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Exporting Soil Testing Equipment to Nepal Final Report

The goal of this proposal is to export soil testing equipment from Canadian company M&L Testing Equipment to the country Nepal (M&L Testing Equipment, 2014). The ultimate goal is to benefit the interests of all pertaining nations. Through the use of an analysis percometer in accordance with Soil Colour Charts, it would lead to allowing the agricultural producers of Nepal more efficient means to produce crops, increasing yield and net income. At the same time, it would benefit the Canadian economy through a new avenue of exports. The export product is twofold. The first part of equipment would be an H-4112 moisture testing percometer from Canadian company M&L Testing Equipment (M&L Testing Equipment, n.d.). In addition, a soil classification method using the Munsell Soil Colour Book will also be part of the export package. These export products have the potential to benefit Nepalese farmers on a large scale as well as Canadian interests.

M&L Testing Equipment has been around since its establishment in 1960 (Government of Canada, 2013). The company headquarters are in Dundas Ontario (Government of Canada, 2013). They also have an office in Calgary, Alberta (M&L Testing Equipment, n.d.). Their area of expertise is selling and calibrating testing equipment for soil, plastic, steel, and concrete (M&L Testing Equipment, 2014). The company's sales in Canada are annually one million to five million Canadian dollars (Government of Canada, 2013). M&L Testing Equipment has primarily exported to the United States in the past, but is exploring other potential export locations including Asia (Government of Canada, 2013). The company has only 15 employees (M&L Testing Equipment Costs, 2014). Despite this, they are one of the largest providers of material testing equipment for use both in the field and lab (M&L Testing Equipment, 2014). Due to the fact that M&L Testing Equipment has an office in the western part of the country, export to Asia would be more efficient due to the reduced distance to Asia.

The first export item, the H-4112 percometer, as seen in Figure 1, has a cost of $10 500 Canadian Dollars. This is approximately 930 000 Nepalese Rupees (XE Currency Converter, 2014). One of the percometer primary functions is its ability to test the moisture of soils (M&L

Testing Equipment, n.d.). Other extremely significant functions of the percometer is its ability to test soils conductivity (M&L Testing Equipment, n.d.). This analysis tool will also provide the soils' ionic concentration. It can also test the salinity of the soil and sulphate content. The analysis percometer is lightweight, easy to use and accurate. It can also measure temperatures of materials, dielectric values, and moisture content of soil through a series of probes. (M&L Testing Equipment, n.d.). The advantages of knowing these reading for soil in a given area may be in doubt, but there are numerous applications that have the ability to exploit these readings.

Figure 1 H-4112 percometer M&L Testing Equipment

http://www.mltest.com/PDF/Percometer.pdf

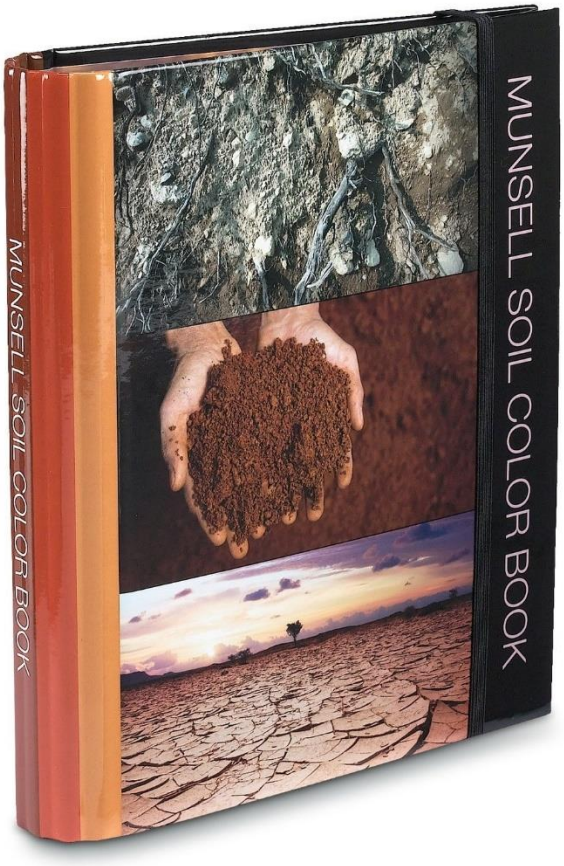
This has the potential to be extremely beneficial to Nepalese agricultural producers due to the wide variety of testing options. To begin, the fact that the information display is on the display screen itself, without the need for external hookups would be invaluable when used in the more remote regions of Nepal (M&L Testing Equipment, n.d.). The percometer runs on a 12V battery, supplying eight hours of testing. An external +9 to +14 Volt power source can also be used (M&L Testing Equipment, n.d.). This may, however, be an issue in the rural parts of

Nepal, where access to electricity or batteries could be an issue. The percometer comes equipped with a surface probe, but additional probes, such as the Short Tube Probe, are not included (M&L Testing Equipment, n.d.). The surface probe is capable of measuring values from two to three centimetres in depth, but a Tube Probe would be much more effective at analysing soils at a depth of 10 centimetres or greater (M&L Testing Equipment, n.d.). As for the actual applications of the percometer, the results of the soil testing can be used to determine several things about the soil. The electrical conductivity of the soil determines the soil salinity, colloid in the soil as well as temperature. Most importantly, however, is the fact that the electrical conductivity has the ability to determine the sulphate content in the soil, which would be invaluable in determining whether acidic stabilization of the soil is required. The dielectric value of the soil can determine frost risk in non-saturated soils. It also determines the soil regeneration capability. The percometer determines the temperature of soil being tested, which aids in determining whether ionic concentration or temperature is responsible for electrical conductivity variances (M&L Testing Equipment, n.d.). The analysis of soil chemical makeup can be extremely beneficial to the producer in identifying an abundance of acidic content in soil and chemical makeup, allowing the agricultural producers to take steps in adjusting agricultural practices to account for chemical issues in soils. For example, if there are sulphate ion concentration issue, steps can be taken to deal with the problem. Most importantly, if the agricultural producer is unaware as to their soil chemical makeup, this analysis tool will provide extremely useful insight into the soils chemistry and lack or abundance of vital content.

The secondary export product is the Munsell Book of Soil Colour Charts, Figure 2. This book is designed to allow simple soil classification in the field, Figure 3. The soil colour charts, in addition to the analysis percometer, can also be bought from M&L Testing Equipment, with a

cost of $300 Canadian Dollars (M&L Testing Equipment Costs, 2014). This is approximately 26 500 Nepalese Rupees (XE Currency Converter, 2014).

Figure 2 Munsell Book of Soil Colour Charts

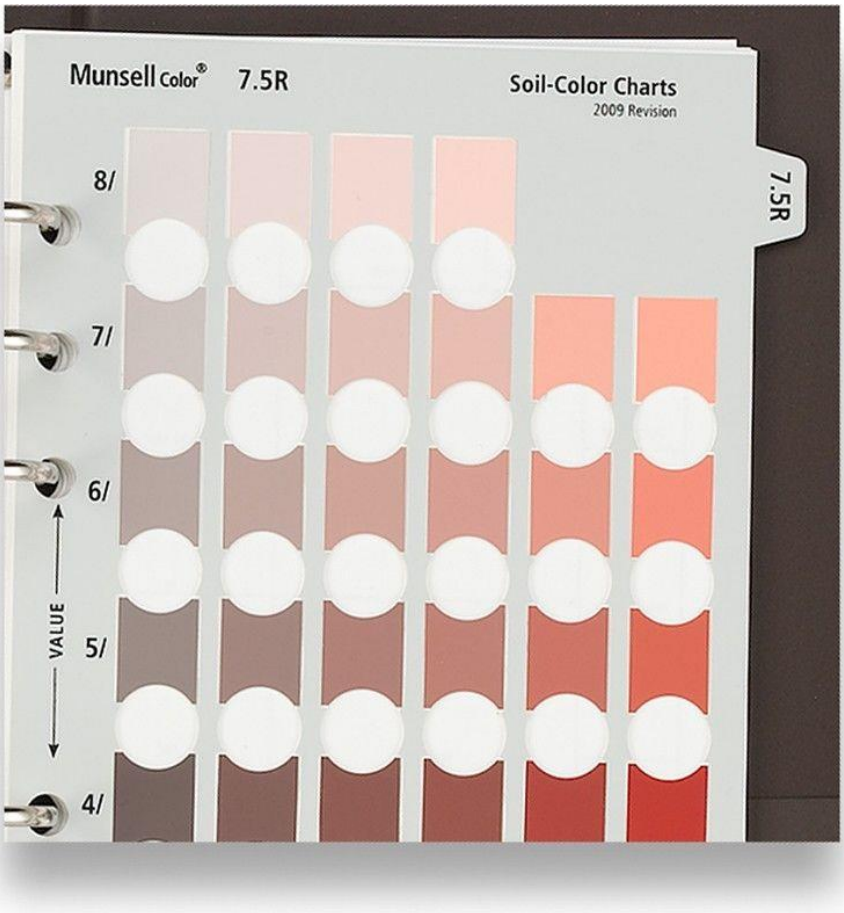


http://www.forestry-suppliers.com/product_pages/Products.asp?mi=73221&title=Munsell%20Soil%20Color%20Book&itemnum=77321

The book of soil colour charts is a relatively inexpensive way to evaluate and classify soil types in an area (M&L Testing Equipment, n.d.). This type of evaluation has been used in the United States for more than 50 years. This book has the ability to assist in the usage and management of natural resources in any sector of land (M&L Testing Equipment, n.d.). This book of Soil Colour Charts has the potential to allow the Nepalese producer to identify the soil types on their

land. As a result, if the producer has knowledge of the soil type, they can determine the most profitable type of crop that can be grown in a specific type of soil. Though it is most likely that the crops already growing in an area are suited to that soil, it could still open options and insight into changes from the regular Nepalese agricultural practices. In the long term, this can allow the producer to increase profitability of a set land area, increasing productivity and benefitting the Nepalese government. This would lead to increased tax revenue as well as a stimulated economy. The soil charts usage is actually quite simple. The book, as seen in Figure 3, is actually made up of a series of colour chips (Forestry Suppliers, n.d.). This leads to extremely basic analysis using direct samples of soils in the field.

Figure 3 Soil Colour Chart



http://www.forestry-suppliers.com/product_pages/Products.asp?mi=73221&title=Munsell%20Soil%20Color%20Book&itemnum=77321

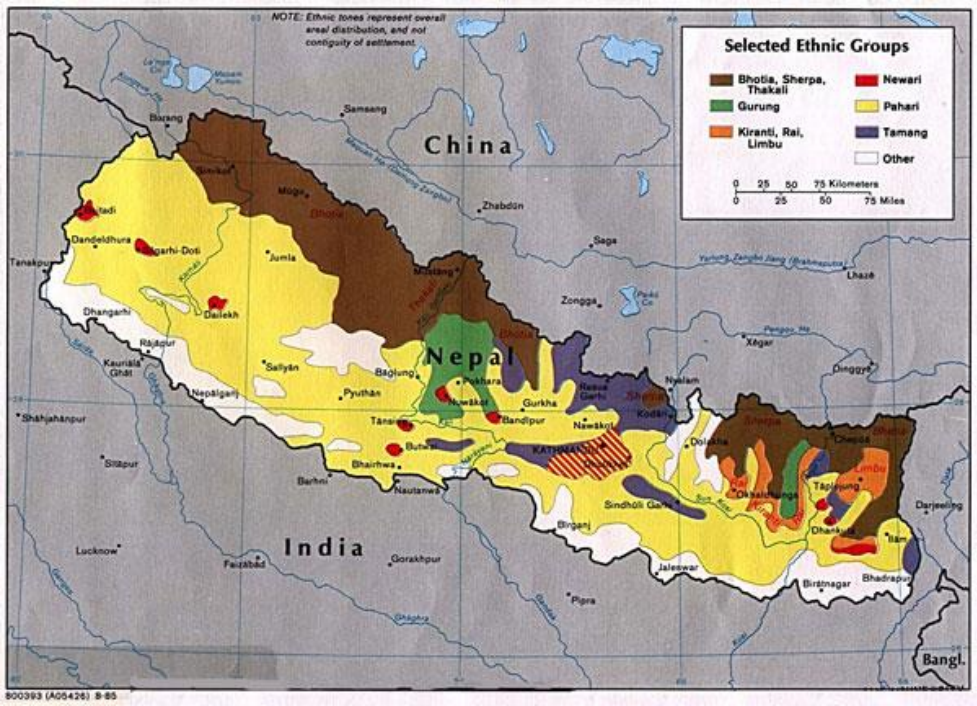
There are numerous restriction pertaining the use of both the analysis percometer and book of Soil Colour Charts. The readings from the H-4112 percometer would almost certainly be meaningless to the majority of the agricultural producers of Nepal. The analysis results would need to be analyses by an accomplished practitioner of chemistry and biology. These experts would ideally be graduates from Nepalese Universities who are interested in advancing the Nepalese economy and benefiting agricultural producers in rural Nepal. The results of the testing would need to be analysed, and the results would be used to provide advice to the agricultural producers. The direct results from the percometer, including the dielectric values, electrical conductivity, moisture and temperature of the soil, as well as salinity and sulphate values would be collated by the analyser. This information would be combined with the determination of soil types, obtained with the Munsell book of Soil Colour Charts, and chemists and or biologists could provide a course of action. Beneficial advice that could be given to agricultural producers on a region could include which crops grow ideally under applicable circumstances. If there is an acidic issue in the soil, they could provide suggestions as to how to neutralize it or how to circumnavigate the problem through different planting options, for example. The cost of this equipment is simply astronomical in Nepalese Rupees, so the government of Nepal would need to purchase the analysis percometer and book of Soil Charts. Ideally, the Nepalese Department of Agriculture would oversee the purchase and usage of the classification and analysis equipment. A major issue in the usage of these products would be the fact that 45% of the population speaks Nepalese (Government of Nepal, 2014). The use of Nepalese trained biologists and chemists would only be possible if they knew the English language, as it is required to collate the classification and analysis results. Communicating results to the people of Nepal would also be a major issue, since the census of 2011, 123 different languages were spoken as a primary source of communication (Government of Nepal, 2014). The analysts would almost certainly not know all these languages, so interpreters would be required to communicate with the Nepalese. As of the census of 2011, there was an overall

literacy rate of 65.9% in Nepal, the highest being in the capitol (Government of Nepal, 2014). Communicating courses of action based on soil analysis to the Nepalese would be an additional issue, as for a percentage of the agricultural producers, suggestions would have to be given verbally, due to the literacy rate. Another issue would be the terrain of Nepal. In the census of 2011, special precautions were required to deal with problematic terrain as well as the working around the rainy season of Nepal (Government of Nepal, 2014). These issues would be problematic if large scale analysis were performed around the country. The answer would be to send teams of trained analysers under the pay of the Department of Agriculture to go to districts and analyse geologically uniform regions rather than going to every farm. The results could then be analysed on a larger scale, and courses of action could be collectively communicated over an area. The overall cost of the H-4112 percometer along with the Munsell book of Soil Colour Charts is $10 800, $10500 for the percometer, $300 for the classification book (M&L Testing Equipment Costs, 2014). Shipping would cost approximately $500, quite high as the company M&L Testing Equipment does not export a lot of their products. Overall, the costs of procuring a package of the book, percometer and surface probe would be $11 300 (M&L Testing Equipment Costs, 2014). This is approximately 984 000 Nepalese Rupees (XE Currency Converter, 2014). The costs would be astronomical for the average agricultural producer, so the Nepalese Department of Agriculture would have to directly purchase the equipment from M&L Testing Equipment. A separate company situated in Nepal could not profitably facilitate the use of this equipment without government subsidies, as the soil analysing is not designed to be a direct method of profit. In explanation, in the more rural parts of the country, farmers could not afford to pay for analysis of their land, as there is a lot of poverty in Nepal. When analysing the 2011 Nepalese census highlights, the statistics support this assertion, considering low literacy rates and the types of fuel used for cooking (Government of Nepal, 2014). The Nepalese Department of Agriculture would facilitate the purchase of the testing equipment. Appropriately trained personnel would need to be assigned to the project, including field personnel to do the testing,

chemists to analyse the data, biologists to determine courses of action to relevant agricultural producers in a region, and communicators to distribute the information to the relevant regions. All this would be required from the Nepalese government in order to effectively purchase and use the analysis and classification technology with the aim of benefitting the agricultural producers and ultimately the country's economy.

One of the multiple goals of the Nepalese Department of Agriculture is to advance agricultural production based around geographic variances, as shown in Figure 4 (Government of Nepal, 2014). The proposed export of testing equipment would assist the department in achieving this objective. The soil classification book would be the primary advantage when considering the geographic variances, through various soils.

Figure 4 Map of Nepal's Terrain



http://4.bp.blogspot.com/_oH7I7ZB_Rzc/S_OPyEJ-dTI/AAAAAAAAAAc/4nWGB3kMXuo/s1600/nepal_geographical.jpg

The use of the Munsell book of Soil Colour Charts will allow the identification and classification of soil types in various geographic locations. This information could then be used to identify means for the agricultural producer to increase production per land area, based on geographic regions and various soils. The majority of Nepal's population lives in the rural country. As such, only 17% of the population live in urban areas of the country (Government of Nepal, 2014). This indicates that soil analysis has the ability to benefit the majority of the population. Considering the fact that the Nepalese population was approximately 26.5 million as of 2011, this would benefit a lot of households in Nepal (Government of Nepal, 2014). If all these households increased efficiency and income per year, economic growth would be stimulated. The export of the testing equipment will positively influence the Canadian economy as well. M&L Testing Equipment is a Canadian company with little experience exporting outside of Canada (Government of Canada, 2013). An increase in external sources of revenue will allow the company to flourish. This will benefit Canadian jobs all the way along relevant industries, including the transportation and manufacturing sectors. The sale of a reliable product overseas will also increase trade cooperation between Canada and Nepal, depending on the success of the products sale and usage. This could open other trade opportunities to Asia through additional testing equipment as well as other products. The increase in productivity in Nepalese agricultural would be attributed to a Canadian company, and will help promote the Canadian trade reputation.

The results of the soil classification would also benefit the environment of Nepal. If the appropriate crops are planted suiting the environmental conditions, issues such as erosion can be avoided. Importantly, the percometer can identify the moisture content of soil. The Nepalese agricultural producers could be advised as to when planting should be done to minimize seed loss and negative environmental effects (M&L Testing Equipment, n.d.). This product would benefit the Nepalese environment, increasing the country's sustainability.

The Canadian company M&L Testing Equipment has two offices, including an office in Calgary, which has two employees (M&L Testing Equipment Costs, 2014). The headquarters of the company are just north of Hamilton, and it houses 13 employees (M&L Testing Equipment Costs, 2014). Though the company could be considered small in terms of employees, they handle a wide variety of material testing equipment (M&L Testing Equipment, 2014). The costs of shipping the product to Nepal is roughly $500 (M&L Testing Equipment Costs, 2014). This is not an exact value, as M&L Testing Equipment does not currently export to Asia. The percometer shipping size is one foot square with a mass of four pounds. The Munsell book of Soil Colour Charts has a mass of one pound (M&L Testing Equipment Costs, 2014). The export and transportation of these products would be relatively simple due to their small size and mass. The testing equipment would probably be shipped from the Calgary office either directly to Nepal, or through a neighbouring country such as China or India. This could be advantageous due to the relative small amount that Canada currently exports to Nepal (Government of Canada, 2013). As of 2013, Canada only exported $7.1 million in worth to Nepal. Canadian imports from Nepal were worth $11.7 million per annum. The Canada-Nepal Business Executive Committee was formed to promote the business relationships between the two countries by expanding the business relationship between Canadian companies situated in India and Nepalese companies (Government of Canada, 2013). Due to the fact that Canadian companies have relationships to Nepal through India, this would be an efficient means of getting the product to Nepal, along established transportation routes.

Though the overall cost of the analysis percometer, soil colour book and shipping come to around $11 300 Canadian, it will pay for itself in the long term (M&L Testing Equipment Costs, 2014). The Nepalese Department of Agriculture has the ability to obtain this technology and efficiently facilitate its use. If the Nepalese agricultural producers increase the profitability and income of their farming systems, it will stimulate the Nepalese economy and allow for

economic growth as well as taking a step past poverty in rural regions of the country. As far as basic research can determine, the Nepalese do not have analysis technology of this calibre. The ability to identify soil needs is extremely important considering the size of the Nepalese population living in rural areas (Government of Nepal, 2014). The ability of the Nepalese to identify the correct types of crops to be grown on a specific type of soil will benefit the agricultural producer in several ways, including the potential for reduced erosion, reduction of seeds loss by planting at ideal moistures, and identification of acidic content in soils.

The company exporting the product is M&L Testing Equipment (M&L Testing Equipment, 2014). The company can be contacted through their email, info@mltest.com (M&L Testing Equipment, 2014). The potential buyer would almost certainly have to be the Nepalese government, as the costs are just too great for individual agricultural communities. The testing and classification can also be considered a long term investment for Nepal, as it is not designed for short term profit. Indeed, the goal is to stimulate the growth and profitability of the Nepalese farmers, while supporting Canadian interests. Little marketing strategy would be required. If the Nepalese Department of Agriculture decides to purchase this technology, they would handle the positive marketing to the population regarding the potential benefits of knowledge of soil composition and types.

The greatest unknown is whether Nepal has the trained personnel to use the analysis percometer, determine readings and their values, determine a course of action and communicate the results to the population. If Nepal is capable of supplying these requirements, the analysis percometer and soil classification book would be extremely beneficial to Nepal. However, due to the extreme costs and almost certain limitations in trained personnel, only a limited number of this product could be sold. It would be estimated that less than 30 analysis percometers would be sold to the government of Nepal. The book of Soil Colour Charts, however, I quite a bit cheaper, with a cost of only $300. A much greater number of the Munsell

book of Soil Colour Charts could be exported, perhaps to around several hundred. I would recommend the export of a limited of analysis percometers and colour charts to be sold to the Nepalese government.

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