SSA 10 Pertuis charentais

Freshwater allocation in the Charente river catchment

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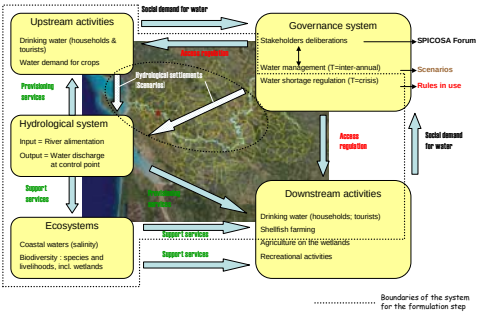
SPICOSA

SIXTH FRAMEWORK PROGRAMME

1. Map of the site and the virtual system



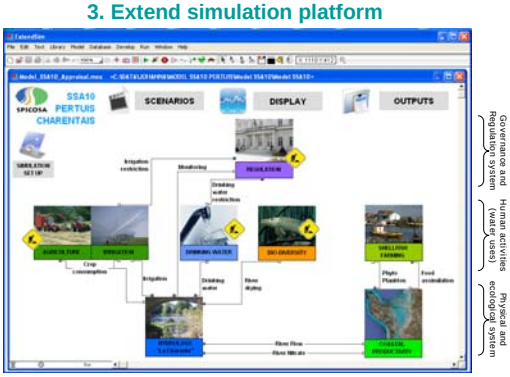
2. Policy issue

❑ The policy issue concerns the quantitative management of the freshwater in the Charente river basin. This problem has been addressed by the regional plan for water management (SDAGE), which includes a "Water shortage Management Plan" (PGE) dedicated to the Charente river.

❑ The SDAGE and the PGE have fixed the following:
- the hierarchy of the freshwater uses = 1) good ecological status of the coastal ecosystems 2) drinking water for households 3) other uses: agriculture, shellfish farming…
- Reachable Discharge Thresholds (RDT) at different control points, which are supposed to be sufficient to ensure the 2 first uses; the general objective of this management plan will be to make sure that the system is able to reach the RDTs during the summer at least 8/10 years.

❑ The current debate aims at modifying the "authorised volumes of water" for each uses (consumptive uses: drinking water, irrigation) and improving the restriction rules.

3. Extend simulation platform



❑ The blocks and modules are organised in a user-friendly way. Graphical tools improve the visualisation of relevant indicators. Scenario, display and output blocks have been set to regroup all the model control panels.

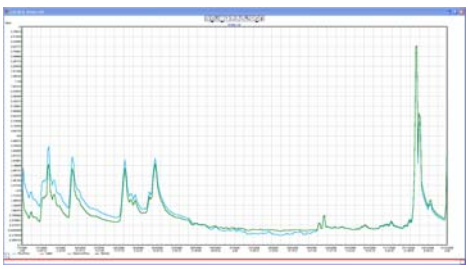
❑ Each module is linked to a corresponding database that records all model parameters and state variables. The model has been developped using Hierarchical and Custom blocks in ExtendSim ModL language.

4. Model calibration

Model calibration is illustrated with the hydrological module.

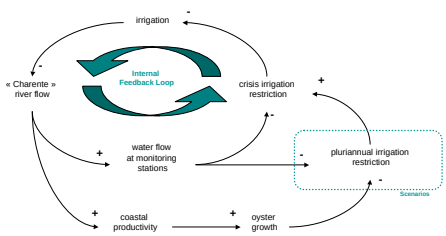
❑ The Hydrological module is adapted from an existing model (CycleauPE) and translated into the ExendSim modelling platform. Model outputs are tested with several input data sets (rain, evapotranspiration) and simulated riverflows are compared to the results of the original model.

❑ The other modules (Hydrology, Coastal Productivity, Agriculture, Shellfish Farming) are also tested independently using existing datasets or outputs from existing models.



Example of the riverflow of watershed simulated during one year (blue) and comparison with the CycleauPE simulation (green).

5. Internal feedback loops



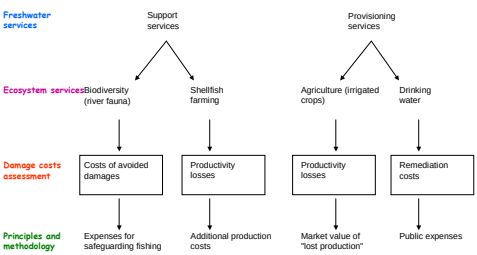
❑ The above schematic presents the internal feedback loop which brings together the irrigation practices of farmers, their impacts on the river flow and the possible enforcement of irrigation restriction measures. After those measures have been implemented, irrigation is constrained and the water flow at monitoring station may increase again, leading to the suspension of the restriction measures.

❑ At a wider scale, the system encompasses feedback loops which link the evolution of water uses and the inter-annual negotiation of the regulation framework. However, such policy changes are considered through scenarios.

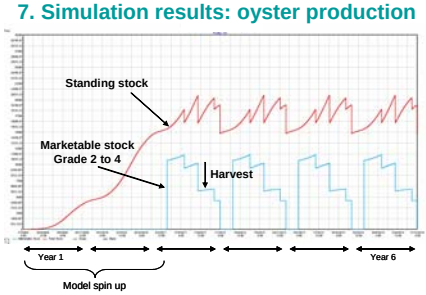
6. Innovative socio-economic component: ecosystem services economic assessment

❑ According to the representation of the system which has been agreed upon by the participant group, the freshwater of the Charente river provides mainly "support services" for natural habitats and shellfish farming and "provisioning services" for households and agriculture.

❑ The economic assessment of the ecosystem services will be based on the damage costs assessment method (costs of avoided damages, productivity losses and remediation costs).



7. Simulation results: oyster production



The links between fresh water availability, coastal productivity and shellfish farming production are explored by the model. Outputs of the shellfish farming sub-model estimate additional costs (benefits) associated with the productivity losses (gains) due to freshwater relative scarcity, which depends on climatic changes and the joint evolution of rival anthropogenic uses.

8. Participant Group

❑ The participant group (PG) of the SSA consists in regular *de visu* meetings between 6 local managers and a sub-group of 3 researchers from the SSA team. Each meeting is observed by a social scientist in order to analyse the exchanges between the managers and the researchers.

❑ Recent meetings of the PG were dedicated to the building of scenarios, following a deliberation methodology based on transparent votes (work in progress). In a first step, the PG produced a list of 50 assumptions regarding the future of the system in three domains: trends (climate, demography), management options and changes in uses and practices. In a second step, the stakeholders voted on these assumptions in order to sort a hierarchy. In a third step, stakeholders will be asked to vote on combinations of assumptions using the deliberation matrix (in order to build complete scenarios).

❑ Besides the existing decision support tools that they already use, the stakeholders expect from the SPICOSA experiment a scientific exploration of the complex and dynamic relationships between the three dimensions (ecology-economy-society) of the freshwater allocation problem.

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