



## **Environmental flow deficit at global scale – implication on irrigated agriculture**

Amandine Pastor (1,2), Fulco Ludwig (2), Hester Biemans (3), Pavel Kabat (1,2)

(1) International Institute of Applied System Analyses (IIASA), Laxenburg, Austria (amandine.pastor@yahoo.fr), (2) Earth system sciences, Wageningen university, Netherlands, (3) Climate Change and Adaptive Land and Water Management Group, Alterra, Wageningen, Netherlands

Freshwater species belong to the most degraded ecosystem on earth. At the beginning of the 21st century, scientists have developed the concept of environmental flow requirements (Brisbane declaration 2003) with the aim of protecting freshwater species in the long term. However, the ecological state of rivers is different across the world depending on their fragmentation, on the presence of dams and reservoirs and on the degree of pollution. To implement new regulations on river flow, it is necessary to evaluate the degree of alteration of rivers which we called “environmental flow deficit”. The European water framework directive is still working on evaluating the ecological states of river across Europe. In this study, we calculated monthly environmental flow deficit with the global vegetation dynamic and hydrological model LPJml. Environmental flow requirements were first calculated with the Variable Monthly Flow method (Pastor et al., 2014). Then, we checked in each river basin where and when the actual flow (flow minus abstraction for irrigation) does not satisfy environmental flow requirements. We finally show examples of different river basins such as the Nile and the Amazon to show how climate and irrigation can impact river flow and harm freshwater ecosystems.