assessment and APA's identification by the National Biodiversity Strategies of both countries.** The present National Biodiversity Strategies of Uruguay and Argentina do not address the aquatic realm, or are very poor in this area. Thus, the quality and quantity of scientific knowledge compiled and generated by FREPLATA, and mainly the analysis and synthesis carried out, could be of great utility in this theme.

**Design a System of Aquatic Protected Areas.** Using the APA's identified, design a system of protected areas covering the different environments and habitats of the region. This System should be submitted to the pertinent authorities and stakeholders of both countries, before the implementation tasks.

**Generate and promote the use of Maps of Ecological Susceptibility.** Using the results of ecological assessment carried out here, generate Maps of Ecological Susceptibility (hard copy and SIG) oriented to environmental managers. Promote the use of this tool for managers, like environmental directors of oil companies (contingency plans), navigation channels dredging, etc.

**Promote public awareness on marine biodiversity values, and sustainable resource utilization.** Public environmental education is key to change damaging practices in the future, as well as to push politicians towards sustainable policies.

## INDEX

### PART I

EXECUTIVE SUMMARY .....	2
INDEX .....	6
1. INTRODUCTION .....	7
2. METHODOLOGICAL APPROACH .....	8
2.1. Logic framework and general procedure .....	8
2.2. GIS implementation .....	10
3. BACKGROUND INFORMATION AND ZONING .....	11
3.1. Geomorphology .....	11
3.1.1. Geomorphs .....	11
3.1.2. Substratum type .....	12
3.1.3. Coastal and marginal habitats .....	12
3.2. Hydrology and oceanography .....	13
3.2.1. General circulation patterns of the Southwest Atlantic .....	13
3.2.2. Freshwater flow corridors and discharge of the Río de la Plata .....	13
3.2.3. Salinity fields .....	14
3.2.4. Temperature fields .....	14
3.2.5. Bio-physical zoning of the RPFM region .....	15
3.3. Legal aspects and policy .....	15
3.3.1. Legal zones and Protected areas .....	17

Anex I. Figures 1 to 11

### PART II

4. ECOLOGICAL ASSESSMENT .....	21
4.1. Biodiversity assessment .....	21
4.1.1. Copepods Species Richness .....	21
4.1.2. Molluscs Species Richness .....	22
4.1.3. Demersal Fishes Species Richness .....	23
4.1.4. Areas of Maximum Species Richness .....	23
4.2. Focal species assessment .....	24
4.3. Assessment of population and ecosystem processes .....	25
4.3.1. Chlorophyll surface distribution in the Río de la Plata .....	25
4.3.2. Copepods Standing Stocks .....	26
4.3.3. High standing Stock areas .....	26
4.3.4. Reproduction grounds for nektonic populations .....	26
4.3.5. Nursery grounds for nektonic populations .....	26
4.3.6. Priority areas for nektonic populations .....	27

Anex II. Figures 12 to 22

### PART III

5. IDENTIFICATION AND RANKING OF AQUATIC PRIORITY AREAS (APA'S) ...	28
5.3. Environmental Threats analysis .....	30
5.3.1. Invasive Species and harmful algal blooms .....	31
5.3.2. Benthic habitat alteration. Dredging and fishing tows .....	32
5.3.3. Sediment pollutants (critical values) and bottom debris .....	32
5.3.4. Synthesis of major biodiversity threats .....	33
5.4. Identification of Aquatic Critical Areas (ACA's) .....	34
5.5. Aquatic Priority Areas Data Sheets .....	35
6. CONCLUDING REMARKS .....	45
7. GENERAL RECOMMENDATIONS AND PRORITY ACTIONS .....	47
7. ACKNOWLEDGMENT .....	48
8. LITERATURE CITED .....	49

Anex III. Figures 23 to 28