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Current Conditions in Southeast Asia and How Farmers Can Adapt and Progress

Throughout the world today, there are approximately six billion mouths to feed. Intensive subsistence agriculture will support half of these people. But there is a major problem to be settled – less than ten percent of the world's land is suitable for subsistence farming, and that number is shrinking. While the Earth's population is rapidly growing, the amount of food grown cannot keep up with past standards. This is largely due to the lack of suitable land. We have degraded an area of land the size of the United States and Canada combined, and farmers throughout the world face a number of problems related to soil and land conditions. These problems range from lack of water to lack of space. In the soil that is available, there is often a depletion of nutrients because farmers cannot afford the land area or time it takes fields to replenish their minerals.

All of these problems lead to the same threat of poverty that is so strong in the countries of Cambodia, Laos, Myanmar, and the Philippines. Along with the threat of poverty comes the threat of malnutrition in farming families. 75% of the poor in Southeast Asia live in rural areas and many of them depend on agriculture. The Food and Agriculture Organization estimates that five to seven million hectares of soil is lost every year because of erosion. One of the largest problems facing farmers is, thus, the depletion of fertile soil by erosion.

Water and wind are the two main causes of erosion. In fact, it would cost about one billion dollars to restore, with fertilizer, the soil nutrients carried to sea by rivers every year. Soil conditions of directly correlate with the size and quality of the harvest. Wind and running water often sweep away loose fertile soil, and without land and soil there are no crops. This is a root cause of world hunger, and the reason there is a great need to stop erosion. Unfortunately, some farmers do not know that erosion exists because their governments have not found effective ways to educate them about this matter.

We can improve the quality of life for subsistence farmers and prevent erosion in Southeast Asian countries by providing farmers with plants specifically designed to keep soil grounded. To encourage and further this process, farmers should be given money for planting specific fruit-bearing trees that also serve as erosion controllers. In this way, farmers would get more nourishment from their crops, and they would create a larger harvest for themselves in upcoming years. If farmers yield enough fruits, their families could sell them in market or grocery stores, which would help the economy of these countries. This should be motivation for governments to provide their countries with these plants.

Subsistence farmers are dominant in regions with dense populations such as China, India, and Southeast Asia so families only have small pieces of land. In order to survive, they need to plant more than one crop in the same field every year. A census in Myanmar in 2003 showed that the average area of land with holdings was 6.2 acres. 85% of landholders were male, and 3.4 million (99.7%) of these land holdings were owned by private households. All of the holdings included some form of livestock, with chickens as the most common. Most of the families, however, relied on crop production for their main source of income. As such, 91% of the land was used for annual crops.

A similar census in Thailand showed slightly different results. Families living on agricultural land make up about 35% of Thailand's population. Only 24% of the households were headed by women, but there was almost a 50-50 split in the number of men and women in each family. The total area of holdings in the country was around 45.8 million acres. The largest sector of the land was devoted to rice, and was followed by field crops, permanent crops, and para rubber.

While new technologies can be used to improve the farming conditions of Southeast Asia, this is often a slow process. Such advances are adopted only after long periods of time because of cultural resistance to change. Furthermore, the new technology must provide answers for problems such as poor soils, inadequate water supplies, and large-scale distribution of new techniques. Many subsistence farmers are wary of fresh ideas and the risks they pose. While new equipment can lead to benefits, the farmers look for the highest pay with the most sure and stable techniques.

This preference for consistency over gambling for more money with new technologies is also the reason behind many farmers' hesitance toward cash cropping. Subsistence farming has provided for families for generations. While farmers want income from selling crops, most do not want to be subject to fluctuations in the market. Subsistence farmers with the least amount of risk of starvation are more likely to try these new ways. Other variables, such as the number and age of their children and the size of their land, are other factors affecting the degree of risk farmers are willing to take. While the average family size in the Philippines has declined by about 42% since 1970 (from six to three and a half), the typical mother has one more child than planned. Generally, the more children and less land the families have, the more likely they will stick to traditional farming practices.

There is a question as to whether these traditional ways are good enough. The minimum wage in Thailand is 175 baht per day (there are about 34 baht for every U.S. dollar) but many do not receive that. Taxes on subsistence farmers in Southeast Asia are not uncommon. Multitudes of people live off only 100-200 baht each day. On average, those involved with agriculture, hunting, and forestry make about 3,019 baht a year. High levels of poverty lead to larger populations because families hope to have better odds of a child surviving and keeping their family name alive. Unfortunately the land is already struggling to support its inhabitants. Though higher qualities of life and health services have improved enough to decrease mortality and increase life expectancy, a number of basic needs for Southeast Asian farmers need to be addressed.

These issues include sanitation, health, and education. As mentioned, life expectancy has increased in Thailand. In 2008, the average age is 75 for women and 71 for men. While many of the younger generation of women seem to have equal access to education as men, sexism still occurs in major fields of studies. Nearly half of women in the labor force are unpaid family workers. Education is partitioned in regard to location more than gender. In general, more children who live in urban Southeast Asia receive an education than those in rural areas. In the Philippines, the percent of children enrolled in school from the ages 6-10 is 78% in rural areas and 88% in cities. Child mortality rates need to be reduced. They are as high as 12.6% in Cambodia. In many situations, these basic problems can be improved by a large push away from rice and towards more profitable crops. Due to the level of poverty in rural Southeast Asia, the main focus for improvement must be centered on a higher quality of life for farmers.

For many years countries in Southeastern Asia have grown cassava as a staple during the tough times. About five hundred million people live off of this plant, approximately one out of every ten people in the world. Cassava has a starchy root and is very durable. It grows in infertile soils and during droughts, which has led to its image as a last resort during bad times. Now it is seen as an important export for poor farmers. Countries want to buy this cheap form of starch as feed for their livestock.

From 1995 to 1997, improved cassava varieties with greater crop yield and starch content were developed in Thailand. These varieties spread through 384,000 hectares – nearly a third of Vietnam's total cassava area – by a simple and effective distribution system. Extension officers contracted farmers to plant small areas of a variety. Once they disseminated the improved varieties to other farmers after the harvest, they received rewards such as planting stakes and cutting fees. They could also spread the more

effective varieties to the rest of their land. From 1990-1997, this plant has generated nearly half a billion dollars in economic benefit, and a reasonable amount of that money has gone to the rural poor.

There are also down sides to using this crop. First, with so much increased production, it is necessary to find more diverse products for cassava so that the supply does not overtake demand. The demand is high enough, though, for farmers to intensify cultivation to the risk of serious soil erosion. Unfortunately, the increased crop yields from new cassava plants are hiding the decreases of production as a result of erosion. The Muong farmers in Northern Vietnam are more aware of this problem, however. As a minority ethnic group, they have small pieces of land in upland areas with a lot of erosion on the steep hills. CIAT (International Center for Tropical Agriculture), a company funded from Japan's Nippon Foundation, has focused on this problem in four Southeast Asian countries. They have found a possible solution in the vetiver (*Vetiveria zizaniodes*) plant.

Without plants to pin down soil, the ground is vulnerable to erosion, which can lead to many dismal effects. Erosion removes the topsoil first, which is essential for the nutrients it contains. Stripped of these, the soil cannot support life. It is very difficult, and sometimes impossible, to grow plants there again. This is the process of desertification, which cannot be easily reversed.

Plants help in four different ways to prevent erosion. First, they slow water runoff, enabling the water to soak into the ground. This is especially important in areas with dry, arid soil. In addition, plants can reduce water flow in wetlands and along river. They also bind their roots to the soil. Plants can form obstructions to water flow, decreasing the water's momentum and strength over other areas. This keeps more soil grounded. Finally, plants break the impact of raindrops so there is less ground eroded during storms.

The domesticated form of vetiver is used to form a living barrier against erosion. There are many reasons why vetiver is ideal for this. The plant keeps its leaves off the ground, allowing it to grow close to each other. Despite this, the stalks are bottom heavy and the woody structures of the stems and leaves are strong. This helps them hold themselves up. While the vetiver is dormant in the winter and dry months, the plant continues to stop soil erosion. The roots of the vetiver actually put out new roots when dirt builds around its stems, creating a self-rising effect. The roots can be over three meters in length and can grow 60 cm in just three weeks. Many plants close to each other will intertwine to form a compact blockade. The plants can be also be used to produce vetiver oil, but unfortunately there is not a very large market for this perfume base. It should be noted that vetiver is difficult to kill, but slicing off the crown close to the surface, will work. It can also be killed with most herbicides. Scientists are not concerned about unwanted spreading of the domesticated vetiver, however. Once vetiver is planted it stays in place, and the seeds do not germinate often.

Flemingia macrophylla is another plant used for erosion control. It is a deep-rooting shrub originally from and distributed in Southeast Asia. Like the vetiver, during the first six months of sowing the plants need weed control. They are also similar in that they also require little attention once established. *F. macrophylla* can live through fairly long dry spells and waterlogged soils.

In addition to anchoring soil, the *F. macrophylla* can also improve conditions. It provides mulch for food crops because of the slow decomposition of its leaves. This could be beneficial for the farmland, especially because about 58% of landowners in Thailand use only inorganic fertilizers for their fields. Many of these farmers are using pesticides, which can be harmful. This mulch is a more natural fertilizer that can be used as a long-term weed control, moisture conserver, and moderator for soil temperatures. The shrubs act as good windbreakers and can provide shade. Its firewood can be used as fuel and dye comes from Flemingia fruit. Many countries use this plant as a treatment for fevers or joint pains.

Agroforestry is another solution with agricultural benefits because it has a high potential in the uplands. Farmers who combine annual and perennial plants in their rotations can help maintain soil fertility. An article from the International Food Policy Research Institute says, “Perennial crops help recycle nutrients and reduce soil erosion. In addition, perennial plants such as fruit trees can be an important source of cash income to poor upland farmers”. Taking this action would be a big step for Southeastern Asia because poor subsistence farmers could get an income while protecting their fields. As stated before, many farmers do not want to risk selling food in an unstable and unpredictable market, but this solution can combine subsistence and cash cropping systems. Farmers can still feed their families on the crops from the fields while adding a surplus of food that would be available for sale, if desired. This would also help reduce malnutrition, which in 2000 affected 29% of pre-school children in Southeast Asia. The main problem of this idea is a farmer’s lack of accessibility to the market.

The *Cajanus canus* has potential as a perennial tree with agricultural benefits. This species is found around the tropical world between 30 degrees south and north. It is tolerant of a six-month dry season, but does not grow well in waterlogged soil. It could be valuable, though, as vegetable and animal feed. *Cajanus canus* trees have dried stalks and branches that can be used for thatches and fuel. Besides stopping erosion, the tree can fertilize the ground with its leaves.

There are other trees indigenous to Southeast Asia with similar benefits. *Cassia siamea* is used for shade, curry, fuel wood, and furniture. *Coffea arabica* is used to produce coffee, livestock food, and fertilizer. First grade honey is produced from *Eucalyptus camaldulensis* trees, which are commonly used in agroforestry systems because of their strength and durability. The *Fictus spp*. is often planted by Buddhist temples because of some species have religious importance, but most species also produce edible fruits.

A similar plan to rebuild the environment has worked in Beijing. Farmers there received small cash and grain payments for as many as eight years in return for their efforts to change fields into grasslands and orchards by planting foliage. This effort, however, did not receive the same success in the smaller Chinese city of Zuitou. The farmers do not look after their trees because the species issued were not suitable for their environment. The plants died, and the farmers were upset with the labor they were forced to do for a lost cause. They also believed they had been misled by officials who didn’t give farmers their subsidies. To further the problem, with so many producers, distributed almond plants were flooding the market. Some of the citizens did not understand what erosion meant, and because the technologies their government wanted them to use was not effective, they continued with their traditional but destructive practices for uphill farming.

This does not have to be the case in Southeast Asia. There are many indigenous plants available to use. With the wide variety of fruit trees the Southeast Asian countries can provide, the issue of overproduction should be less of an issue. When trees are grown in the correct conditions, it will encourage farmers to continue the practice. In order to educate farmers to the dangers of erosion, each plant given to them could come with pamphlets fully explaining problems and solutions. If, after the first year, farmers do not pass a basic knowledge test over erosion, the governments could withhold their plants. Another solution would be to encourage farmers with reimbursements to try new techniques or plant varieties that are beneficial toward soil restraint. While trees can take up the already sparse farming land, the farmers receive money to make up for this loss. The fruits grown and sold can also be a form of compensation. Other plants such as the vetiver do not take up much room as they only grow where they are planted, and the nutrients they keep in the soil will help maintain high yields throughout many years of planting.

Though some countries in Southeast Asian may not have the finances to sponsor this large-scale operation, there are many groups that would be willing to see this problem fixed. Some countries like the

United States give out large sums of money for programs like this one to succeed. When countries have fewer citizens living in poverty their families often have fewer babies, which could solve some of the over-population problems our world is facing. There are many other groups such as the United Nations who may contribute because they realize that poverty is often linked to war. Non-profits, large corporations and multilateral organizations may also pledge funds in order to improve the lives of these farmers.

Poverty is common in rural areas, and subsistence farmers in Southeast Asia are faced with many problems. They have very small areas of land and often they cannot generate enough income from their fields to escape poverty levels. Poor soil conditions due to erosion have also hurt crop yields. There have been many times where staple crops such as cassava plants are the people's main source of food. It is hard for new technology to travel through this area because the people there are wary of change. The citizens there also suffer from health, education, and sanitation issues. Many do not receive minimum wage and some educational experiences are sexist. Even though life expectances are increasing in many Southeast Asian countries, the risk of disease is still high.

While the current problems of the conditions in Southeast Asia can be overwhelming, the solution does not have to be. By letting the land revert to a more natural state with the help of plants and trees, nutrients are replenished and fertile soil is held down. These nutrients will help subsistence farmers get larger yields out of their small amount of land space. Minority groups who often have the smallest and steepest plots of land that are prone to erosion would especially benefit by the increase in fertile soil. Certain fruit bearing trees can also give them money or extra food which leads to a snowballing effect through the rest of the economy. Hopefully the surplus of food could also boost many of the countries' sagging agricultural outputs. Solutions issued to decrease poverty should also address the education of farmers who do not realize the poor conditions they leave their land in. In this case, information would be passed on as soon as the farmers receive their plants so they can understand the motives behind the redevelopment program. Other countries would also benefit from this system because poverty often leads to war and larger populations. Southeast Asian governments, along with these outside countries and organizations, can fund this program.

Though this paper is focused on Southeast Asian countries, there are many others that could benefit from similar plans. This technique can easily be re-designed for various climates and countries that need financial and material help. Though it will not be simple or likely for us to completely solve world hunger, actions such as these can be taken to improve the lives of individuals and in doing so, improve conditions throughout the world.

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