

Water Recycling at Byland's Nurseries: An Extensive Water Catchment and Recycling System

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Twenty-five minutes is not a long time to talk about water recycling so I will endeavor to give you a brief overview as to what we have done at Bylands Nurseries to solve our water runoff problems. Byland's Nurseries is a diversified wholesale nursery located in British Columbia's Okanagan Valley. We are classified as a Zone 5 or 6 depending on location and proximity to Lake Okanagan which has a significant moderating influence on our climate. The climate is semi-desert with many years only receiving 12 to 15 inches of rainfall or snowfall equivalent. Like many nurseries we were a field grower that converted to container-grown plants to fulfill a demand from our customers, and like many growers we started growing container plants on a very small scale.

Container plants require large amounts of water when compared to field-grown plants and, of course, the disposal of this water can be a huge problem. On a hot summer day up to 1 inch of water is applied daily on our container plants. On our 40-acre home lot this is the equivalent of about 750,000 gal per day. One of the unique problems posed by the location of our nursery was there were no swamps, lakes, or streams into which irrigation water could drain. Our water comes from an irrigation district, not from adjacent bodies of water. This means we irrigate our plants with high-quality chlorinated water (potable), but it also means disposal was a challenge. When we started growing plants in containers the area covered with container stock was small enough to allow for the water to percolate away. As we added more area this became more difficult. Large ditches were constructed to allow for percolation and large quantities of water ran into adjacent vacant fields and orchards. Our water problems seemed to be in control until one day after a heavy rainfall, water escaped from our dwindling orchard and flooded nearby industrial buildings. We knew we had to contain our water and the only way possible was by recycling. The challenge, of course, was designing a closed system as we have no outlet for overflow. This problem was helped immensely by the fact we are in a semi-desert with low annual rainfall. Once we had made the decision we contacted several engineering firms for proposals and after discussing the issues with them the proposals were, to say the least, elaborate and some were insane. We then contacted the B.C. Ministry of Agriculture and talked to a drainage specialist by the name of Ted Van der Gulik. Many of his ideas plus some of our own gave us the confidence to proceed on our own with the assistance of a very competent local contractor. One of the most important things that was done in the planning phase was the drawing of a topographical site map of the area we wanted to reclaim water. Based on this map the locations of ditches, ponds, and catch basins were determined. This had to be done while working around existing structures and nursery beds and also keeping future expansion in mind. Construction began in the fall of 1991 and was completed in the spring of 1992 with the pond being the last part built. Without going into detail an elaborate system of drain pipes, screens, sumps, catch basins, ditches, underground pipes, and above ground channels was created weaving in and about existing buildings, greenhouses, and container beds. All water is picked

up including that from parking lots. The water eventually finds its way back to the main recycling pond which contains one million gallons of water when full.

There, it is mixed with fresh water and reused. The main pond is constructed of blown concrete called gunnite. The water levels are controlled by a series of four floating balls. The lowest is a low level shut off to shut down the pumps should the water level drop too low. The second float ball turns on the fresh water feed, the third float ball shuts down the fresh water feed, and the fourth float ball is a high alarm shut off that turns off the two sump pumps that feed the pond. This causes water to back up in the ditches until the pond is low enough for the pumps to turn on again to fill the pond. Although we recycle water from a 40-acre property we reuse the water only on 15 acres. The reason we do this is our home lot was comprised of six different lots acquired at six different times with a different irrigation system for each lot. We consequently have a different irrigation system for each lot. We felt it was too difficult and expensive to tie all the irrigation systems back into our recycling system. We also have chlorinated 100 psi water at our doorstep so it seemed ridiculous to repump it if not necessary. We made the decision to dump the water into our new pond and repump it as the entire field was designed for recycling from day one and it was the simplest system to construct and design.

Are we happy with our system? Completely. Although nothing is maintenance-free our system has proven to be trouble-free and easy to look after. Water quality is high and diseases have not been a concern. We were experiencing increased problems with *Phytophthora* in junipers, but by moving them away from the area using recycled water this problem has largely been solved. Our water has been tested for pesticide residues and nutrient levels and both tests show very low levels. The worst problem we have had over the years has been algae growth. Fixed copper treatments proved very effective, but the addition of an aerator completely solved the problem while improving water quality. The only other significant change to our original recycling system has been replacement of the original pump with a Variable Frequency Drive Turbine. These pumps are extremely efficient in their use of power and are virtually trouble-free. They work very well where the water requirement of different zones is quite different. The area where recycled water is used has zones that use between 150 and 450 gpm.

We have now completed a second recycling system in a second field and it too is working trouble-free. It was also much easier to do because we planned to recycle the water from day one. What have we learned from our water recovery systems? First of all the higher water quality you start with the easier it is to reuse the water with simple systems. Don't build your storage reservoirs too small. Allow sufficient time for the water to aerate and settle. This also helps with disease suppression. Keep it simple, but don't get cheap when it comes to controls and pumps. Try to build traps to catch debris and sediment. Try to make these large enough to provide some settling time and also lengthen the time between cleaning. Pay attention to weather records so pipes, catch basins, etc. are large enough to handle freak rainstorms. Finally, have a plan for those floods that may occur in 100 years especially if you have a closed system like ours. Our new pond is designed to flood adjacent container beds. The pump house is built about 1 m higher than surrounding areas so the electrical equipment and pumps will not flood. I would encourage all nurseries that are not recycling their water to start planning now to prepare for the future. No matter where you are regulations concerning water consumption and runoff are bound to get more stringent.