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NUMERICAL SIMULATION FOR RIVER REGENERATION PLAN

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Abstract. The Matanza-Riachuelo Basin is a 2,200 km^2, highly polluted urban basin within the Metropolitan Region of the city of Buenos Aires. The uncontrolled discharge of high quantities of organic matter, arising from both domestic and industrial sources, have produced anoxic conditions (low dissolved oxygen content) for the most part of the Matanza-Riachuelo River, and during most of the time. As a part of a Regeneration Master Plan, driven by an active involvement of the Justice Supreme Court, a basin authority was conformed (ACuMaR), which commended UTN-INA to implement a numerical simulation study, in order to devise a strategy to bring back the river to oxic conditions. This study constituted one of the key elements taken into account by the World Bank to approve a loan to ACuMaR in order to materialize the plan. The numerical model includes the hydrologic processes (transformation of rainfall to runoff) within the whole basin, and the hydrodynamic and water quality (pollutant transport and transformation) processes for the main water courses of the basin. Four pollutant sources were identified: (i) domestic, (ii) industrial, (iii) wash load, and (iv) benthic. Sub-models were developed to estimate loads from diffuse domestic and industrial sources. Wash load, only active during rainfall events, includes contributions arising from urban activities, solid urban residues, and agricultural runoff. Benthic oxigen demand is relatively low in the under the present anoxic conditions, but it will be significant during the regeneration period. The models were validated and calibrated using measured data. The devised regeneration strategy consists in combining large infrastructure works, in order to update the central sewage disposal system, with local action at the industry level through Reconversion Plans to guarantee an effluent water quality compatible with the pretended water quality for the water body. The water quality model has been playing a leading role in establishing viable alternatives, values of design parameters for the infrastructure works, and treatment levels for the industries treatment plants. In this paper, the criteria for the model implementation and calibration are presented. The use of the model to perform a diagnosis of the system and to evaluate different regeneration scenarios, are described. The role of the model as a key decision making tool for water quality regeneration planning, is stressed.