

## Manure Irrigation Pumps

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### Introduction:

Nepal is a small landlocked country in southern Asia, set in between India and China, with a total area of approximately 147,000 square kilometres (Central Intelligence Agency, 2016). In Nepal, roughly 30% of the land is used in agriculture, and of the total area in Nepal, only 15.1% of land is arable land, the rest of the land is either permanent pasture and crops, forest area, or other land that is not suitable for agriculture (Central Intelligence Agency, 2016). The three main regions of Nepal include the mountain region, hills region, and the terai region. The vast majority of crops are grown in the southern terai region due to the suitable climate promoting better growth than other regions in Nepal.

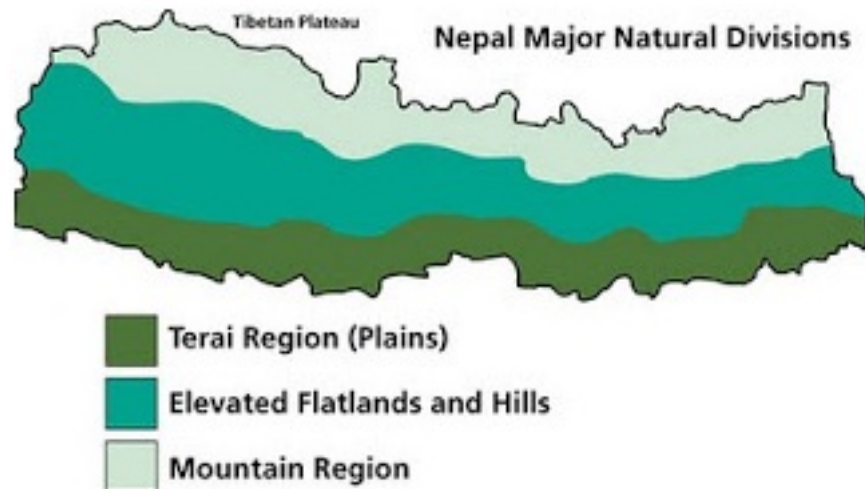


Figure 1: Geographical Map of Nepal

From: <http://www.advzambuling.com/trips/view/Terai-Tour>

Nepal has a population of approximately 29 million people which puts them at the 46<sup>th</sup> highest populated country in the world, and at the capital city of Nepal Kathmandu, there is

about 1.2 million people. The official language of Nepal is Nepali, where 44.6% of the population speaks, but there are multiple other languages spoken in fairly high percentages as well. The vast majority of the population is Hindu (81.3%) but there is also Buddhist, Muslim, Kirant, Christian, as well as a few other religions. With a population of 29 million, Nepal also has a population growth rate of 1.24% which leads to more poverty each year. Although there is a fairly high population in Nepal, only roughly 64% of people in Nepal above the age of 15 can read and write, which leads to further poverty.

The Nepalese economy heavily relies on agriculture as a source of GDP, since agriculture alone accounts for about 30% of all GDP in Nepal. Of the 30%, the main agricultural products making up the large portion of GDP in Nepal consist of rice, corn, wheat, sugarcane, jute, pulses, water buffalo meat, milk, and root crops. Other substantial industries in Nepal include mainly service and tourism type industries. Even though agriculture makes up only 30% of GDP, it contains about 70% of the total workforce of 15.2 million people in Nepal. The main imports in Nepal consist of petroleum products, machinery and equipment such as liquid pumps, as well as gold, electrical goods, and medical products. And with the Canadian dollar being equal to 51.14 Indian rupees, this makes importing goods to Nepal difficult (Central Intelligence Agency, 2016).

## **Part 1:**

### **Product Description:**

A manure transfer pump, is a PTO or electronically operated pump which rotates an impeller at the bottom of the pump to force liquid up the pipe and out of the pit, to the desired area to manage manure, as well as to manage fertilizer levels on crop land. Manure transfer

pumps are a large part of any operation's manure management system, and allows for the relocation of animal waste as well as for irrigation purposes. The pumps can be used for flooding rice fields to suppress weed pressure, to manage liquid manure, to drain ponds, marshes, or flooded areas, and to pump water for irrigation purposes. There are multiple companies that manufacture and sell these types of pumps such as Husky Farm Equipment, Gea Houle Farm Equipment, Nuhn Industries LTD, and Jamesway Farm Equipment. The pumps being focussed on for this project are those of Husky Farm Equipment.



Figure 2: 3" electric manure pump, and a 8" PTO driven manure pump

From: <http://www.huskyfarm.ca/products.html#pumps>

### Different Sizes and Types of Pumps and Price:

Husky Farm Equipment sells a variety of sizes and types of manure pumps (Husky Farm Equipment, 2016).

Size of Pump (diameter of pipe in inches)	Type of Pump and Name	Price of the Pump (CAD)	Machinery Required
3"	Electric (Electric)	\$3000 (new)	None

		\$1600 (used)	
4"	Electric (ElectraKing)	\$4000 (new) \$1600 (used)	None
6"	PTO Operated (K31)	\$8000 (new) \$3400 (used)	Tractor with a PTO
8"	PTO Operated (H5000)	\$14700 (new) \$3000-5000 (used)	Tractor with a PTO

Figure 3: Chart of types and sizes of pumps along with their cost

### **Labour Required:**

The labour required to set up and operate these pumps are very minimal, the PTO operated pumps being more labour intensive than that of the electric pumps since the pump needs to be hooked up to a tractor and backed up to a manure pit, usually taking anywhere between 30 minutes and an hour with two people. The electric pump only needs to be set into a pit and started. Other labour associated with this equipment is maintenance and repairs on wear parts that need to be replaced when worn down.

### **Market Opportunity:**

The market for manure pumps in Nepal is already an existing market where imports of liquid pumps makes up about 1% of all equipment imports in the country from mainly India and China, but does import a small quantity from the United States. Since the market for manure and liquid pumps already exists in Nepal, this would not be a new market where consumers are unaware of the product (The Observatory of Economic Complexity, 2014). For cost efficiency, the electric manure pumps will be the main focus for marketing due to the lower initial price as well as a lower cost to operate the equipment.

### **Benefits to Canada:**

The major benefits to Canada for exporting this product to Nepal would include supporting local companies such as Husky Farm Equipment, as well as other manure pump manufacturers, introducing small companies into international trade, creating new jobs within Ontario due to a growing business, and helping Canada’s economy by increasing exports.

**Part 2:**

**Transportation Logistics:**

To get the manure pumps to Nepal, the manure pumps will be transported in 20x40-foot transport crates by truck from Mapleton, Ontario to a port on Montreal. From there, the crates will be loaded onto a ship and transported by freight boat to Pipavav, India, where the crates will then be loaded back onto trucks and be transported to Kathmandu, Nepal. From Husky Farm Equipment in Mapleton, Ontario to the port in Montreal it costs roughly \$1100 per crate, then from the port in Montreal to the port in India, it costs around \$1300 per crate, and then lastly from India to Kathmandu Nepal it costs about \$1600 per crate. The whole trip for one crate costing roughly \$4000 (Freight Calculator, n.d.).

Size of Pump	Dimensions of Pump	Number of Pumps per Crate	Cost Per Pump to Transport (CAD)	Total Cost of Pump Including Transport Costs (CAD)
3"	12 feet long 2 feet wide	30	\$133.33	\$3,133.33 (new) \$1,733.33 (used)
4"	12 feet long 2 feet wide	30	\$133.33	\$4,133.33 (new) \$1,733.33 (used)
6"	12 feet long 6 feet wide	9	\$444.44	\$8,444.44 (new) \$3,844.44 (used)
8"	12 feet long 6 feet wide	9	\$444.44	\$15,144.44 (new) \$5,444.44 (used)

Figure 4: Cost analysis for the transportation of different sizes and types of pumps

**Cost Analysis to Reach Profit:**

. The cost to ship each pump is included in the cost of the pump see in the figure above. The price required to break even is the price listed in the figure above, to profit from the sale of these pumps, a higher price would need to be assigned to the sale of the manure pumps.

The price point on manure pumps is fairly high for a small farm and is quite unrealistic for a single farmer to purchase one for their own farm, but if a community were to purchase one pump to share then the initial price of the pump is less substantial.

### **Needs and Benefits of the Product:**

The need for manure transfer pumps in Nepal is due to the lack of mechanization in Nepal. Nepal is set so far behind in technology that if the farmers of Nepal were to attempt to take on the technology used in agriculture in Canada, it would be useless to them since the farmers have no prior knowledge to the equipment being used by today's farmers. By introducing more farmers in Nepal to manure pumps, it is a small step to inform more farmers on the types of equipment being used in the agricultural industry today (Karki, 2016). Nepalese farmers are also in need of these pumps because of agricultural labourers being a scarce commodity, current crop and livestock productivity is low due to low fertilizer levels, chemical fertilizer is a large cost to cash crop and subsistence farmers, and with future predictions of a rising population crop yields and production must increase through crop intensification to achieve high enough yields to feed more people (Tripathi and Jones, 2010). By introducing manure transfer pumps the benefits to the farmer as well as to Nepal include higher yields, the ability to manage manure and manure storage which prevents further leaching of nitrogen into groundwater systems, and the manure pumps can help a whole community since manure pumps can double as water pumps which can be shared by a community so everyone can benefit from the pump.

### **Environmental Benefits:**

Nitrogen leaching due to improper methods of manure storage is a large problem in developing countries such as Nepal. With nitrogen leaching contaminating water sources including groundwater, rivers, lakes, and streams these all lead to huge environmental issues. Not only does the leaching of nitrogen directly impact the drinking water leading to illness and other health issues, but leaching also largely impacts surface water. With excess nitrogen in water it's not only a hazard for human consumption, but it also can lead to eutrophication which is when algae and other aquatic plants rapidly grow and cover the surface of the water competing for sunlight and oxygen ultimately killing other aquatic life and poisoning fish (Di et al., 2002). With having a proper manure management system, manure does not stay in improper manure storages as long as it would, which ultimately cuts back on a large portion of nitrogen being leached into groundwater. Instead of being leached, the nitrogen is being utilized on crop soil to be used as a cheap fertilizer to fertilize crops as well as to replenish the nutrients and organic matter within the soil (Karki, 2016).

The land also sees benefits to manure transfer pumps. Since the pumps can also be used to transfer water, it allows for irrigation to crops keeping ground moisture at an appropriate level preventing the ground from fracturing, losing moisture, and cutting back on soil erosion due to wind and heat. The pumps can also be used to flood fields to help suppress weed pressure to cut down on chemical pesticides being purchased and utilized.

### **Canadian Companies Involved:**

The Canadian company directly associated with the manure transfer pumps is Husky Farm Equipment located in Mapleton, Ontario which is relatively close to Guelph, Ontario.

Other local Canadian companies such as Gea Houle Farm Equipment, Nuhn Industries LTD, and Jamesway Farm Equipment are also possible companies that could be involved with exporting manure transfer pumps to Nepal since all of their products are relatively close to one another in size, design, and price range.

Other possible Canadian companies that could be involved in exporting this product to Nepal could be trucking services in Canada used to get the product to the port in Montreal, as well as freight services used to transport the equipment across seas to India. There are hundreds of different trucking services in Ontario alone which could be involved in exporting this equipment. The freight services would involve the Canadian government since the government owns the port (Government of Canada, 2016).

### **Regional and Global Competition:**

As of now the vast majority of liquid pumps being imported into Nepal are coming from China and India, with India exporting 53% of Nepal's liquid pump imports, and China exporting 38% of Nepal's liquid pump imports (The Observatory of Economic Complexity, 2014).

Between China and India, there is a large amount of competition within the region, making sales more challenging. Although India and China are the two main sources Nepal imports liquid pumps from, a large part of these pumps are not suited for agriculture which does open up the market for new companies. Globally there are many different companies which manufacture and sell manure transfer pumps, but the cost to import and export the equipment is a costly factor.

### **Recommendations for the Future:**

For future success, educating the farmers of Nepal on how farmers operate their farms with technology and introduce the Nepalese farmers to new technologies to assist them in



keeping up with today's agriculture and the increasing need for food. More recommendations more specific to this product would be to invest in more modern manure storage for agricultural waste such as concrete pits to better contain the nutrients as well as to prevent nutrient leaching.

### **Conclusion:**

In conclusion, agriculture in Nepal has a long way to go before the industry will be profitable and efficient, and there are many things that need to happen and that need to be changes in order to achieve efficiency. Through exporting manure transfer pumps and making this kind of technology more available to the farmers in Nepal, this allows the farmers to get a taste of what agriculture in Canada is like and it shows them what kind of technology is out there available for them to utilize in order to increase productivity. Sometimes all that any farmer needs to change his or her mind is to see how good technology actually works, and a fair amount of persuasion. Overall, the Nepalese farmers would be better off purchasing manure transfer pumps from regional manufacturers and sellers rather than Canadian companies, simply because the equipment is rather expensive itself and to ship the equipment is another expense that will be included in the cost to the farmer. Also by purchasing from Canadian companies it takes away from sales from regional companies which therein negatively impacts the regional businesses.

### **Contacts for Further Information:**

Nepal's Ministry of Agricultural Development: <http://www.moad.gov.np/en/>

Agriculture and Agri-Food Canada: <http://www.agr.gc.ca/eng/home/?id=1395690825741>

Husky Farm Equipment: <http://www.huskyfarm.ca/home.html>

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