Envirothon 2020

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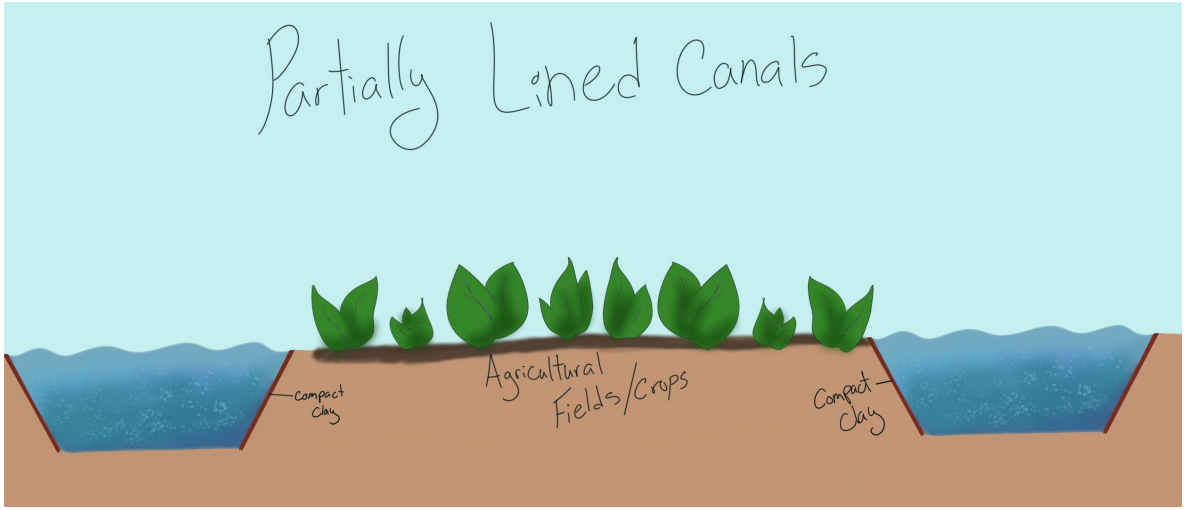
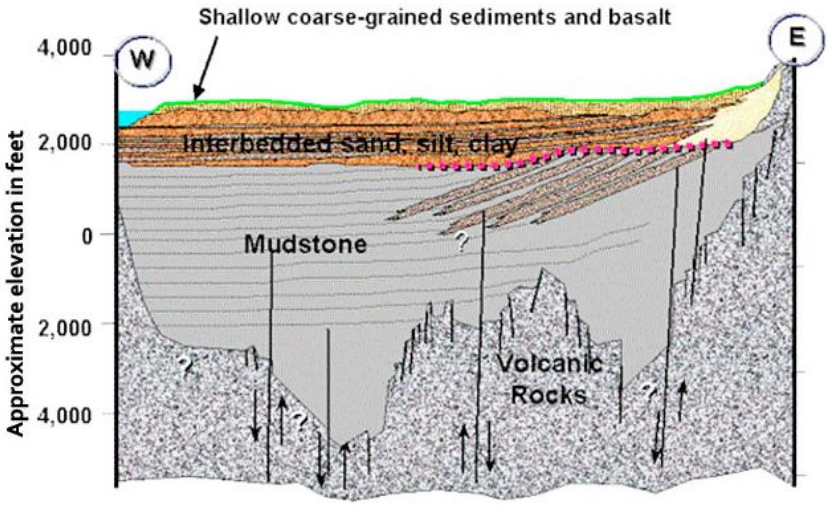
Introduction and Diagram



Soil

Around 50% of the Treasure Valley land area is irrigated by either flood or sprinkler irrigation. Seepage from flood irrigation, including canal seepage, accounts for around 95% of recharged to aquifer. Only a small portion currently of this water enter deeper into the aquifer. Many of the shallower aquifers discharge into the river canal or ditch canals.



Wildlife

There are many different species of wildlife in Idaho. Fish in general need to be able to have food and places to rest. If the canal is straight then the fish won't be able to rest from the flow of the canal. Linings in the canals raises the temperature of the water, which can be too warm for fish and their food to live. The linings would also not be able to grow food and shelter for fish and other wildlife.

Aquatic

Canal irrigation systems contribute to the recharge of aquifers through seepage loss. Resources at basin level or even aquifers larger than basin level benefit from this, though it is argued that unlined canals cause waterlogging in adjacent lands. With a partially lined canal, water is still able to seep into the ground, but not so much as to waterlog nearby land. Water productivity indicators can determine if a canal is efficient or wasteful.

If a canal seeps and recharges the aquifer, it is supporting the ecosystems that are dependent on groundwater. Many fauna rely on groundwater for drinking water, including humans. Groundwater contains microfauna that help remove contaminants, and this can help maintain healthy surface water, as well as support some rare plants and animals that depend on groundwater discharge.

Forestry

Of the larger trees found most commonly in the Treasure Valley area, Ponderosa pine roots can extend their roots at most to 100 feet, making it important to keep these trees growing away from any canals. By allowing trees with long enough root systems to infiltrate the canals, they can cause problems with the structural integrity and steal water from the canals which would be better used to recharge the aquifer. Cutting down trees is the only solution, though not ideal. Although this would slow/stop growth for a bit, the root systems would regrow and the problem would need to be addressed in the future. Ideally, canals would be built around fields without a large abundance of trees, which is typically the case with agricultural fields.

Current Issue

Before The New age of Agriculture, and the human race demanding more water. The aquifer was able to recharge itself through recharge canals. The Aquifer was able to keep itself recharged because it only had to support wildlife and trees. This changed when people started to explore. They stayed on the banks of the river, and were using this water for Agriculture. This was not an issue because when they were watering the plants, they still were getting some recharge, but not as efficient. Experts say that it was only 50% effective. When humans started to demand more water, for domestic use, this is when we started to use more than the Aquifer could recharge, and we have a solution for this.

Our Solution

Our solution is to dig canals on the edges of agricultural fields in the ESPA area and line them with compacted clay to create compacted soil canals. Both the sides and the bottom will be compacted, in studied done on this particular type of canal it was found that when boths the bottoms and sides were compacted, water seepage was reduced by 86%. In comparison, canals that are only lined on the sides only reduce water seepage by around 12-30%. The advantages of compacted soil canals include; it is a relatively cheap method in comparison to other lining methods for canals, it helps improve stability and reduce erosion risks, and is much more efficient in comparison to unlined canals.

Our Solution

Pros: The compacted clay approach is cheaper in comparison to other lining methods, it helps to reduce the risk of erosion, seepage into agricultural fields, the efficiency rate is much higher than that of unlined canals, and the compaction helps to reduce vegetation growth.

Cons: Lines canals do not allow for as much water to get through to the aquifer as quickly, reduced air permeability, and reduced soil pore size.

Overall, when keeping the goal of recharging the ESPA in mind, building compacted soil canals will help to recharge the aquifer, while reducing seepage.

Conclusion

There are pros and cons to lining canals, and in our case a partial lining is the best way to go. Using clay to line canals can help reduce erosion and seepage of water. Without the lining on the canal, the soil will erode quickly. Using clay is a very cheap way to line a canal, and it is less porous than soil. Leaving the bottom of the canal unlined allows for enough seepage to help recharge the aquifer.