Water Game - Overview

Purpose:

This game evaluates performances of urban, agricultural and environmental water supply portfolios. Players meet their objectives by choosing various supply options, such as surface water, potable and non-potable recycled water, and grey water, and their quantities. Typical objectives are reducing cost and energy, maximizing recycled use and minimizing groundwater overdraft.

Watershed and Users:

The Elbonian watershed is a hypothetical watershed and has two basins: upper and lower. In the current version of the game, the upper basin has agricultural, environmental and rural water demands, and the lower basin has urban and suburban water users.

Supply Options:

- Surface water (SW)
- Groundwater (GW)
- Direct potable reuse (DPR)
- Indirect potable reuse (IPR)
- Greywater (GreyW)
- Desalination (D)
- Conservation (C)

Please note that not all options are available for all users.

Available options for:

- Urban: SW, GW, DPR, IPR, GreyW, D and C
- Suburban: SW, GW, DPR, IPR, GreyW, D and C
- Rural Homes: SW, GW, GreyW and C
- Agriculture: SW, GW, IPR and C
- Environment: SW, GW and C

Table 1: Demand and Supplies

The maximum surface and groundwater availabilities are in Table 1. But, users can augment water availability. Positive values (wet) increase, and negative values (dry) decrease water availability. This table also shows target demands of Elbonian water users. Players are expected to meet target demands by choosing options. When a sector's demand is met, it becomes 100% and the cell turns green. If the cell is red, it means the user's demand is not met and more options are needed. Yellow cell color indicates abundant water beyond user needs, so, players can decrease water supply amounts.

Table 2: Management Options and Decisions

Players enter supply amounts to yellow highlighted cells by checking sectoral performance (Table 4) and basinwide performance (Table 5). When values are positive, players can enter any number. We expect users play with numbers and check how it affects the performances. However, there are some restrictions on decisions (supply amounts). Sum of all surface water amounts cannot exceed surface water availability. The same for groundwater. Furthermore, recycled water options and grey water require some surface or groundwater supply. If the cell color is red, then players must enter a different value.

Table 3: Sectoral Performance

This table shows performances within a sector, depending on management options. Performance indicators are total cost, total energy and wastewater reuse ratio. The reuse ratio is calculated as recycled water supply amount divided by total water supply.

Table 4: Cost of Options

Unit cost of each portfolio option is shown as Elbonian dollar per acre-foot. These numbers are hypothetical as the watershed. Players can modify unit costs if they want, and it will update the game.

Table 5: Basinwide and Regional Performance

These are objectives that players set before starting the game. A player can set single or multiobjective. For example, total cost, energy, groundwater overdraft or outflow salinity can be minimized, while wastewater reuse ratio or meeting target demands can be maximized. Color bars show how well players are doing with their decisions. Players are expected to minimize yellow bars and maximize green bars. There are two columns: current (Upper or Lower) basin and Full basin. Current basin is the active basin, and full basin shows the whole Elbonian watershed.