Watersheds as complex adaptive systems: Maipo River (central Chile) as a case study.

 Luisa E. Delgado2, 3, Víctor H. Marín1 and Copier, A.C1.

1. Laboratorio de Modelación Ecológica, Departamento de Ciencias Ecológicas, Fac. de Ciencias, Universidad de Chile

2. Fundación CTF, Padre Mariano 391, Oficina 704,

 Providencia, Santiago, Chile

 3. Escuela de Ciencias, Facultad de Ciencias, Universidad de

 Chile, PO Box 653, Santiago, Chile

Water basins are complex systems that adapt to their surroundings. These systems are composed of different components that interact with each other in various ways, leading to the emergence of patterns and entities at higher levels of the hierarchy. Hydrographic basins, in particular, have different hierarchical levels and interconnected and interdependent components. These components can be described using the DPSIR framework, which helps to differentiate between different properties at each level. The interactions between the components of a basin are localized and dynamic, allowing the system to self-organize and adapt.

Our research was conducted in the Maipo River Basin, one of the most important in Chile. It provides water to about 42% of the population and contributes 42% of the National GDP. However, the basin is facing environmental and social challenges, such as drought, climate change, increasing demand for water for human consumption and productive activities, and water pollution due to human activities. These challenges affect rural and urban ecosystems and natural and anthropic environments, where material and energy processes are exchanged.