

# THE RIPARIAN SHADING SIMULATOR EXERCISE

## Thermal Water Quality Trading

Thermal water quality trading is an emerging policy tool for managing water temperature. Temperature trading programs give point source thermal polluters the option to comply with effluent restrictions by paying nearby landowners to plant shade trees. The shade trees cool the water, offsetting the thermal pollution emitted by the point source (figure 1). Only one thermal trading program has been implemented, on the Tualatin River in Oregon, but water quality trading has been used to manage pollutants other than temperature, including nutrients and chemicals, throughout the United States. A thermal trading program can be set up within Clean Water Act regulation, by writing National Pollutant Discharge Elimination System (NPDES) permits to specifically allow compliance through trading.

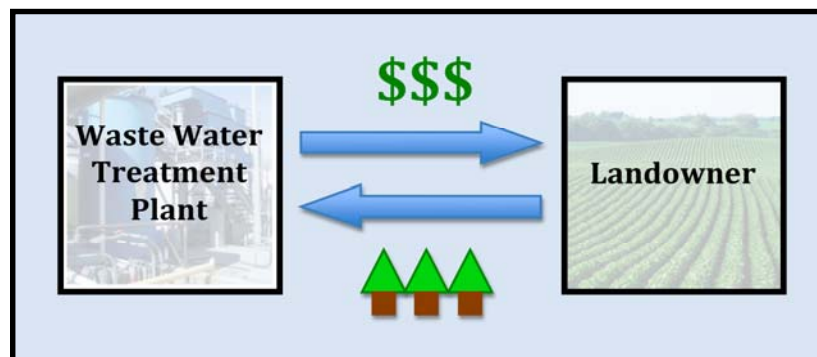


Figure 1: Thermal water quality trading

## The Riparian Shading Simulator Exercise

You will be participating in the Riparian Shading Simulator Exercise, which allows participants to simulate a thermal water quality trading program. You will work in teams. Two of the teams will act as wastewater treatment plants, which are point sources of thermal pollution. Each plant is required to either offset its pollution by making trades, or to buy a refrigeration unit to directly reduce the heat content of its effluent. A refrigeration unit costs \$50 million.

The other five teams will act as landowners. The landowner teams each have one trade that they can make. When a landowner team makes a trade, they agree to plant shade trees along the entire part of the river where they own land. One trade will offset the same amount of thermal pollution that a wastewater treatment plant needs to reduce. However, the trading policy uses a 2:1 trading ratio. The trading ratio is put in place because shading has more uncertain effects on temperature than

refrigeration. Because of the trading ratio, each wastewater treatment plant has to make two trades to avoid buying a refrigeration unit.

The river is shown below in figure 2. Three landowners are located upstream of the reservoir, and two are located downstream. There is one wastewater treatment plant in each reach of the river. Players will negotiate with each other to make trades. When you make a trade, the information will be entered into a system dynamics model, which will then simulate hydrology, tree growth, and stream temperature. We will run through the simulation twice. Keep an eye out for surprises. After the simulations, we will have a debriefing session, which will give us a chance to talk about what happened and why.

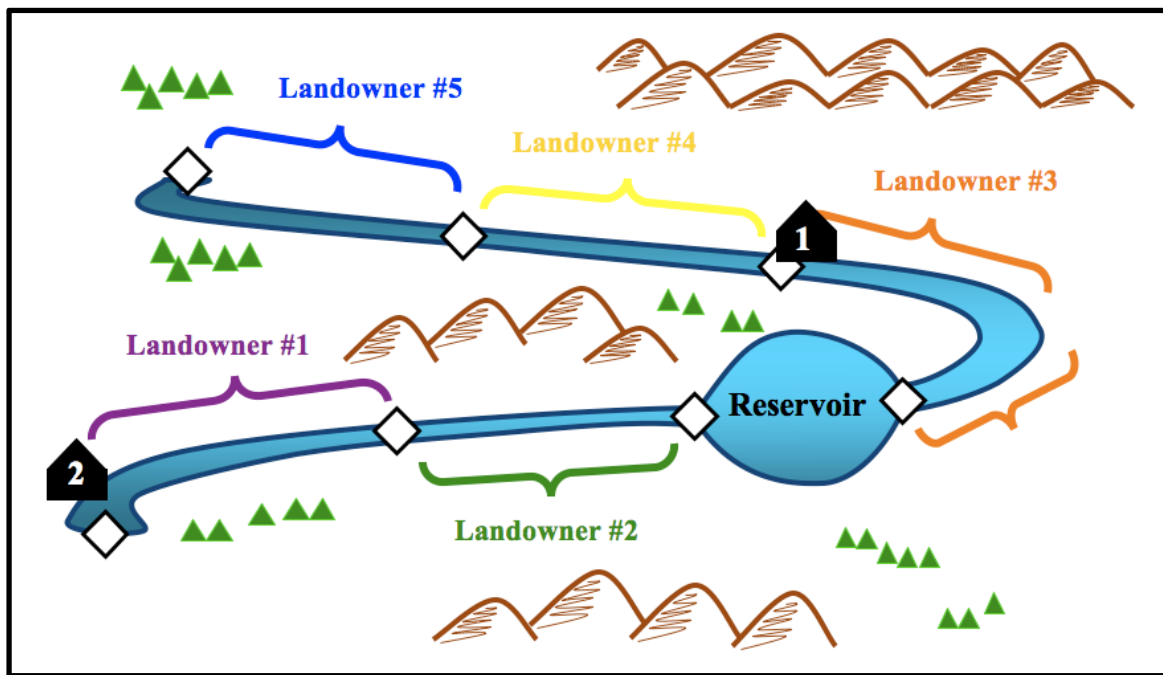


Figure 2: Picture of the river being simulated