**Rebalancing a Water Budget for Sustainability**

**Overview for Professors**

This exercise is designed to be completed in two phases. Step 1 is to be completed by each student as a homework assignment. Step 2 is designed to be a small group exercise (4-8 students per group) that can take place in class, after the students have completed their Step 1 homework assignment independently.

Prior to beginning the Step 1 homework, each student will need to be assigned to one of the case study watersheds or aquifers described in separate case study files. They will also need to be assigned to a specific “stakeholder role,” such as farmer, city manager, nature conservationist, or water agency director, to enable them to prepare for the in-class role play described in Step 2. Suggested stakeholder roles have been identified for each watershed or aquifer, as described in the case studies.

To prepare for their stakeholder role, each student will need to carefully review the case study assigned to them, and do some additional research on their own to gain a better understanding of water conflicts that exist in their assigned place. In playing their roles, they will need to think about the concerns, fears, desires, values and needs that are held by the stakeholder group that they will be representing. They will then need to argue for one or more solutions – described as “water tools” in the case study write-ups – that they feel will result in the most preferable outcome for their stakeholder interests.

You should encourage your students to represent their stakeholder interests earnestly, but at the end of the role play exercise the group will need to come to consensus on the group’s preferred or “optimal” solution, which will be presented as a mixture of water tools to be pursued for rebalancing the shared watershed/aquifer water budget.

**Learning Objectives for Students**

This exercise is designed to increase student awareness and understanding of:

* The foundational importance of water budgets in gaining an understanding of the causes of water shortages, and the solutions that might have greatest benefit in rebalancing a water budget
* The basic elements that are used to construct a water budget: water availability, water withdrawals, return flows, consumptive uses of water, and water remaining in the natural system (i.e., environmental flows)
* Some examples of water budgets that have been constructed for watersheds or aquifers
* The range of options available for rebalancing a water budget when water shortages or environmental impacts have been occurring
* The difficulties that are typically encountered in trying to reach consensus around proposed solutions

**Step 1 – Getting to Know Your Watershed or Aquifer (homework: 2-3 hours)**

In this first step, there are three tasks that you will need to undertake as homework.

First, you will need to read Chapter 2 (“Taking Stock of Our Water Budgets” and Chapter 3 (“Options for Resolving Water Bankruptcy”) of *Chasing Water* (Richter, 2014). These chapters will help to familiarize you with the options available for: (1) increasing water supplies or (2) reducing water demands through conservation or improved efficiency of water use. When communities are trying to rebalance their water budgets, they will commonly apply multiple solutions, and will usually implement both supply and demand options.

Second, you will need to carefully review the water budget for your assigned watershed or aquifer, along with the description of the stakeholder role that you will play in the group exercise described in Step 2 (watershed case studies and role descriptions are provided as separate files). Each of these watersheds or aquifers is presently experiencing water shortage problems of some type. For instance, the overuse of water may be causing environmental problems, recurring economic losses, or social disruption. In addition to studying what has already been prepared for your assigned watershed or aquifer in the case study write-up, you should do your own research to gain a fuller understanding of the challenges confronting water users in your assigned place: why are they experiencing water shortage problems? What actions are being proposed to avoid water shortages in the future?

Lastly, you will need to prepare your arguments for your recommended suite of options for rebalancing the water budget for your assigned watershed or aquifer. Think carefully about the role that you have been asked to represent. Do your best to understand the needs, preferences, and anxieties that someone in your role might hold with respect to water management decisions. For example, how will you protect your livelihood and way of life? How will you help your community move toward a sustainable state of water management? Are there options available that can balance the water budget with minimal impacts to other stakeholders? Given that water shortages are occurring, how can consumptive use of water be reduced so that water shortages do not occur in the future?

***You should come to class with a list of the actions that you feel should be undertaken to rebalance the water budget of the watershed or aquifer that you have been assigned, and you should be prepared to argue for those options with the other stakeholders.***

**Step 2 – Negotiating for an Optimal Solution to Rebalancing of Your Water Budget (class exercise: 1-1/2 hours)**

During class, each student will participate as a stakeholder for their assigned watershed or aquifer. For the first hour, you will argue your points for the “water tools” that you feel will be most beneficial to the stakeholder group to are representing. Then, in the last half-hour, your group will need to seek consensus on the best suite of options for optimally rebalancing the overall water budget. To complete this exercise, each watershed or aquifer team will produce the following:

* The proposed mix of water supply or demand management options agreed to by the team. Be as specific as you can, e.g., if you decide to pursue “water conservation,” then you will need to specify whether those conservation actions will take place in cities or towns, in industries, or on farms. If you propose to import water, describe where that water will come from, and why you believe that it won’t cause problems in the source from which this imported water will be taken.
* Specify how much of the available water will be “re-allocated” by implementing the proposed options.
* Describe the nature of the objections or compromises that were raised during your stakeholder dialogue, and how you resolved those objections. Describe the stakeholders that will likely not be happy with your proposed solutions, and how you will try to win them over with your proposal. Also note whether your recommended suite of options differs from what is already being discussed by stakeholders, as described in the case study.