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## **Educating the Family Farmer in Lao PDR**

Approximately 2.8 billion people in the world live on less than two dollars a day. Roughly four million people reside within the borders of the under developed country of Laos (also known as Lao People's Democratic Republic). Nearly all of its residents live on less than one U.S. dollar a day as a result of being subsistence farmers. Most farm families, however, only plan to produce enough for home consumption and a humble existence. Their marketed share of agricultural goods is below thirty percent. But even so, not all their needs are met living off of themselves alone. Making situations worse, the geography of the country causes the societies to be socially and economically secluded due to the mountainous terrain and very few roads. It makes it harder for the Laotian people to receive aid when needed. By educating the family farmers about results from agricultural yield and sustainability research and providing access to and support implementing methods from this research, the average income of the family, as a whole, would increase dramatically. The family's diet would ameliorate, health and nutrition in children would improve from its current state, women's maternal mortality rates would decline, and illiteracy rates would plummet. One of the biggest causes of poverty anywhere is the lack of education. Thus, educating the family farmers in current trends, technology, and economics will undoubtedly adjust any family's income to the standard of living today. The only snags in this hypothesis is getting the farmers into the routine of staying updated with current trends and research results, simplifying the results as a whole to make it easier to comprehend, and how to make sufficient succor available and affordable. Once these obstacles are overcome, the country's economy will go into a period of transition and, in time, become fully developed. One of the more conceivable results of Lao PDR, once developed, would be the conversion into a major exporter of rice, soybeans, durian, papaya, sugar cane, and other agronomic goods.

The typical Laotian family farm is not as big as usually inferred. Lao PDR is 91,429 square miles in area, only about 20,000 square miles is suitable for farming, and about one-third of that is cultivated. 58,500 square miles of mountainous terrain or "dead" land remain. The average family farm in Lao PDR consists of: 6 members, 4 acres of farm land, and livestock (i.e.: buffalo, cattle, pigs and chickens). Most of the items grown, for example: rice, coffee, tea, soybeans, tobacco, and spices, along with the livestock; are used for trading to buy consumer goods, such as cooking pots, soap, and salt. Rice, being their main crop, is also their main diet. But it can also comprise of corn, sweet potato, and a small variety of vegetables, though it can vary between regions and villages, as does education. The regions of Laos that are poorer than the others have a lower education percentage for both men and women. Women, ages 18-35, living in the poorer regions, have a literacy rate of 45%, and of men, 68%. While the women in regions that are more in the median, have a literacy rate of 74%, and men being 89%. Regardless of education, however, all subsistence farm families bring in an average of about \$160 per person/year. The reason why the per capita income is so diminutive is because of its rough terrain. Immeasurable miles of mountainous terrain and meager amounts of roads make it hard for the subsistence farmers to trade for consumer goods and/or capital. The terrain also causes sufficient farming to be somewhat of a challenge. One of their most common agricultural practices would be the planting of one yield of rice a year, to coincide with the rainy season. Rice is a monocarpic annual plant, meaning it is a plant that flowers, set seeds, and dies. In this case, the rice plant goes through this routine once a year. It requires ample amounts of sunlight and rainfall, which is why the farm families in Lao PDR grow it only during the rainy season. Another reason why only one rice yield is planted per year is because irrigation is extremely strenuous for the regions that are more on the western side of the country because their prime source of water is the Mekong River, and it is located on the east border between Laos and Thailand. Even with so little a yield, farmers must subtract the amount needed for domestic consumption from the gross

economic yield to determine how much the net economic yield would be worth, thus establishing the reason for sovereign poverty in Lao PDR.

The paucity of education is the main reason why subsistence farmers in Lao PDR do not produce enough food or earn sufficient income. Most farmers are completely unaware of current economic and agricultural trends that could make their lives much more facile. These family farmers suffer the most because their way of living inflicted upon them without any other alternatives. They have no way of accessing implementing methods for increasing economic and agricultural yields or sustainability, which, if they did, would give the entire family more collateral to depend on. Some of the issues prohibiting the education of these family farmers would be the evident verity that they cannot afford it. To be able to inform them and keep the education consistent costs more than they can constitute. The amount of time needed to perform this task is incalculable, and it is also in conjunction with the cost. The more onerous vindication would be molding the current research results into terms the family farmers can understand. Most farmers today do not understand the crucial importance of economic consideration because their lifestyles do not emphasize it. Lastly, to coincide with the fathom of new research results, modernistic technologies and methods for healthier yields and/or sustainability are not part of their routine. A lot of the more vintage farmers will strongly oppose to changes entirely, simply because they rely on their traditions, regardless of how laborious it may be, to carve their standard of living.

Today, the status of the average Lao PDR farm family is substandard. Only 85% of all villages in Lao PDR have a primary school, 43% of the residents of each village actually complete primary school, and only 11% of those individuals continue onto a secondary school. Malnutrition is probably the most problematic dilemmas of this time. In Lao PDR, the daily dietary intake is 1,745 – 1,976 kilocalories, which is about 70% - 80% of the recommended requirement. Of the dietary intake, rural residents receive 75% of their recommended protein a day, which amounts to 45.2 g - 46.9 g out of the recommended 60 g. Rice makes up 50% of their entire protein intake, and 80% of their entire calorie intake. Another factor of malnutrition would be the food taboos the residents believe in. For example, withholding food during illness and postpartum. Fascinatingly enough, girls are marginally better off nutritionally than boys. This came to be because the girls help their mothers prepare meals thus, favorably giving the girls a better access to food. Undernourishment, unfortunately, runs higher among infants. 7% of those from birth to six months are malnourished. It then grows to 36% between the ages of six months to twelve months. Once the children have exceeded their first year, the undernourished percentage proliferates to 62%. 90% of the subsistence farm mothers' breast feed for over twelve months in hopes of supplying copious amounts of nutrition to their children. Subsistence farm family incomes vary between each region and family. An average farm family makes about \$160 U.S. dollars a year when the poverty threshold for one individual in the United States averaged out to \$9,039 dollars a year, as researched in 2001. Lao PDR used to be one of the most biodiversity-rich countries in Southeast Asia because it has a small population and low rate of natural resource exploitation. In the later half of the 20<sup>th</sup> century, however, there was an expeditious decline in forests, forest resources and wildlife. This is mostly attributed to limited administrative and management capacities in national and provincial governments, weak law and regulation enforcement, lack or awareness and understanding, and failure to address cross-border issues relating to resource exploitation, such as trade in wildlife and poaching, however, the degradation of some areas of the country associate with the production of roadways, which could conclude in the urbanization of some villages. The status of women and girls' education, health and income opportunities are generally lower in rural areas than urban. Women in subsistence farm families are accountable for 70% of all farm and house work. Most women, however, weave silk textiles on simple wooden framed hand and foot operated looms. It can take days, even months, to create a single piece of hand-woven silk. Two types of the fabric created would be the epingaline, which are usually brightly colored and used more in special ceremonies and weddings, and the eria, which are made in earthy shades and are used more for everyday attire. These pieces of fabric are greatly admired and can be worth a considerable amount, especially if further dimension is added by embroidering silver and gold thread into intricate designs.

The trends for educating a family farmer would include new yield alternatives and sustainability, better farming methods, better irrigation methods, and better livestock management. Yield sustainability can be measured by recording the amounts per yield per season and of what is planted, for example, rice. Under dry season cultivation, in 1996/1997, 18,000 hectares increased dramatically to 92,000 hectares in 1999/2000. The corresponding increase under wet season cultivation during the same period was from 535,000 hectares to 630,000 hectares. During the 2000 wet season, 519,000 hectares were planted in lowland areas, of which approximately 44,000 hectares were lost; do to flooding, while an additional 152,000 hectares were cultivated in upland areas, totaling at 627,000 hectares harvested in the 2000 wet season. The Lao PDR government emphasis to increase rice cultivation has an association with the primary concern to counter poverty and malnutrition. Until now, rice agriculture has been characterized by low yields, due to poor soil fertilization, and low rice varieties. Ever since the adoption of higher yielding varieties and a balanced use of fertilizers, a significant improvement in agricultural and economic yields has been its outcome. With this change, subsistence family farmers' standard income will increase, allowing the family to rise out of the local poverty threshold.

Promoting subsistence family farmer education in agricultural yield and sustainability research and providing access to and support for implement methods from this research would, in fact, cause an increase in the amount of food and income available. With the access to implementing methods, farmers can create a growth in economic yields, thus concluding in a greater net profit. Agricultural yield sustainability will directly impact the amount of food consumed domestically, and food used for trading. A better education would preserve the environment and maintain biodiversity by allowing the family farmers to be aware of the conservation needs. By enforcing laws and decrees, and establishing a protected area system, forest land and wildlife would be better secured from degradation and illegal activities. Women would have access to better job opportunities; therefore have a better chance of independency. The smaller farmers would benefit from the fact that they are able to depend on their own yields for home consumption, rather than sacrificing their domestic yields for other yields, for example, rice in exchange for soybeans. For the surrounding developing countries, trade will become stronger, and if roadway production is encouraged, urbanization will prosper.

The production of biofuels in Lao PDR will substantially affect the status of education in the average family farmer and yield diversity. For example, one of their major exporters, soybeans, is a large contributor to biofuel production. The soybean itself can be processed into soybean oil which is then converted into a biodiesel. The production of soybeans is neither arduous, nor time consuming. Its basic requirements include: a maximum day length of 14 hours, average overall temperature between 20 - 30 degrees Celsius (68 - 86 degrees Fahrenheit), soil pH of 6, and a well drained field. This is not hard to come by because their main cash crop, rice, consists of the same growing conditions. With this, the farm family can acquire the appropriate information on what to produce, in order to receive the benefits of biofuel productions. It would also affect the trends of education in new yield alternatives by giving the residents of Lao PDR more resources to work from. For example, the production of soybeans will soon surpass the production of rice because soybeans are more beneficial in the biofuel sense. Soybeans are a complete protein and are also very versatile when it comes to making food. 25 grams of soy protein a day may reduce the risk of heart disease and in 1999; the FDA recognized its cholesterol-lowering effects. The soybean is also very easily digested; therefore soymilk can be used to nurture babies. Another example would be the production of a plant called *Jatropha curcas* L, also known as the physic nut. This particular plant is extremely hefty, and can grow in almost any condition. The seed it bears contain a high oil content and is excreted by using simple presses operated in villages. Traditionally, these oils were used for lamps and soap production. The oil is comparable to diesel and, after simple cleaning or removing of impurities, can be used in diesel motors as a biofuel. *Jatropha* is not eaten by livestock and is a perennial plant, thus concluding that it has a life span of about 2 years per yield. *Jatropha* also has a high potential

to increase incomes of villagers through selling of the oil or saving on their own energy expenses. It also has a high potential as an element in conservation approaches through its use as a perennial hedge.

Throughout the extensive research, of which I have conducted, I recommend the increase of *Jatropha* and soybean production. Soybeans contain a symbiotic bacteria residing in its roots which returns nitrogen into a usable source into the soil. By first planting a soybean yield and using the fruits in bears for home consumption and processing the soybean oil into biofuels, the soil will then have an abundance of usable nitrogen to assist the *Jatropha* plant in germinating, even though the *Jatropha* plant can grow in almost any condition. The soybean plant can support the farm family in Lao PDR with a source of food while the *Jatropha* plant is mainly used as a cash crop, because it is not edible. Rice and other crops produced can also assist in domestic consumption and income.

My suggestion for appropriate roles of corporations, national governments and other organizations would be to help influence the Lao PDR residents to improve their education in agricultural yield and sustainability, and provide a better access to and support for implementing methods from research results. The United Nations, more specifically, the United Nations Volunteers (UNV) has been serving in Lao PDR since 1973, initially under the direct supervision of the United Nations Development Programme (UNDP) and after 1986 under the management of a separate UNV office. My suggestion to them is to continue their efforts in educating the subsistence family farmer and to heavily encourage a stronger role for women. The World Bank consists of two unique development institutions, the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA). The IBRD focuses on middle income and creditworthy poor countries, while the IDA focuses on the poorest countries in the world, for example, Lao PDR. Ever since 1977, the World Bank has supported the Lao PDR's development efforts through 34 IDA credits, with commitments to date totaling at an astounding \$711.3 million US dollars and has mobilized about \$31 million in grants. A total of 23 projects have been completed, those including projects encouraging agriculture, education, financial sector reform, energy, health, infrastructure, and environmental sectors. With the help of the IDA, biofuel production in Lao PDR could become the breakthrough needed to assist its residents out of poverty. My recommendation for the World Bank is to successfully continue their projects in Lao PDR, make sure the forestry of the country is sustained because some villagers may obtain half of their whole income and also half of their dietary protein from forest products, especially those in the poorest regions. For private organizations, like Japan's Country Assistance Program, I suggest that they persist in their efforts of economic growth in Lao PDR and other surrounding countries.

In conclusion, educating family farmers about results from agricultural yield and sustainability research and providing access to and support for implementing methods from this research would, in fact, improve the average family farmer's income and food security. Altering rice yield sustainability methods by using both high land and low land cultivation could increase its agricultural yield by approximately 83%. By increasing the educational opportunities for women and girls, they could then have the alternative of independency. The increased production of soybeans would assist in the nurturing of infants because soybeans are easily digested and can be cooked into milk. In addition, soybeans are a legume and contain symbiotic bacteria in its roots that, beneficially, return nitrogen as a usable source back to the soil. If used in crop rotation, the cultivation rice or other crops would prosper. The production of the unique planted called *Jatropha curcas* L, or physic nut, would provide the family farmers with another source of income. The physic nut bears a seed that has a uniquely high oil content. Though its oil is traditionally used for lamps and soap, it can be processed into a biodiesel. The encouraged production of roadways will assist in trading between villages that could, eventually, lead to the urbanization of Lao PDR. The only downfall to that would be the loss of forestry because many villages depend on forestry for up to half of their income and dietary protein. Wildlife conservation is also directly influenced by the conservation of forestry and natural resources. Also, with a progressed enforcement of laws and decrees, and enforced cross-border defense, poaching and illegal activities, that could cause Lao PDR's depreciation in

improvement, would desist. With extended assistance from the World Bank, specifically the International Development Association (IDA), the United Nations Volunteers (UNV), Japan's Country Assistance Program, and other private and civic organizations, the subsistence family farmers of Lao PDR will break the poverty threshold by have the convenience of growing enough agricultural yield to support their families and have enough to trade for necessary consumer goods and/or capital. Family farmers being able to understand the concepts and importance of the economy, and up to date research on implementing methods allow them to better their lives for them and their family, all it requires is a little change and a lot of time.

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