

# Ecohydrology: New Challenges for the Evaluation of Safety of the Environment and Human Health through Water Quality Monitoring

Elena Alvareda<sup>1</sup>, Christine Lucas<sup>1</sup>, Jimena Alvarez<sup>2</sup>, Franco Teixeira de Mello<sup>3</sup>, Pablo Gamazo<sup>1</sup>, Pablo Sierra<sup>2</sup> and Adriana Piperno<sup>2</sup>

<sup>1</sup>Departamento del Agua, CENUR, Universidad de la República  
Rivera 1350, Salto, Uruguay

alvareda@fq.edu.uy; clucas@cup.edu.uy; frantei@fcien.edu.uy

<sup>2</sup>Facultad de Arquitectura, Diseño y Urbanismo, Universidad de la República  
Br. Artigas 1031, Montevideo, Uruguay

<sup>3</sup>Departamento de Ecología y Gestión Ambiental, CURE, Universidad de la República  
Tacuarembó 20100, Maldonado, Uruguay.

## Extended Abstract

It is well-known that the quality of life in cities depend largely on the management of its aquatic resources [1]. The traditional patterns of urbanization has generated water-cities conflicts that impact on physical, chemical and biological factors of watercourses [2]. In recent years, urban streams with highly urbanized areas such as the *Ceibal* in Salto city from Northwest coast of Uruguay, show significant signs of deterioration of fluvial ecosystems in urban environments due to an accelerated urbanization and consumption rates along the hydric course [3].

Within the framework of the Interdisciplinary Nucleus Project of the Republic University of Uruguay (UdelaR), *Agua Urbanas*, the spatio-temporal variability of water quality parameters of the *Ceibal* were evaluated over 15 months in 2016-2018 [3]. The concentration levels and diversity of pollutants detected in this basin, especially during flood events could affect aquatic ecosystem diversity and the human health of the Salto city inhabitants [4].

In this work we apply a systematized methodological framework to integrate the information obtained in the mentioned Project by means of geographic information system (GIS) of the *Ceibal* basin, incorporating a variety of geographic information including land use, population density and urbanization characteristics, to understand and evaluate the main features that affect the health of aquatic ecosystems across the watercourse.

The principal evidences are the deterioration of water quality caused by the presence of effluents from anthropogenic activities discharging directly into the stream, a lack of urban infrastructure to separate sanitization wastewaters from storm drains and the existence of vulnerable zones in which ecosystems are not sufficiently protected.

Some suggestions are proposed to restore and protect water ecosystems. These results could help the local government to incorporate specific actions focused on the ecosystem health in the urban water management plan.

## References

- [1] L. Pintér, D. Swanson, I. A. J. Agu, K. Nagatani-Yoshida, A. Rahman & MNP, M. K. IEA, “Training Module 5 Integrated analysis of environmental trends and policies,” *UNESCO* [Online]. Available: <https://wedocs.unep.org/bitstream/handle/20.500.11822/11306/module-5.pdf?sequence=1&isAllowed=y>, access 20 august 2019.
- [2] C. J. Walsh, A. H. Roy, J. W. Feminella, P. D. Cottingham, P. M. Groffman, R. P. Morgan, “The urban stream syndrome: current knowledge and the search for a cure,” *J. N. Am. Benthol. Soc.*, vol. 24, no.3, pp. 706–723, 2005.
- [3] Urban Waters Interdisciplinary Project, “Espacio Interdisciplinario UDELAR” [Online]. Available: <http://www.aguasurbanas.ei.udelar.edu.uy/index.php/proyecto-de-evaluacion-de-canadas-urbanas/>
- [4] E. Alvareda, F. Teixeira de Mello, G. Sapriza, P. Russo, V. Erasun, P. Gamazo, R. Texeira, A. Piperno, “Raising Awareness of Urban and Suburban Hydric Resource Pollution in Promoting Urban Water Management in Northwest Uruguay,” in *Proceedings of the 3rd World Congress on Civil, Structural, and Environmental Engineering (CSEE'18)*, Budapest, Hungary – April 8 - 10, 2018.