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**Fact Sheets**
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# Surface Water for Irrigation

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Rivers, streams and ponds are an alternate source of irrigation water to wells or a municipal system. They can be less expensive to develop but generally have more problems in water quality and quantity.

## Quantity of water

Surface water sources are dependant on runoff from adjacent land or from ground water springs. These are dependant on rainfall rates that vary from year to year. Rainfall rates are highest during the rainy season which in New England is usually in the spring. During the late spring, summer and early fall when irrigation needs are the greatest the rainfall rate is usually lower.

If available, check water flow rates, flooding and maximum height for a river or stream to see if it will supply the quantity of water needed. If this is not available, a check with the local NRCS office or town officials may give some indication of what water is available. Water supply from a pond is more difficult to assess as it is subject to runoff from adjacent land or springs as well as evaporation and leakage. A common method of determining the flow of water from a stream or outlet from a pond is to multiply the average speed of flow (ft/min) x the cross-sectional area (sq ft) x 7.48 gal/cu ft = gallons/minute. For example: a brook with an average stream flow rate of 50 ft/min and 2 sq ft of cross-section will have a flow of 748 gpm (50 fpm x 2 sq ft x 7,48 gal/cu ft = 748 gpm). A weir could be used to more accurately determine cross-section area.

Water use rates are related to transpiration and evaporation. For most sections of the U.S. a maximum rate is about 0.4”/day on the warmest days. This translates into about 0.25 gallons/sq ft/day of growing area. In greenhouses, use rates can exceed this at times dependant on air movement, container size and color and temperature that the greenhouse is operated.

## Water Quality

Surface water is subject to contamination from a number of sources such as sediment, chemicals and plant growth. These may need to be removed to make the water usable in an irrigation system. Tests for total suspended solids, volatile suspended solids, total dissolved solids, pH, conductivity and some of the key elements should be the first step in evaluating a source of surface water.

**Sediment** – suspended particles such as, soil, clay and sand from runoff from adjacent agricultural land, construction sites and bank erosion can affect the operation of pumps, piping and nozzles. High levels of particles can reduce the life of pumps and clog sprinklers. Water samples taken at different times of the year and after a heavy rainfall can help to determine the concentration of suspended solids.

The type and size of filters will vary with the size and amount of the particles and the type of irrigation nozzles used. Multiple filters may be required. A common filter for dirty water is self flushing. When the pressure difference between the intake and exit is above a certain level, the filter will be flushed and water dumped.

**Algae and bacteria** – high light levels and temperature along with carbon dioxide, nitrogen, phosphorus and trace elements influence the development of algae. A pump or compressor aerator that circulates the water and introduces oxygen may be needed. Recently wind and solar powered aerators have become available. Slime caused by the presence of bacteria can clog irrigation systems. Development of these may be from hydrogen sulfides, iron bacteria or manganese present in the water.

**Animal organisms** – protozoans, zooplanktons, small crustacean and fish can create blockages in irrigation pipes and nozzles. Water fleas and water mites are also present at certain times in the year. Filtration is needed.

**Chemical sediments** – surface water is likely to have the presence of chemicals from runoff of adjacent fields or from illegal industrial waste. It is also possible to have harmful quantities of chemicals such as chlorine, boron and other salts that are found naturally in the soil. One of the most common pollutants found in New England streams is high nitrate levels from manure application and fertilizer used on dairy farms. It is also possible to have water that has a harmful level of herbicides from agricultural fields near the stream.

**Location of the water source**

The distance and elevation of the water source in relation to the greenhouse should be considered. The amount of trenching needed and the location of the pump can add to the cost of the installation. You should know the total cost of pumping water before you decide if the source is viable.

Maintenance of the equipment and water source also adds to the cost. Fencing may be needed to keep animals and children out. The dam on a pond will require mowing and cleaning of overflow pipes. A buffer may have to be installed to filter out sediment and pollutants.

**Water diversion regulations**

Water right laws have been passed in many states that limit the amount of water that can be use. For example, in Connecticut daily consumption of 50,000, gallons or more requires a permit from the Department of Environmental Protection. Digging a pond does not require a State permit but taking more than 50,000 gallons/day out does. A pond with a dam below grade does not require a permit but an above ground one does. An application for a diversion is expensive and may take up to a year to obtain. Annual reports of water usage are required.

Discharges of water from garden center, nursery or greenhouse operations of more than 5 acres of impervious surface require a non-storm water discharge permit.