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Biofuels: Will they improve food security in Laos?

Laos, a landlocked country between Thailand and Vietnam, is one of a few places in the world that has yet to be exploited at a high level by foreign and local private sectors. Eighty percent of the population lives rurally, practicing agriculture and, according to the Country Studies done by the U.S. Department of the Army, “family crop production [is] still an important element in the economy of many urban Vientiane (the capital of Laos) families.” (Country) The country is sharply divided in poverty level, with different levels in the north and south, according to climate, which affects the type of agriculture implemented. In the north, called the highlands because of its mountainous regions, shifting cultivation is practiced. The poverty rate in the uplands can be as high as forty-three percent. (Rural) The average amount of people in a household is generally ten to twelve, including the extended family, and the wives and children of married sons. (Country) Their diet consists of the products grown in their small swidden fields, including small amounts of rice supplemented with corn, various vegetables, and small scale animal husbandry. (Country) According to the Rural Poverty Portal, the crop yield in the uplands is actually declining, and they must exploit the forests to provide money to purchase rice from the south. Opium cultivation, which was used as an extra source of revenue, has almost been completely eradicated. (Rural) The government of Laos has worked hard to improve education. (Country) Teachers are paid irregularly though, and must farm or do other work to survive, so classes are only held for a few hours every few days. Many people take ten to twelve years to complete the five years of primary school. The division between girls and boys going to school has lessened over the years. By 1985, ninety-two percent of men, and seventy-six percent of women were able to read and write. (Country) The income of agricultural families is not significant because the economy of rural villages has not been monetized, and any money that is made is used to purchase food. According to James Rubenstein, in the practice of shifting agriculture, (which is being discouraged) the village owns all of the farmland, and it is divided up between the families according to need. The average size of a family plot is .9 hectares, with only a rice yield of one ton per hectare. (Sihanath) The rice planted, which does not grow as well as in the south, has to be supplemented by crops that grow better in the upland area, such as corn, tubers, and various types of squash. In the north, animal husbandry is much more prevalent, as a security for hard times, and as a source of revenue. (Country) The farmers only use a field they have cleared through slash and burn methods for a few years, then leave it to replenish nutrients for up to twenty years. While they let those fields fallow, they create more by clearing forested areas. (Rubenstein) The crops obtained from shifting agriculture generally are not marketed, as they are needed to sustain the families. Farmers who practice shifting cultivation have problems being more productive. They are stuck in a cycle of only being able to produce as much as they need because of lack of technology, and not being able to obtain the money needed to purchase this technology. Animal husbandry has not been very effective, due to feed shortages, and the fact that disease decimates herds. (Country) According to G. Sihanath, who conducted research on forage plants for livestock, “there are few forage species suitable for different agro ecological zones (in Laos).” The practice of shifting cultivation takes up more land than any other type of agriculture, and yields less than any other. Land is harder to obtain, as the government is taking an active role in protecting forests. (Country)

The south, called the lowlands, has a slightly improved standard of living than the north. The average poverty rate is twenty-eight percent, more than ten percent lower than the north. (Rural) The main reason for this decline in poverty is that a different agricultural practice is more practical in the lowlands, which is perfect for growing rice. Rice feeds more people per hectare than any other grain. The lowlands

traditionally used shifting cultivation, but, as their climate is better suited to producing rice, they implemented better practices for producing it, primarily through intensive subsistence farming. (Meyer) Of course, the south is different, not only because of its farming techniques, but also because of its ethnic groups. Their families are comprised of fewer people, on average six to eight. The family consists of a married couple, and their unmarried children. (Country) Their diet consists mainly of rice, on average one ton per family, per year. (Meyer) Education in the lowlands is more accessible, as villages are less “geographically and institutionally isolated,” and the gap between men and women is narrower. (Rural) Income, because of a surplus of crops, has increased to 160 U.S. \$ per year. (Meyer) 160 U.S. \$ is still far below the UN poverty line of 275 U.S. \$. (Country) The income, like in the north, truthfully is not relevant yet, as money only goes to supplying families with food to sustain themselves. The farm size in the lowlands is higher than the uplands; with the average family farm about 1.9 hectares, and a rice yield of 2.24 tons. (Sihanath) The most prominent and most important crop is undeniably rice. They use labor intensive agricultural practices, starting with planting the rice on dry land until they become seedlings. Then, the seedlings are moved to flooded fields to grow. The fields are rain, or irrigation-fed. (Rubenstein) Seventy-five percent of fields are rain-fed. (Meyer) Crops of the lowlands are not generally marketed to foreign investors, but there are specific kinds of rice that, according to Meyer, have an “increas[ed] demand from international markets.” The biggest barrier, for marketing, and for productivity and income of farms in the lowlands is that although rice yields have gone up, the population has also increased. This increase leads farmers to use whatever surplus they might have had to feed their families. The barriers that affect both the north and the south exemplify the fact that the country is just learning to feed itself, and has little population control, and also indicates that introducing biofuels into Laos may bring as much harm as it would bring good.

The most important factor to improve agricultural productivity and food security in Laos is conducting research about sustainability, and production yields, and then getting this information to the farmers so they can use these methods. In the uplands of Laos, there were attempts at creating a policy to improve agricultural yields through the introduction of cooperative farming systems based on cash crops with higher yields. Although, according to the Country Studies, “(farmers) are beginning to produce and sell their specialized crops,” they also said that these farmers are hesitant to market those crops, and “employment in the cooperatives has decreased.” Sustainability of the forests of Laos has been realized as an important issue. To preserve the sustainability of their land, “a number of decrees were issued to encourage environmental protection...the use of manure and compost [was] encouraged to help rejuvenate the soil.” (Country) Even if productivity is at a low, the truth is that food security is not. The country has developed a means to feed itself, and harbor people from the largest problems associated with poor countries: famine, epidemics, and urban slums. (Country) The leaps and bounds made in genetically enhancing seeds are useless in the north, where the climate is not suited to the advancements. Some research has been conducted on foraging for livestock, but the geography, with its “infertile, acidic soil,” (Sihanath) creates a barrier that research may not be able to overcome. The lowlands, on the other hand, have benefited greatly from research implemented there, primarily because the climate is suited to what the research entailed. In the nineties, the Swiss Agency for Development and Cooperation partnered with Laos to improve yields of rice by using new species, while preserving the diversity of the thousands of other species found in Laos. This project was extremely successful. In areas, “the yield [of rice] increased from 3.42 tons in 1990, to 4.45 tons per hectare in 2004.” (Meyers) All data indicates that the utilization of the research in crop yields and sustainability are improving standards on individual farms in the north and south, and as a whole.

Presently, in the north, the research being implemented is on unstable grounds. The reason that many things cannot be implemented is because “rural communities have very limited access to government [and] financial services.” (Rural) Sustainability is trying to be promoted by deforestation prevention, and pasture development is being attempted. Currently the Lao-Swiss partnership is working

on ways to bring success to the north as they did in the south. In the south, agricultural yields are not the issue as much as population control to promote sustainability.

The situation of food security in Laos is not as severe as it should be for one of the poorest countries in the world. In the north, when field yields are not high enough to feed the family, they turn to the forest or emergency livestock to sustain themselves. In the south, many families have surplus, and will loan out rice to others that did not have such luck. (Country) The problem then, coming from the ineffectiveness of this factor right now is the standard of living. Yes, most Laotians can feed themselves, but they have a “lack of access to or inability to afford medical care and education.” (Country) They also cannot afford the feed or medication to make their animal rearing anything more than small scale. In the north, income in urban areas is around 150 US \$ (Country), while farmers in the south make about 160 US \$ (Meyer). This is still only fifty percent of the amount the UN calls “the poverty line.” (275 US \$) If the research from this factor could be utilized, then higher yields would result in a surplus of crops that could be sold for an actual monetary income.

For the entire country, the trend is that environmental degradation is rising, and biodiversity is being preserved. The environmental issues are more prevalent in the north, where deforestation to create farmland is causing multiple problems. The most important problem is the destroying of unique forestland of Laos, because of “foreign demand for wild animals...and forest products...and a growing population putting increased pressure on forests.” (Culture) The farming and exploitation of the forests of Laos not only decrease essential forest environments, but cause erosion, leading to “siltation of reservoirs...and [siltation of] irrigation systems downstream.” If access to fertilizers and technology could be provided, the people utilizing shifting agriculture wouldn’t have to let their fields fallow, and the same land could be used instead of practicing more deforestation. (Culture) In the south, deforestation has decreased, and a biodiversity program has been developed focused on the typed of rice native to Laos. The Swiss Agency for Development and Cooperation (SDC) has helped set up a rice germ plasma bank in Laos, including “Over 15,000 samples...representing an estimated 8,000 rice varieties.” (Meyer) These different types of rice are important because some are resistant to certain types of pests, and others are flood or drought tolerant. The SDC hopes to use this diversity to breed a type suited to the north’s climate.

The rural women of Laos have a surprising advantage compared to women of other third world countries. Although patriarchal authority dominates, government projects have raised the percentage of women going to school, and “women are involved in all aspects of agricultural production.” (Oparochia) According to Oparochia, “Women exercise autonomy...through raising livestock and poultry.” If research on selective breeding and what few foraging plants Laos has could be brought to these women, their production of livestock would increase. If they had a better production of livestock, they could sell off surplus, which would provide them with the income to purchase medicine and feed for their cattle, thus enhancing their herd even more.

There have been a few projects and programs proposed to introduce biofuel production in Laos. The interest that has been shown is the production of a plant called *Jatropha curcas*. According to the Asia Pro Eco Project, *jatropha* “is abundant in Laos, growing in degraded forest area.” The problem is that “farmers have little experience with non-food crops.” (Sengmany) Also, there are no plants that can process *jatropha*, or any other biofuel materials. If research on biofuels could be given to rural farmers, an attempt could be made to switch from food production to biofuel production. This attempt would be more effective in the north, where areas of forest have already been ravaged and farmland is often left to fallow for long periods of time. This means that *jatropha* is already growing in some areas. Biofuels could be produced in the north that could not only be used internally, but have a potential to be exported. The people of the north could buy food from the south, and the south could acquire a sustainable energy from the north. The introduction of biofuels should be very gradual, to determine what the immediate and long-term effects will be. The country has just learned to feed itself, and not very effectively, and the

introduction of biofuels here may tip this already shaky balance. The influence of private sectors should be very limited, or very regulated in Laos' instance. The revenue from biofuel production should not be going to companies outside Laos. The Department of Electricity should be given continued assistance of World Bank's Global Environment Fund to work on getting sustainable energy to rural villages. The Swiss Agency for Development and Culture should continue work to have Laos stabilize its ability to feed itself. The Lao Institute of Renewable Energy (LIRE) should keep a close watch on the few private investors allowed to work in Laos right now, like Sunlabob. LIRE will keep tabs on private sectors, because it has rural people in mind.

Will biofuels find a successful niche in Laos? Naturally, if it is given time and proper management. At this point in time, having farmers convert to cash crops may not help them, as all money will just go to providing food, and since there are not easily accessible plants for converting crops into biofuels for remote villages, the farmers would have to pay to have anything happen with their crops. These farmers are not very familiar with anything besides food crops, so they are distrustful of other crops, and even marketing ideas. The country needs to become ready for more outside influences. It also needs to become more self-sufficient and able to rely less on foreign aid before anything can biofuels can be introduced. Infrastructure and government programs also need to be strengthened before anything can happen. When this has been achieved, biofuels should be introduced. If not all of the biofuels are exported, they can improve the standard of living within Laos, provided sustainable power to connect remote villages, light up schools, and help run new technology, making it a much more suitable place to live in.

More importantly, will biofuels find a safe lodging in the world as a whole? If things continue as they are, with gross misuse of resources, biofuels may be pushed into becoming part of everyone's lives without proper development and research. Laos, and the rest of the world, need to have biofuels developed for specific areas before anything can become really effective. This shouldn't be done leisurely however, because sustainable fuel needs to come into widespread use in the near future. In many third world countries, biofuels may become the answer to their food security issues. Of course, instead, a vicious cycle may occur where money produced from biofuel matter exportation will only be enough to buy food for the family. Biofuels will not solve all the world's problems, but biofuel utilization, coupled with social and economic reforms in the country may be able to solve many of them.

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