AquaStress Project Case Studies:

Definition and refinement

Version: Final

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Case Studies in AquaStress

One of the innovative elements of the AquaStress Project has been the fact that the Project Case Studies were not predefined in the contract. Instead, during the project lifetime so far we have not only defined and adapted the Case Study activities, we also defined the concept of Case Study in itself.

The accepted definition of an AquaStress Case Study is: “An in-depth plan covering selected issues and possibly selected regions within the Test-Site, by implementing specific options or combination of options in all or part of a Test Site, and offering integrated solutions coupling technical, economic, institutional, educational and social assets.”

The Case Studies aim is:

- to serve as learning platforms to understand responses and impacts of different types and conditions of water stress and
- to refine the guidelines for water stress mitigation.

Three types of Case Studies have been identified:

- External Case studies (Experiences from actual implementations or experiments in the past to serve as input to the knowledge base on [cost-effectiveness of] measures);
- Virtual implementation;
- Field implementation.

Stages in Case Study Definition

In the process towards the definition of Case Studies, we have so far gone through three stages:

1. Stage 1: offer and demand identification and reconciliation; Definition of Case Study activities;
2. Stage 2: definition of Case Study goals, and means to achieve these;
3. Stage 3: refinement and integration of activities.

In the first stage, which was completed with the definition of Case Study activities in July 2006, a set of separate processes took place.

- Within the Project, the WB3 Partners identified their research areas of interest and expertise in water stress mitigation options, on which they would be able to base Case Study activities at the Test Sites.
- At the Test Site Local level, consultations with the local stakeholders identified the focal problems faced in the regions with regard to water stress, and based on this Focal Problem Analysis, also identified areas for potential mitigation interventions.
- Finally, to achieve offer and demand reconciliation, an effort was made to assign WB3 participants in the Test Site Joint Work Teams who could provide the appropriate expertise, based on each site’s specific water stress characteristics; following this, a preliminary list of activities was identified as a result of further stakeholder consultations and discussions.

An example of the first stage outcomes is shown in Table 1, for the Flumendosa Case Study. Specific activities were described to be undertaken by Project Partners in the Test Site, each of which was a separate entity in its own right. The potential interactions among activities were not fully explored at this stage, and there was no established framework for determining the inputs and outputs of activities. The selection was made based on the expertise of the JWT members, through discussion with and validation by the Local Pubic Stakeholders Forum at each Test Site.

Table 1. The original definition of the Flumendosa Case Study: Integrated and sustainable water management in the Flumendosa-Campidano Test Site

Activity	Sustainable crop growth in the Campidano/ Fluminimannu basin: Determination of irrigation requirements to ensure sustainable agriculture	Research activities related to improvement of agricultural practices to decrease pollutants losses	Flow rates and dam operation during dry periods	Activities related to economic aspects	Training and Capacity building activities - Awareness, dissemination and communication activities	Test and evaluation activities
Sub activities	Work plan formulation CRIWAR further development Data collection Model runs / Field testing activities Implementation of improved irrigation scenarios	Discussion with stakeholders on water quality goals Data collection / management SWAT model environmental database setup Model Calibration / validation "Perceptual model" development Reporting and discussion with stakeholders Group session for perceptual model validation and discussion "Hot spots" identification Selection of BMPs for simulation Discuss viable BMPs with stakeholders Definition of procedures for motivation towards BMP adoption	a) Literature review on existing drought management plans and environmental flow requirements b) Investigation on the river flow regime and on boundary conditions of reservoir operation to maintain environmental flow c) Recommendations for adjusting reservoir operation in association with environmental flow requirements/Analysing the effects of reservoir operation changes	Economic analysis including estimation of end users preferences and perceptions, use of these estimates in Cost-Benefit analysis of options, use results of cost benefit analysis for policy recommendations; questionnaires to end users	Workshops courses, dissemination events	Develop T&E reporting frameworks Plan test and evaluation activities Develop/adapt tools for test and evaluation Conduct tests for actions; Evaluation of case study
Partners	HYC, ALTERRA	HYC, CNR-IRSA, CRANFIELD	UHANN - HYC	UoP, UoR, HYC	CIHEAM-IAMB, HYD, HYC	Cranfield HyC

In the second stage, the defined activities were further refined until the end of the second year, where they were finalized at the Nafplion Annual meeting and JWT Workshop. The Nafplion Workshop discussions set the specific Goal, and means to achieve this, for each of the eight Case Studies.

The goals were set based on the characteristics of the examined regions and on the already established Case Study activities. However it was decided that they should be generalized to some degree, to achieve independence from the specific local context (i.e. rather than specifying the Flumendosa-Campidano Test Site, the goal applied to an agricultural region facing water stress) and greater applicability of the outcomes.

This was also the first step towards Case Study integration as a common target was established for all of the activities to be undertaken at each Site. Table 2 presents the set goal, and the means established for achieving this goal, for the Flumendosa Case Study.

Table 2. Flumendosa Case Study Goals and Means

Case Study Goal	Integrated water resources management ensuring a sustainable agriculture
Means to achieve the goal	o Water use efficiency and water productivity in agriculture o Improvement of management of agricultural practice to decrease the discharge of pollutants o Optimisation of dam operation as to Minimum Vital Flow in low Flumendosa basin

Case Study Refinement and Integration

In the present stage, which was initiated at the Annual meeting, the often disjointed Case Study activities need to be integrated in such a way that the interrelationships among activities are well-defined, and that will enable the further integration across Case Studies and the elaboration of general guidelines based on the Case Study outcomes.

In order to integrate a Case Study, it is not sufficient to plan for activities aiming for a common goal. It is also necessary to determine

- Who is responsible for what,
- Exactly how these activities are planned in relation to each other,
- Whether they require inputs from, or produce outputs for each other, and
- How their outputs can be exploited overall for reaching the desired goal.

In order to get usable results from the AquaStress Case Studies, so as to be able to integrate in the end the results/outputs of the separate activities, “terms of reference” need to be defined in advance:

- What is the desired goal-state for each activity?
- How is that defined, and how can it be obtained?, and
- How would obtaining it change the other activities?

The best way to describe this is through a flowchart-like depiction of the Case Study process, which enables the visualization of these interrelationships, inputs/outputs, feedback processes, etc.

Following this logic in all Case Studies would allow not only the achievement of integration of activities within the Case Studies, but could also promote the integration across regions by defining common axes for activities.

Hence, this document also includes this flowchart as it has thus far been developed for the three Case Studies of Guadiana, Flumendosa and Cyprus (still under refinement and discussion). The three examined Case Studies all deal with the same basic problem; water shortage in largely agricultural regions with high irrigation demand.

Each of the three Case Studies approaches the problem differently; in Flumendosa the main issue is the competition between environmental sustainability and agriculture, in Cyprus the issue revolves around two different options for water stress mitigation by reducing demand or enhancing supply, whereas in Guadiana Decision Supporting System analysis is used to promote integrated water resources management. However there are two main axes of reference applicable to all:

- The selection and investigation of distinct **supply side** and **demand side** mitigation options.
- The continuing consultation with the local Stakeholders aiming at determining the research approach and building consensus on the issues at hand.

The diagrams have therefore been developed along these two axes, elaborating on the target of each mitigation option, its inputs from and its outputs to other activities, while also showcasing the overall analysis frameworks of the Case Studies and their overall goals.

To illustrate the approach, the Flumendosa diagram can be explained as follows:

- The non-shaded boxes (2, 3, 4) are groupings of analysis activities, each of which includes activities that are or can be connected through their inputs/outputs.
- The shaded box (1) represents the process of public participation in discussing and validating the different activities, in order to achieve (stated on top): Social consensus on policy proposals for sustainable agricultural development.
- Box 1 combines the activities of ALTERRA for the determination of crop irrigation needs, with the Economic analysis of UoR; the combined results of the analyses and stakeholder discussion can produce a ranking of crops in term of water efficiency and economic yield.
- Box 2 combines the activities of UHANN for the determination of the minimum environmental flow with the UoR economic analysis, towards the estimation of the corresponding loss of income from the use of water for environmental purposes, rather than for irrigation.
- The outputs of Boxes 2 and 3 can be assessed in terms of the social dimension of the problem, to yield recommendations on social welfare and to reach a consensus with the Local Stakeholders. This consensus on appropriate interventions can be translated to a specific water demand, which can then be balanced to the supply (obtained from the supply analysis of Box 4) providing feedback on water availability.

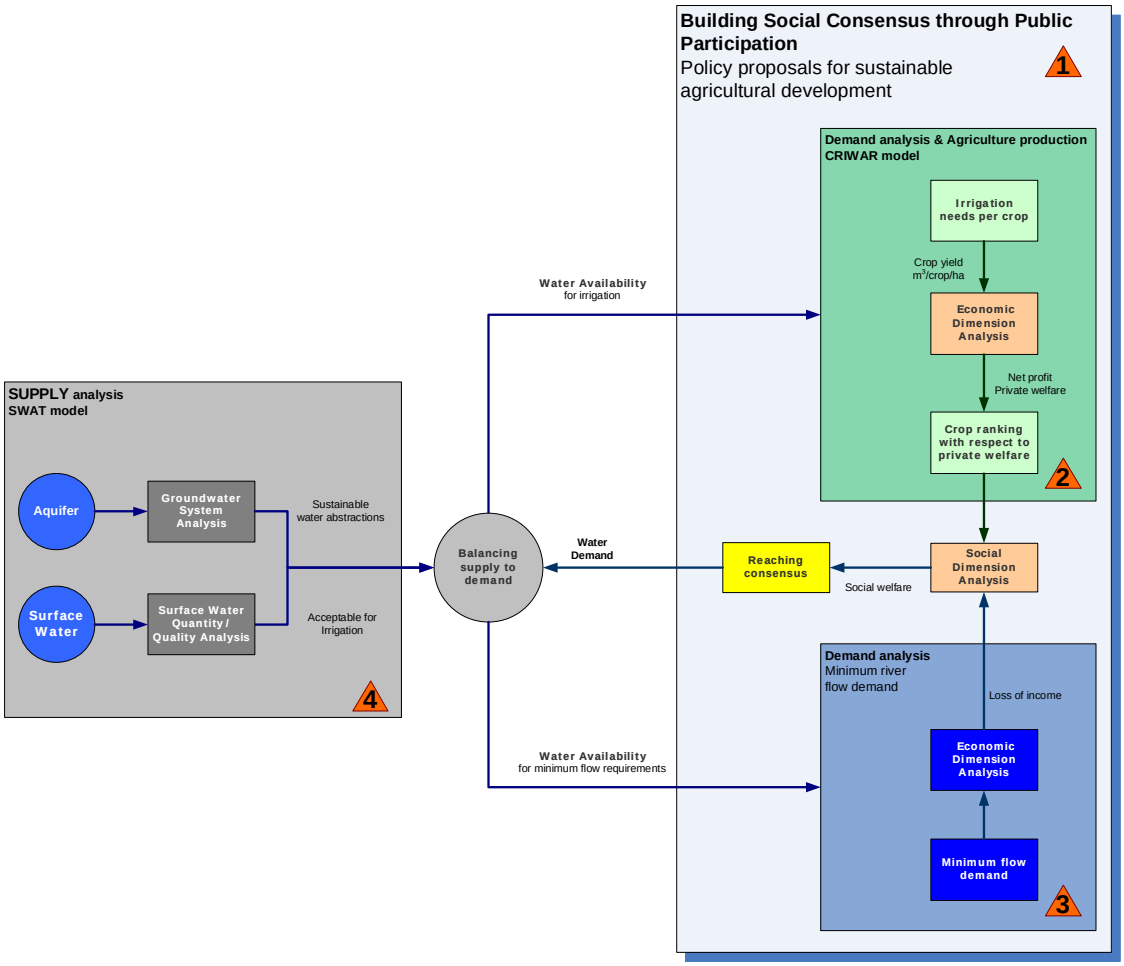

Figure 1. Activity interrelationships in the Sardinia Case Study

Other Examples of Case Study activity flowcharts

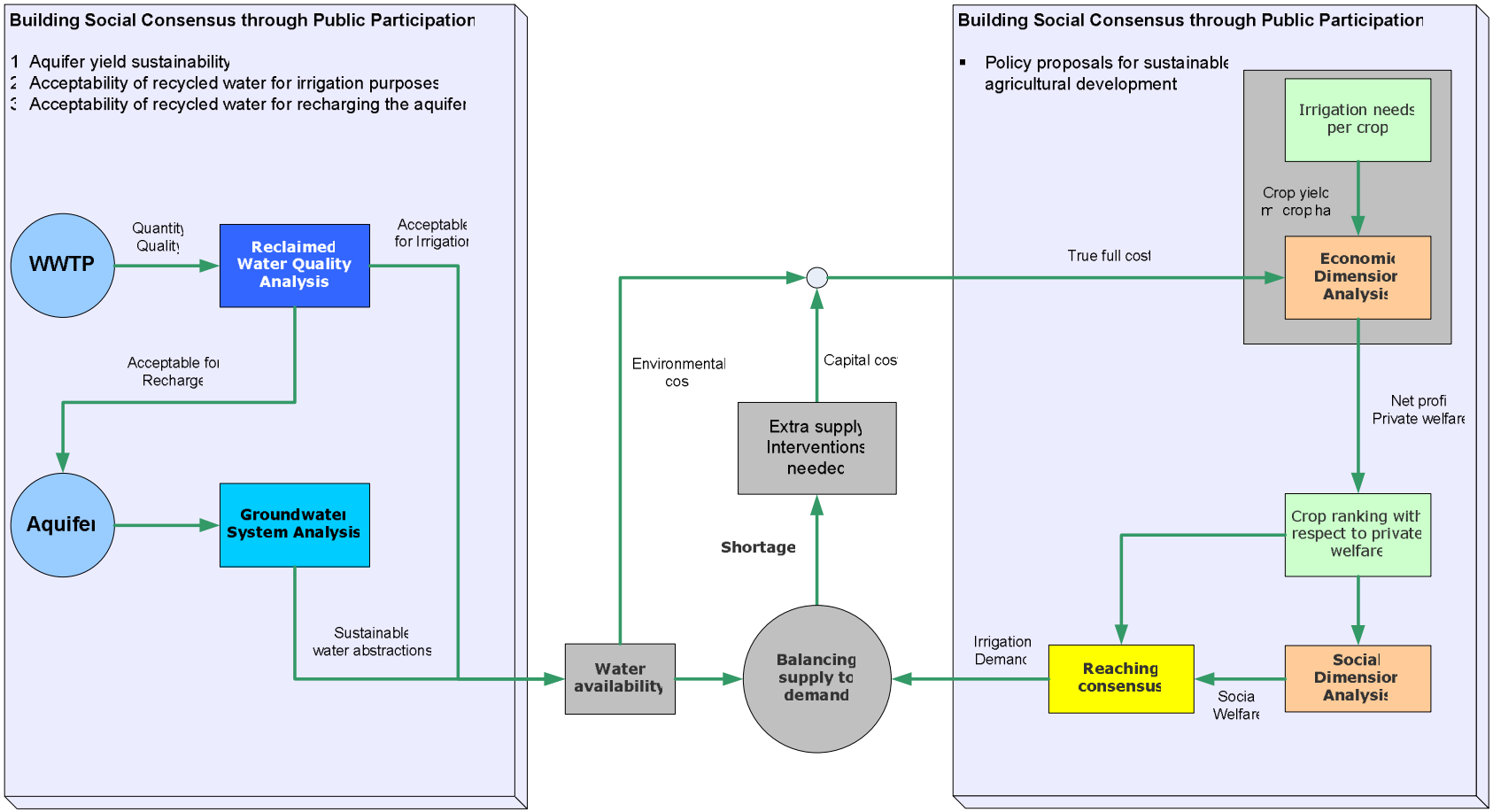

Figure 2. Activity interrelationships in the Cyprus Case Study

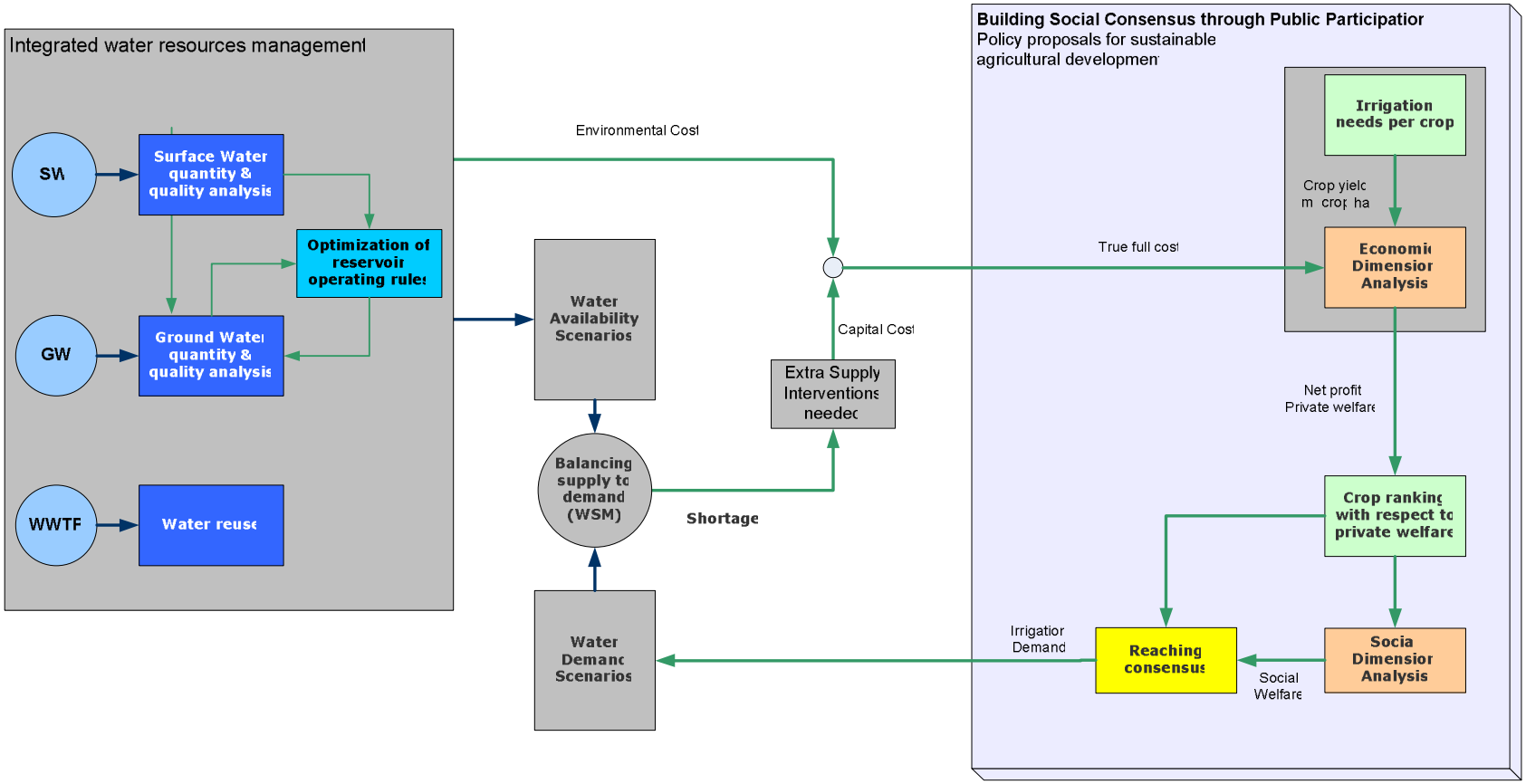

Figure 3. Activity interrelationships in the Guadiana Case Study

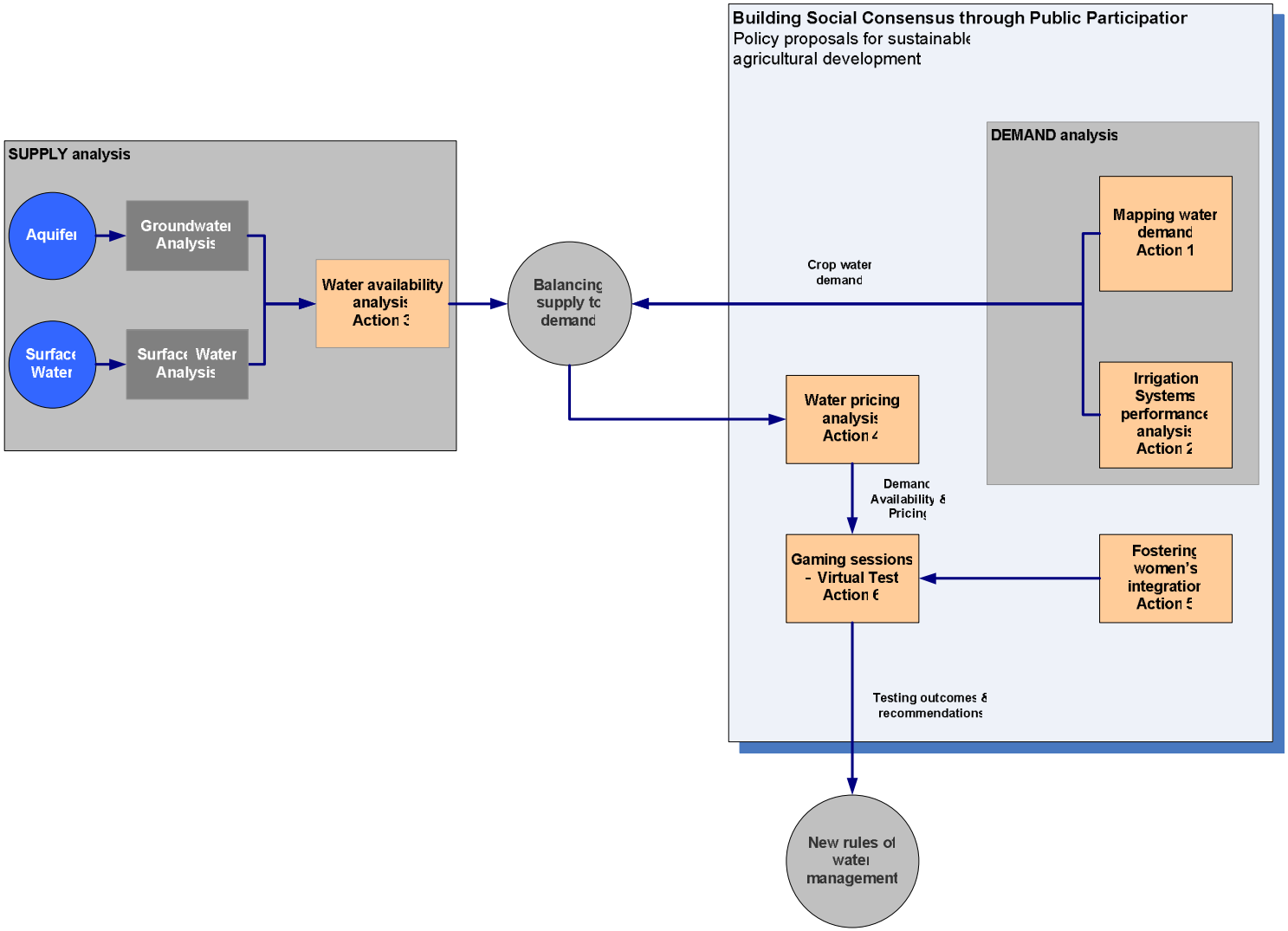

Figure 4. Activity interrelationships in the Merguelil Valley Case Study