

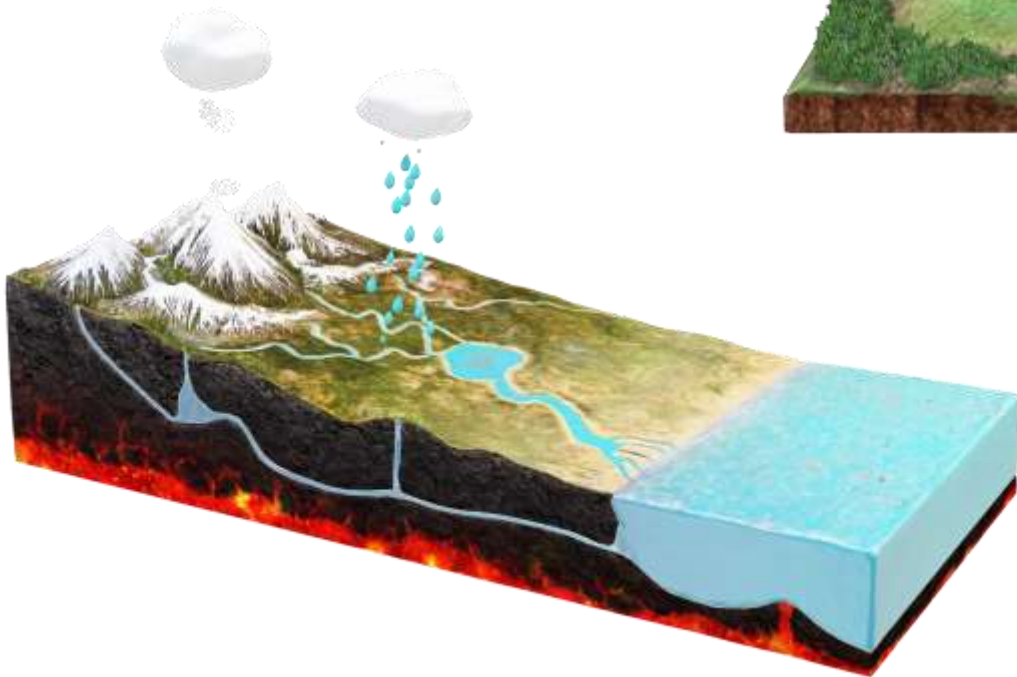
A hydroclimatic-micro-macroeconomic model to assess climate change adaptation in the agricultural sector.

The Micro-Macro modelling tool

Francesco Sapino, Ramiro Parrado, C. Dionisio Pérez-Blanco

VNiVERSiDAD D SALAMANCA

We usually simulate with conventional model, but...



The challenge: advise reliable policy in water management



- Water management policies usually target the **agricultural sector**



- Policies are informed by **models**

Our approach: a modular hierarchy

- Individual components (modules) are easy to understand
- Their interactions generate new outcomes that could not be predicted by each system in isolation (cascading uncertainties)
- Uncertainty sampled through ensembles of models & scenarios

Our approach: Micro-Macroeconomic modeling

- 2 individual modules



Our approach: Software used

- Microeconomic module:



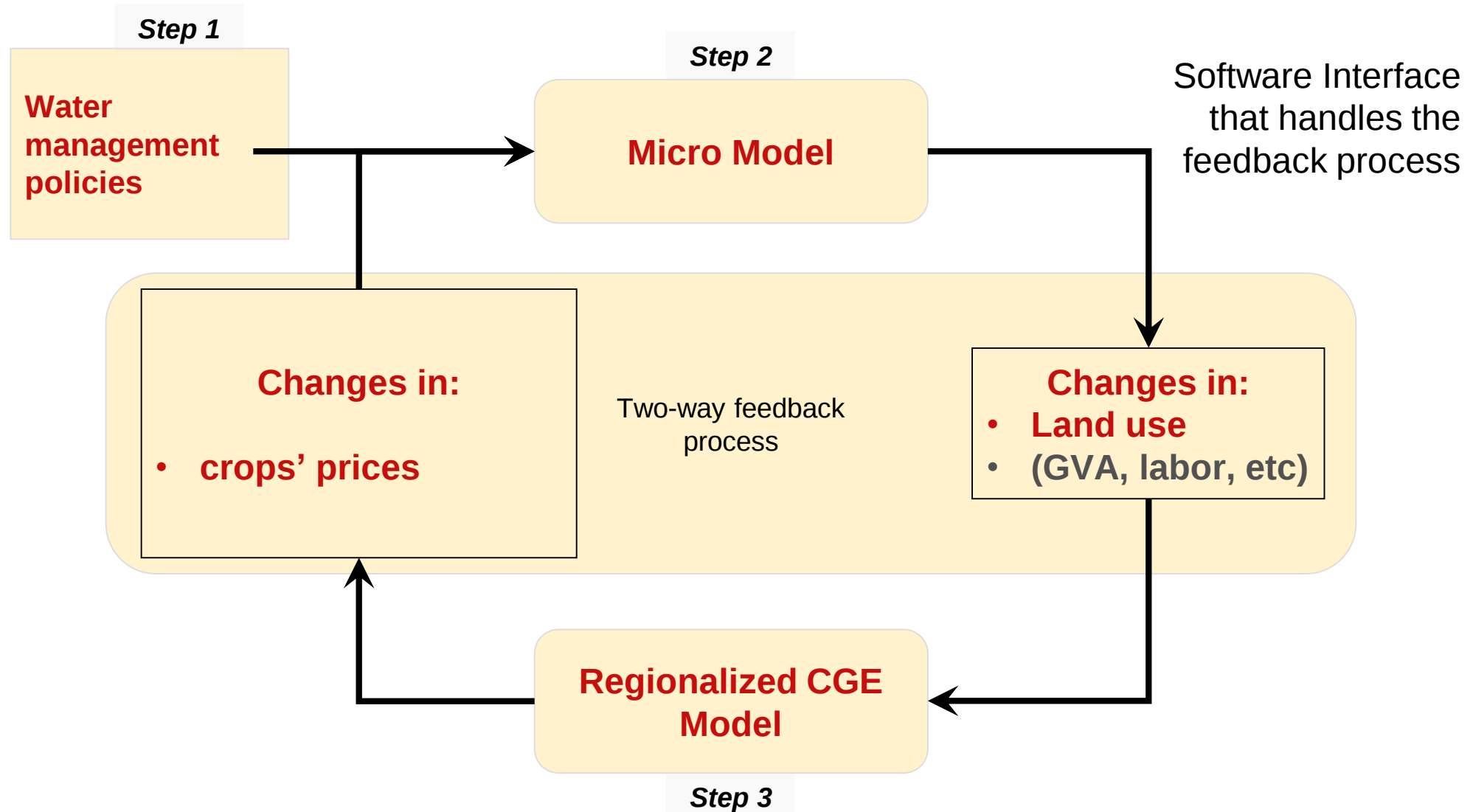
- Macroeconomic module:



- Coupling protocols:

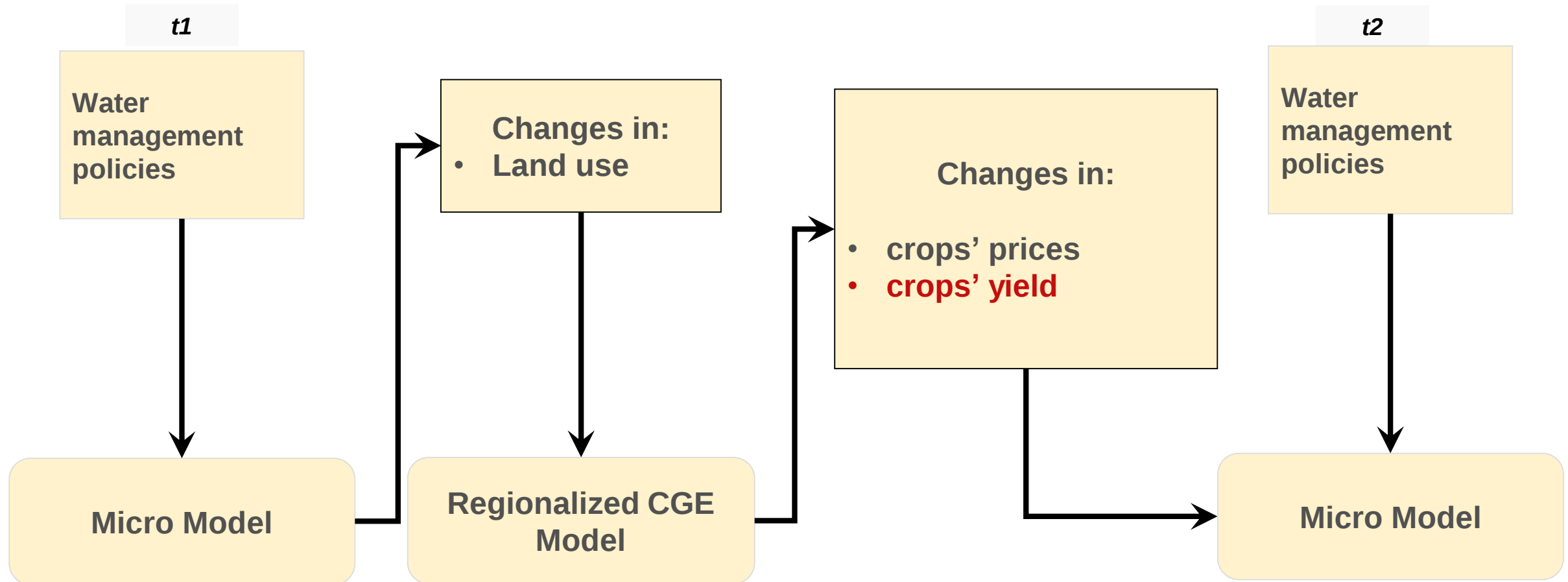


Data exchange in the classic approach of Parrado et al. (2019)

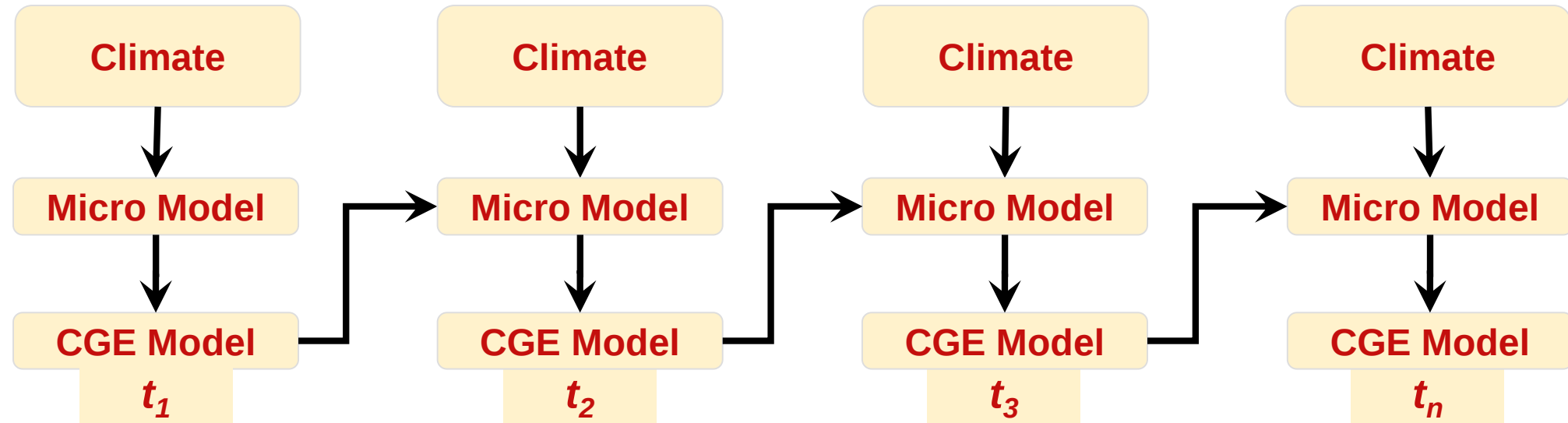


Data exchange in the first novel approach developed by Sapino and Parrado.

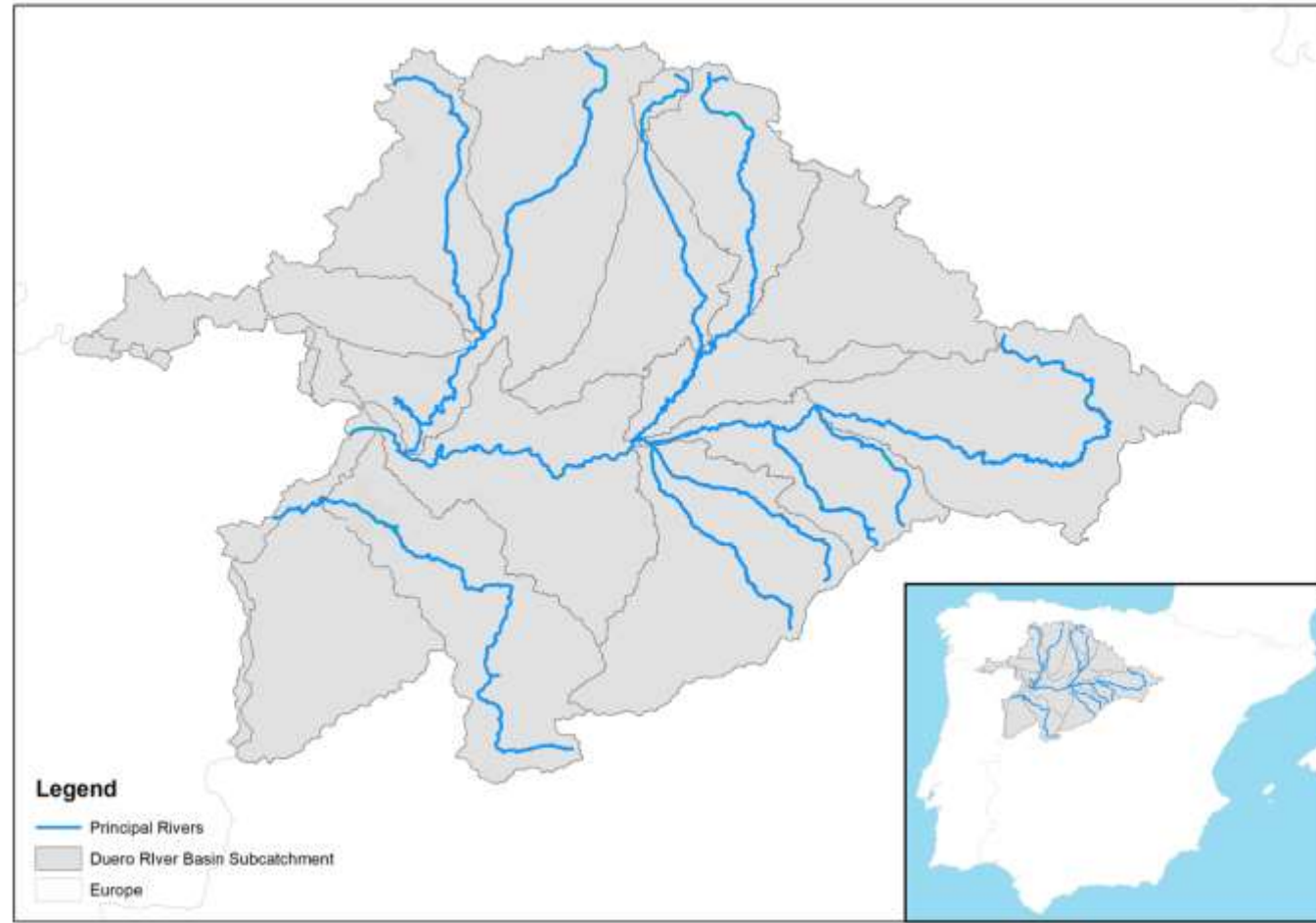
Recursive linking: no convergence in each year.



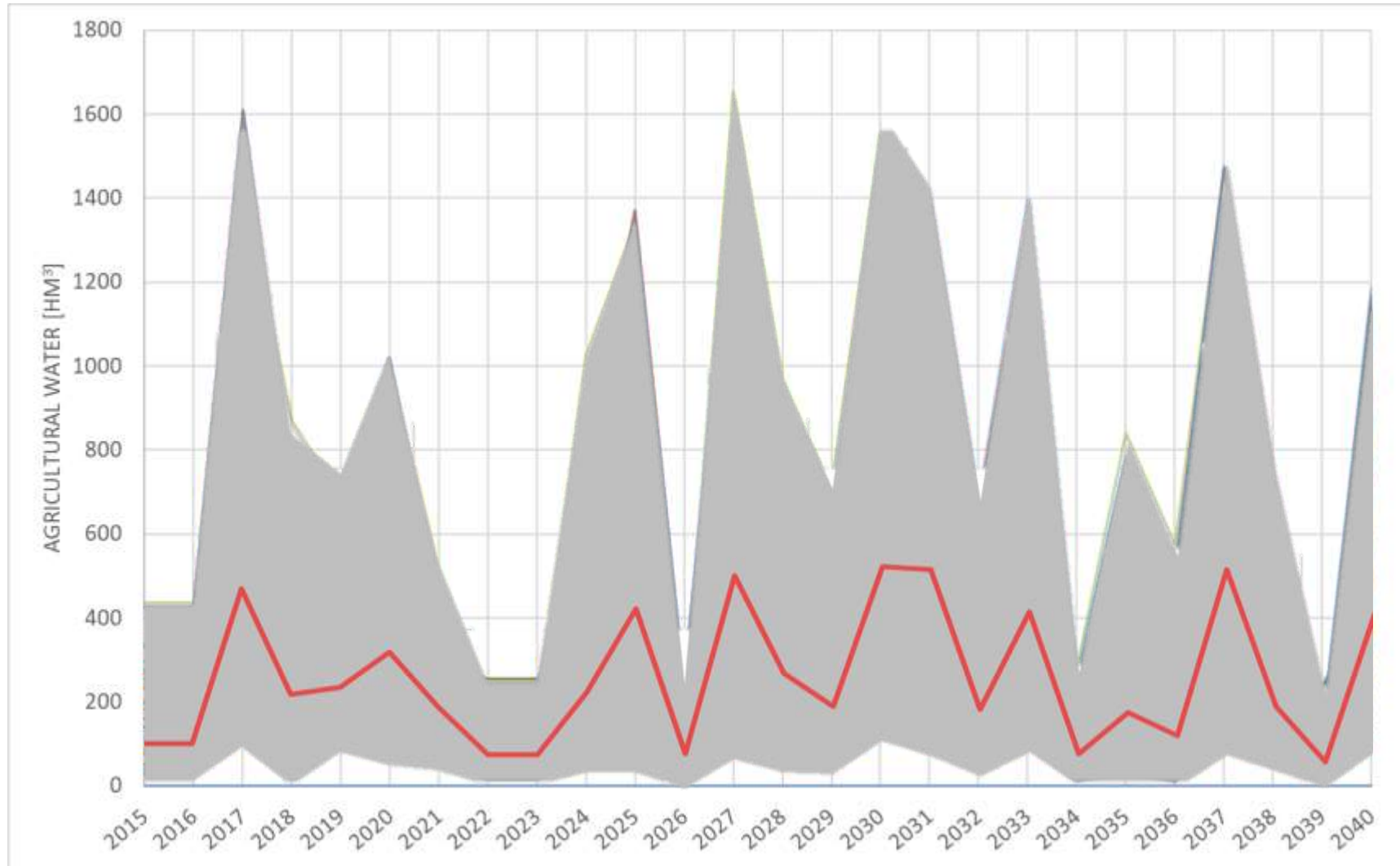
Recursive process of the modular hirerachy



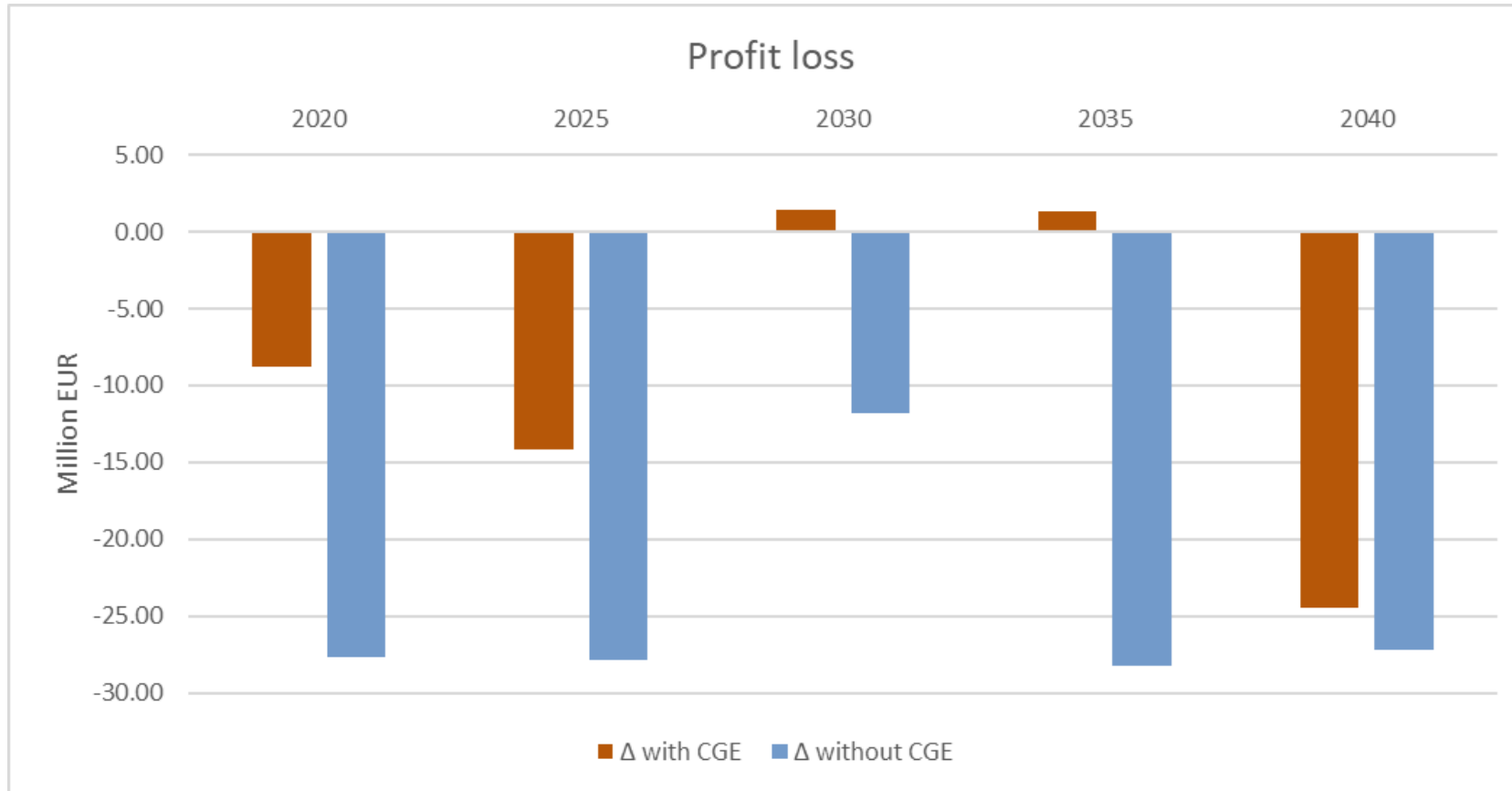
The Douro river basin in Spain



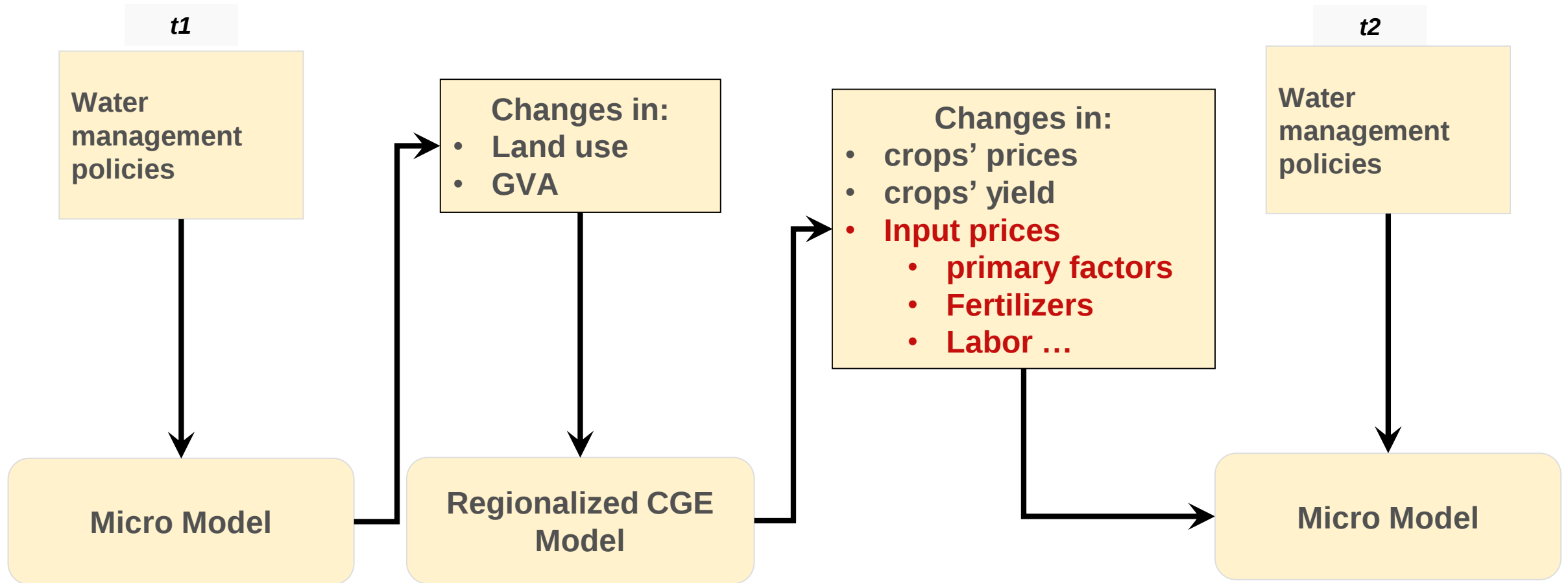
Hydroclimatic ensembles results



Socioeconomic results

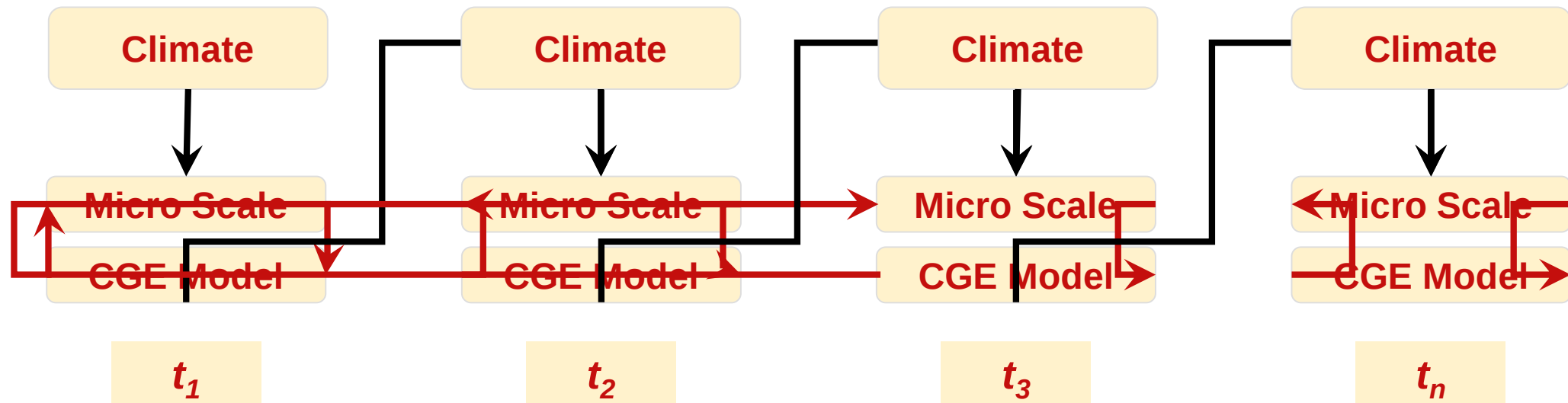


Data exchange for future work



Data exchange for future work

Convergence in each year before advancing to the next year.

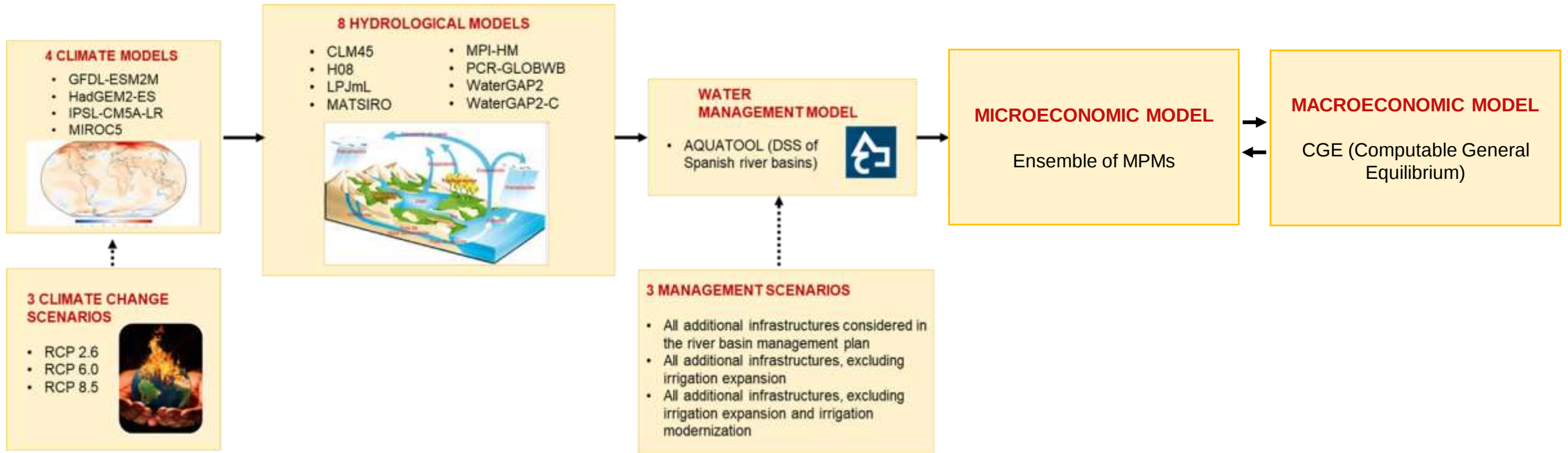




Thank you for your attention

VNiVERSIDAD D SALAMANCA

Future approach: a modular hierarchy: with more ensembles



Can we accurately reproduce all systems and their relationships?



“Essentially, all models are wrong, but some are useful”

Handbook for actionable science

- Modeling human and natural systems dynamics demands **socio-ecological** science
- Quantifying uncertainty requires **ensembles and scenario discovery** (both are complex topics that need to be properly conveyed to non-scientists)
- We need to use the **language of policy makers** (use their models (if possible) also if they are not the state-of-the-art)