

Introducing hydroponics and flood tables to Nepal

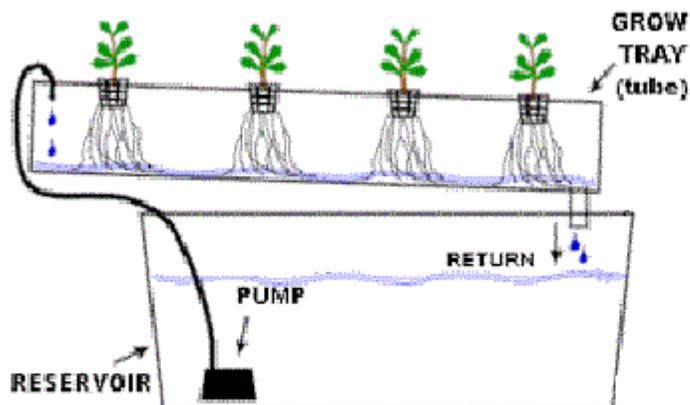
Robert Brannon

Hydroponics are an alternative method to the traditional style of growing plants, where one uses an artificial growing medium and tables to grow opposed to planting a seed in the ground. Flood tabled can be setup on top of any table with a few added features. Flood tables which are generally made of some form of plastic are hooked up to water pumps and a drain. The tables are flooded with water which allows the plants growing on the table to soak up the water they need, all the water that is left is then drained from the table and put back in o the reservoir to be used again. In hydroponics seeds are started and grown in rockwool, this provides the opportunity for farmers to grow a large variety of fruits or vegetables that they couldn't grow before. Rockwool which is also known as mineral wool is a material that is made by melting down rocks which occurs at over 3000 degrees Fahrenheit and then spun into long fibrous strands, the process is not dissimilar to how cotton candy is made. Growth in rockwool is also beneficial to plants as it aids in root growth and development. The growth of roots in rockwool occurs not only faster but also stronger than it would in soil (Rodríguez-Delfín, 2012) The use of hydroponics has gone up constantly, and it is likely that it will play a large role in the future of agriculture. Soilless cultures play a very important part in modern day agriculture. (Urrestarazu, 2013)

There are two Canadian based companies that can provide these products to Nepal. One is the Toronto based company Homegrown Hydroponics, who can provide flood tables, pumps, and other accessories to complete the setup. The other is Canadian Wholesale Hydroponics who are based out of Elie Manitoba, and the can supply the rockwool as well as other growing essentials. The only benefits to Canada that this idea will yield are the potential increase in sales

that selling to Nepal will create. On top of this the increase in sales may lead to a need for more staff at the previously mentioned companies.

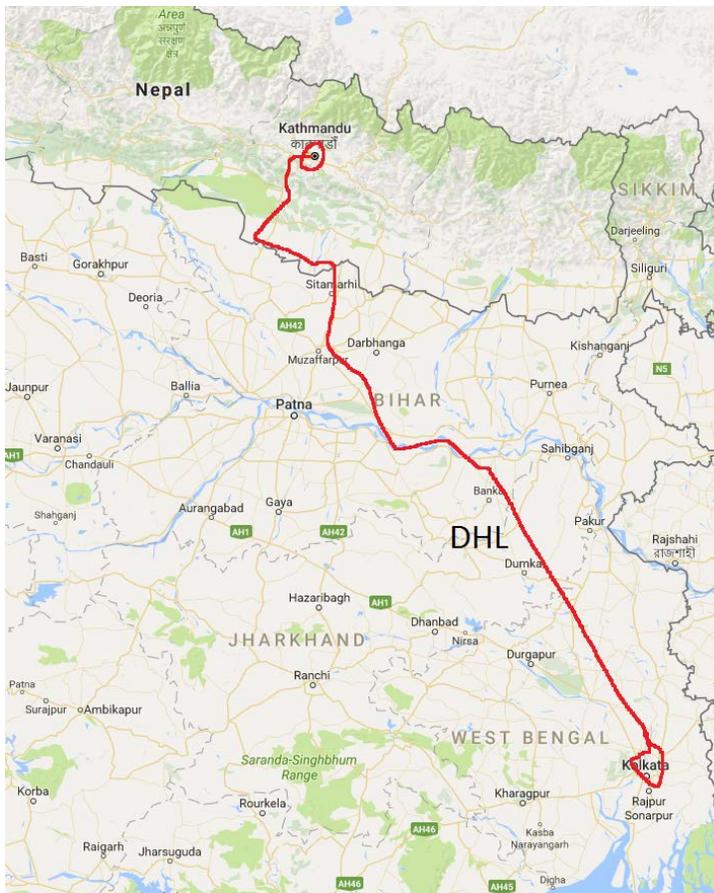
The startup costs could be more than most people in Nepal would want to spend or could afford. An investment of around \$100 dollars depending on the size of the table would be required, this includes pumps tubes and the table. If multiple farmers wanted to team up and share tables, it would take a lot out of the cost. The pumps are one of the most expensive aspects of the set up and one large table or a few smaller ones could be run off a single pump creating an incentive for farmers to share the costs. Each block of rockwool would cost around 20 cents if many are bot at a time.



The set up isn't too challenging as it is mostly connecting the tubes and pumps together, and if desired connecting a rain water collection system. It is not overly challenging to set up your own hydroponics system. All that is needed is a 20-30 gallon tank, support for the system, a pump, piping, and lastly trays to put the rockwool slabs into (Howard, 2013) Pictured above is what a simple hydroponics system could look like, and as mentioned previously not a lot of set up is required and it would just entail finding a place to build the set up and attaching a few tubes.

There are already methods in place in other developing countries to help introduce hydroponics into those countries, this movement is called popular hydroponics. “Popular hydroponics” is a term used nonprofit organizations from the universities of Colombia and Peru which hopes to get people involved in producing their own vegetables in less developed communities. The idea behind it is to use local and inexpensive materials or waste products, that include but are definitely not limited to old tires and plastic containers. (Howard, 2013)

The shipping to Nepal would be the costliest part of this operation. Using quotes from A1 Freight Forwarding it would cost approximately 2300 USD to get the product from Toronto to Kolkata, India, and from Winnipeg to Kolkata it would be roughly the same. From there it would cost another 15000 Indian Rupees or around 220 USD to get the product to Nepal Using DHL. At such a high cost of shipping it would not make sense to only send over a few products. For this to be feasible a community or cooperative of farmers would need to get together and choose to purchase a lot of hydroponic set ups to help offset the large shipping cost. There is always also the potential for fees related to shipping that I cannot calculate or obtain. There is most likely a high import cost to bring something over from Canada as well as brokerage fees. Plus, the actual cost of distributing the product throughout Nepal once it arrives. Another problem could arise while changing carriers after arriving in India and then having to have the product picked up by another carrier and brought to Nepal.



After doing price comparisons between Canadas products and similar products from companies based out of China it became extremely evident that there was a large price discrepancy. Also after seeing the absurd costs of shipping that would be entailed to get products over to Nepal from Canada and how significantly cheaper it would be to send the same products over from China. On the china wholesaler Alibaba, for the same few hundred-dollar investment required to purchase a hydroponic system from a Canadian company they could purchase something almost twice the size as well as purchase extras such as grow tents, which is the same as a non-climate controlled greenhouse. The ability to purchase grow tents as well as more equipment for cheaper is a very compelling reason to purchase from china opposed to buying from here in Canada.

	Canada Sellers	China Sellers
Water Pump	\$42-\$220	\$5-\$50
Flood Table	\$50-\$80	\$2-\$5
Tubing	\$0.30/ft-\$1/ft	\$0.08/Meter
Rockwool	\$0.80/Block	\$0.15/Block
Grow Tents	\$200-\$300	\$40-\$60

There is a range in the prices as the price tends to decrease significantly with the more you purchase, this is especially true with products purchased on Alibaba. There is also a solar powered water pump available from Alibaba for on \$100 which could also be another possibility for the Nepalese farmers to consider, this would be particularly useful in the more mountainous areas of Nepal where electricity to power the pumps may not be readily available. Another huge benefit of ordering through Alibaba is, as mention earlier, the ability to purchase grow tents at a reasonable price. Originally the tents were not part of the startup cost because of their high cost

and the fact that they are not necessarily essential to the use of hydroponics. Having the ability to purchase tents at a more reasonable price gives farmers many more advantages. The grow tents will be able to keep up humidity which will aid the growth of most of the vegetables they would choose to grow, ventilation could also be added and used to lower humidity a bit dependent on their crop of choice. Having a tent also has the potential to reduce the number of bugs and other pests that can get into their crops. Although nothing is perfect and there is no way for them to completely remove pests, having the crops sealed off from outside will definitely reduce the number of pests and diseases getting into their crop which in turn will increase yield and quality.

In Nepal there are roughly 3 topological regions which vary from mountain ranges to grasslands. As to be expected, for the most part agriculture is only possible in the less slanted and hill regions of Nepal. Only being able to grow crops in certain regions limits the use that farmers have for parts of their land that are located in the mountains parts of Nepal. If there was a way for farmers to utilize the untapped space that would be advantageous to not only the farmers but everyone who relies on the food that they produce. By introducing flood tables into Nepal it will allow farmers to use the land they may not be best suited for crop, there is also the potential for the rockwool to provide a growing medium for other fruits and vegetables that couldn't be grown in the soil beforehand. Since water is a limited resource being as efficient with it as possible is a necessity. Using hydroponics allows the farmer to control where their water is going and how much their plants get, this is a significant improvement over relying on rain. With limited amount of water resources and a drastically increasing population there is an increasing demand for intensive-protected agriculture. This technology has been applied all over the world in many different places. (Premanandh, 2011) With the use of hydroponics the plants are not being grown in the group which could prove to have many beneficial environmental

effects on Nepal. Firstly, this would mean a lot less soil erosion as farmers who are located on hillsides will be using ulterior methods of growing crops which will take a significantly less toll on the soil. This will also mean a lot less beneficial nutrients will be taken out of the soil meaning it will remain healthy and arable for longer.

Convincing farmers in Nepal to invest in flood tables initially wouldn't be an easy task, as startup costs could be close to half a year's work depending on how many people team up to invest. Flood tables would have to be pitched as a long-term investment, as initially they may have to dig into their savings but once everything is up and running the profit potential is really there for them. If farmers chose to attempt to grow a crop that isn't commonly grown in Nepal that would give them a huge advantage over their competitors, other farmers. Plant mineral nutrition share the same principals in soilless culture as they would in regular soil. Since this is the case there are many plants that can be grown in rockwool, these include fruits, leafy vegetables, tubers, bulbs, and medical plants (Rodríguez-Delfín, 2012) Having a monopoly on a product or at very least an oligopoly, this would allow them to choose their price, within reason, in turn giving them to opportunity to turn a "huge" relative profit. In Canada the price for fresh vegetables is generally significantly higher than what a farmer would receive for growing beans, wheat, and or corn. Using this same assumption in Nepal the price of fresh produce, especially fruits and vegetables that they may not have seen or tried before would most likely sell for a higher price than grains and other similar crops. This would lead to higher profits and farmers making more money per acre than they would growing grains. Another benefit of hydroponics systems is that if set up properly they can set up vertically. Vertical farming is extremely beneficial in areas in which land for farms is decreasing, this may not be the case yet in Nepal

but if a farmer only has a limited amount of land they could build their systems upwards instead of outwards.

If hydroponics really starts to catch on in Nepal, many parts can be made and assembled locally which opens up the doors for a different variety of jobs in Nepal. Since nothing is perfect things are bound to break or malfunction and will require someone to come and fix. Learning how to fix and work with hydroponic systems can be a valuable skill and in some ways be applied to other tasks around the farm, or around Nepal. Being able to fix hydroponics also creates the potential for more jobs in the repair and service sector. As mentioned before there is a concept called Popular Hydroponics that is taking off in other developing countries, if hydroponic systems in these countries start to catch on before Nepal embraces the technology it could end up causing competition in the market for these specialty fruits and vegetables. Once these countries have a basic set up it would be easy for them to add on and expand, especially with the use of vertical farming. If these operations get to be a large enough size, they will be able to start producing produce for very cheap and potentially have the ability to export. There is a possibility that it would be cheaper for a farmer or the people of Nepal to have produce imported cheaply from another nearby country than it would be to buy from local farmers who are just starting out and cannot produce as cheaply. This could prove to be discouraging to farmers making them reluctant to make the initial investment and in the end mean that Nepal doesn't get the opportunity to use Hydroponics themselves.

Hydroponics are growing in popularity throughout developing countries not only in large scale greenhouses but in smaller operations as well as in people's homes and backyards. It is not unreasonable to assume that hydroponics can be introduced to Nepal at a small scale to start and then having the potential to grow in to something much larger. The introduction of hydroponics

will be extremely beneficial to the country as a whole. Farmers have the potential to increase profits and learn new skills while other residents of Nepal can also learn new skills as well as have access to a larger variety of produce that would not have been a possibility before. Once the farmers really understand all the benefits of this system and see reason behind the startup cost marketing the product to them will not be a challenge. The idea of untapped revenue streams and many new opportunities should seem irresistible to them. It would only take a few farmers initially to get everything started. Once all the logistics are figured out and farmers see others using and benefiting from it, they would be more likely to want and try for themselves.

While doing research and conducting this report there were a few things that became evident. There is without a doubt many benefits to Nepal from the importation of hydroponics, although the benefits might not all be there for Canada. It was found that it would be significantly cheaper and more beneficial for the farmers of Nepal to import from China instead of Canada, the savings from doing so would out way to small benefit Canada would get from a few extra exports. From an economical point of view Canadian companies would have the potential to increase sales ever so slightly and although possible, not likely increase their work force. Aside from this there is no real benefits of exporting this product to Nepal. The utils of happiness and the slight economic growth that Canada would receive is significantly less than the utils of happiness and potential economic growth that would happen in Nepal if they were to adapt hydroponics. This would be increased significantly if Nepal was to import their products from China instead of Canada as more farmers would be able to invest and also be able to get a lot more for the same amount of money. In conclusion it would be in Nepal's best interest to choose to invest in Hydroponics, except do so by purchasing products from Chinese wholesalers rather than those located in Canada.

References

Howard, M. . R. (2013). Soilless Culture. In *Hobby Hydroponics, Second Edition* (pp. 97–118).

CRC Press. <https://doi.org/10.1201/b13737-8>

Premanandh, J. (2011). Factors affecting food security and contribution of modern technologies

in food sustainability. *Journal of the Science of Food and Agriculture*, 91(15), 2707–2714.

<https://doi.org/10.1002/jsfa.4666>

Rodríguez-Delfín, A. (2012). Advances of hydroponics in Latin America. *Acta Horticulturae*,

947, 23–32. <https://doi.org/10.17660/ActaHortic.2012.947.1>

Urrestarazu, M. (2013). State of the art and new trends of soilless culture in Spain and in

emerging countries. *Acta Horticulturae*, 1013, 305–312.

<https://doi.org/10.17660/ActaHortic.2013.1013.37>