Addressing Hunger in Lao PDR: Gardens for Growth

Program summary

The Gardens for Growth initiative is a community-based, integrated agricultural production and nutrition education program designed to build capacity of community and village leaders, students, and government staff to create immediate and substantive action to solve food insecurity and alleviate hunger in Lao People’s Democratic Republic (Lao PDR). “Gardens for Growth” builds upon the comprehensive National Agricultural Biodiversity Program previously developed by the Food Agriculture Organization of the United Nations (FAO), United Nations Development Partners (UNDP), and National Agriculture and Forestry Resource Initiative of Lao (NAFRI) as a framework and long-term strategy for implementing a coordinated approach to better use, develop, and conserve agricultural biodiversity to address food insecurity.¹ FAO has adopted the Country Program Framework (CPF) to define short and medium-term goals for Lao. This framework was developed jointly with the Lao Government to help the country achieve their Sustainable Development Goals for 2020.² The ‘Gardens for Growth’ initiative meets CPF Country Outcome 2.2: Development of nutrition and gender-sensitive and livelihood-oriented agriculture for vulnerable food and food insecure farming households.

Program background

Lao PDR is a rugged, mountainous, landlocked country with a relatively weak infrastructure. It is a least developed country, ranking 138 out of 188 countries in the 2016 Human Development Index. The country faces numerous challenges in achieving sustainable food security and nutrition for its citizens. It has one of the lowest population densities in Asia, yet 28 percent of the population lives below the national poverty line (USD 1.25/day), with a gross national income per capita of USD 1,740.³ While Lao has managed to reduce the proportion of hungry poor to 23 percent, the 2015 Global Hunger Index still rates hunger levels as “serious”.⁴ Climate change is a key challenge facing rural livelihoods, and the country is the world’s 73rd most vulnerable to climate changed due to its low adaptability and its dependence on climate-sensitive natural resources. The changing climate patterns, combined with poor access to markets and diverse livelihoods, further worsen the situation in remote, upland areas, where up to 45 percent of households are food insecure.⁵ More than 75 percent of the population live in rural areas and depend on agriculture for their survival. Agriculture conditions tend to be challenging, resulting in low productivity. Poor conditions are exacerbated by a lack of access to improved technologies and inputs, as well as declining soil fertility.⁵

Malnutrition rates in Lao are among the highest in South East Asia with nearly 40% of children under five suffering from chronic malnutrition (Figure 1), nearly 20% suffering from acute
malnutrition (Figure 2), and about 40% are underweight. Food insecurity affects approximately 25 percent of households in Lao.

The Lao government is working hard to achieve sustainable food security and improve nutrition throughout the country. Focusing on increased production of the local variety of sticky rice, while also highlighting the importance of a diversified and nutrient-rich diet to overcome chronic malnutrition and food insecurity is one of the foremost challenges being addressed. As one of the planet’s “Centers of Origin” of domesticated plants and animals, Lao is one of ten areas with the highest biodiversity in the world. Gardens are host to a large diversity of plant species and play an important role in the conservation and domestication of plant genetic resources. The biodiversity found in gardens provides households with access to an array of nutritious fruits and vegetables, medicines, and other beneficial plants, thereby allowing for a diversified and nutritious diet for the citizens of Lao.

Gardens are good examples of the close link between biodiversity and food security. A multiple district survey of indigenous agro-forestry practices, by the Lao-Swedish Upland Agriculture and Forestry Research Program recorded that gardens are well-known but underutilized. Crops grown include fruits (papaya, banana, citruses, pineapples, mango and jackfruit) and vegetables (aubergine, chili, cabbage, beans), plus ginger, taro, bamboo, peanuts and medicinal plants. Approximately 80 percent of the rural population (>6 million people) are subsistence farmers, depending heavily on rice-based agriculture, raising livestock, and relying on collecting food from the wild to supply their dietary needs.

The central functions of the Gardens for Growth project are two-fold - education and hunger relief through crop and animal production. Diversity of plant species makes an important contribution to improving the nutrition of rural and urban families. Fruit and vegetables cultivated in gardens are rich in micronutrients, easily accessible and add diversity to the diet, thereby helping to prevent disease and malnutrition. This is especially true when garden-raised meats are used to add protein to the local diet. Indigenous foods are important for food security of many rural households and contribute significant micronutrients and phytochemicals to the diet. The Gardens for Growth project will be implemented on the National Institute of Nutrition campus the areas as shown in Figure 3 and Figure 4. Additionally, the greenhouse (Figure 5)
and the Integrated Production System, a micro-eco system showcasing aquaculture, horticulture and animal husbandry (Figure 6) will be situated within the garden area of the campus near the dormitory and teaching buildings.

Figure 3. Location of the various educational and hunger relief production systems at the Lao American Nutrition Institute Campus in Vientiane, Lao PDR

Figure 4. In-ground garden beds during lettuce and morning glory harvest

Figure 5. Greenhouse for campus and Gardens for Growth Initiative
A wide array of constraints and gaps hinder the attainment of food and nutrition security in Lao PDR. A key constraint to food availability is low agricultural productivity. Another factor is the lack of an agricultural information system. The Garden aim to fills these gaps through education, demonstration and improving the communication within the agricultural system, thereby immediately aiding hunger relief while establishing practices for long-term sustainability.

Figure 6. Integrated Production System incorporating aquaculture, hydroponics, and animal husbandry in a “micro-eco” system for high production and sustainability of food products.

Program aims

Specifically, the Gardens for Growth Project aims to:

- Improve household food and nutrition security in rural and vulnerable communities by community capacity building of sustainable gardening and farming techniques, aquatic animal production, livestock production and insect harvesting.

- Directly and immediately aid hunger relief efforts by donating all crops to local villages and schools and using food grown in the garden for patients in the hospital on campus.

The Gardens for Growth program will:

1) Demonstrate the importance of edible aquatic animals and plants (in rice fields and ponds) to the livelihoods and food security status of the local rural communities

2) Conduct activities to document the current local farming systems that are considered models of success to promote sustainable agriculture production, thereby improving food security

3) Influence policy dialog around hunger and food insecurity (central and local levels) in Lao

4) Promote a farmer-to-farmer approach to distribute and communicate information to the local community.
Our goal is to teach 100 subsistence farming households during Year 1 (2019) and increase by 20% each subsequent year.

**Implementation Tactics**

We are developing a year-round educational curriculum to teach communities, clinicians and government staff about the nutritional benefits of horticulture, aquaculture and animal husbandry to combat malnutrition and food insecurity. We have identified 15 different species for fruits and vegetables to begin education and production with a goal to include more varieties as we establish garden beds and best practices. All vegetable seeds will be harvested and provided to learners/farmers.

**Demonstration Garden and Greenhouse**

- Introduce 15 varieties of vegetable seeds, 20 types of agricultural tools and nets to 100 subsistence farming households
- Train 100 families on home gardening, community gardening, sustainable agriculture techniques, integrated production systems, production of bio-fertilizers, and pest management
- Facilitate farmer-to-farmer exchanges between villages for beneficiaries in villages to visit other gardens and the demonstration garden center
- Resource center of all materials and best practices on website (TBD).

Technical inputs provided will be training, extension services, and transfer of technology (field demonstrations).

Multisectoral collaboration (Ministry of Agriculture, Ministry of Health, Ministry of Education, Lao Women’s Union and Lao-American Nutrition Institute) will work together to provide resources, education, course work, follow-up and support to effectively replicate the learnings at the ‘Gardens for Growth’ to rural communities.

**Insect farming**

The percentage of the population in Lao that regularly consumes insects is among the highest in the world. Recognizing that edible insects provide health, nutrition, environmental and livelihood benefits, the Gardens for Growth aim to build upon traditions and increase awareness of the benefits of edible insects. The most preferred and frequently consumed insects in Lao are weaver ant larvae and pupae, wasps, bamboo caterpillars, short-tailed crickets, house crickets, grasshoppers and cicadas. Most edible insects have traditionally been collected from wild habitats but with improved education and farming techniques and harvesting practices, it is becoming more common. Edible insects provide high amounts of protein, fatty acids, vitamins and minerals (Table 1). From 2010 to 2013, FAO conducted a “Sustainable insect farming and
harvesting for better nutrition, improve food security and household income generation” project (Figure 7)\textsuperscript{10}. We aim to use the methods and lessons learned from this work to establish a demonstration insect farm for educational purposes. The cricket harvests which occur every 45-60 days will be given to the local communities that are most food insecure. As most people in Lao consume insects\textsuperscript{11}, there is strong support for promoting insect consumption to help combat food insecurity and malnutrition.

Table 1. Nutrient content of insects in comparison to beef, fish and eggs\textsuperscript{10}

<table>
<thead>
<tr>
<th>Insect/animal</th>
<th>Energy (kcal)</th>
<th>Protein (g)</th>
<th>Carbohydrate (g)</th>
<th>Fat (g)</th>
<th>Calcium (mg)</th>
<th>Iron (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>House cricket</td>
<td>134</td>
<td>12.9</td>
<td>8.1</td>
<td>5.5</td>
<td>76</td>
<td>9.5</td>
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<tr>
<td>Grasshopper</td>
<td>96</td>
<td>14.3</td>
<td>2.2</td>
<td>3.3</td>
<td>27.5</td>
<td>3</td>
</tr>
<tr>
<td>Silkworm pupae</td>
<td>127</td>
<td>12.2</td>
<td>4</td>
<td>7</td>
<td>42</td>
<td>1.8</td>
</tr>
<tr>
<td>Scarab beetle</td>
<td>98</td>
<td>13.4</td>
<td>7.9</td>
<td>1.4</td>
<td>23</td>
<td>6.4</td>
</tr>
<tr>
<td>Giant water bug</td>
<td>182</td>
<td>19.8</td>
<td>7.1</td>
<td>8.3</td>
<td>44</td>
<td>13.6</td>
</tr>
<tr>
<td>Beef (boiled)</td>
<td>218</td>
<td>27.6</td>
<td>0</td>
<td>12</td>
<td>11.4</td>
<td>3.5</td>
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<tr>
<td>Fish (boiled)</td>
<td>130</td>
<td>19.2</td>
<td>0</td>
<td>5.9</td>
<td>108.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Eggs (boiled)</td>
<td>143</td>
<td>12.5</td>
<td>0.3</td>
<td>10.3</td>
<td>57</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Figure 7. Example of cricket farming boxes in Lao PDR

*Integrated Production System*

Integrated production systems (IPS) are comprised of three components: horticulture, aquaculture and animal husbandry. The micro-eco systems effectively use all the available energy from land, air, water and solar energy resources, and also are effective at recycling products and waste. IPS involve the horizontal and vertical integration of crops, livestock, non-crop plants, and aquaculture. The objective is to optimize the use of natural resources (land, soil, water, etc.) and agricultural inputs (seed, fertilizer, pesticides, etc.) to arrest land degradation as well as conserve native forests, provide for the diversified nutrient needs of the family or community, enhance farm incomes, with the overall objective of improving access and quantity of nutritious foods raised with good agricultural practices. Integrated production systems aim to achieve sustainability in agriculture through the optimal use of natural resources
and agricultural inputs, better waste management, conservation of biodiversity, and meeting diversified needs of rural communities, especially subsistence farming families who are food insecure. (See Appendix A for detailed description of the system)

Community Engagement
The Gardens for Growth program will actively work to establish and develop strong community engagement opportunities.

- Link with World Food Day (held near the end of October each year) and promote sustainable farming and food production practices while raising awareness of food insecurity in Lao

- Host 3 workshops for community and local government officers to discuss practical ways to contribute toward sustainable food production and improving food security.

- Collaborate with the on-going and supportive efforts of the World Food Program, European Union, Luxemborg Development, FAO and Lao Ministries to develop consistency in messaging and programming around sustainable agriculture in Lao

- Actively teach and discuss how education and Gardens for Growth are contributing towards achieving Sustainable Development Goal #2: No hunger

Program Metrics and Outcomes
We will conduct the following measure outcomes of the Gardens for Growth program:

1) Pre and post course exams and evaluations

2) Conduct continuing education courses for village and community farmers who attended the program and identify areas of gaps in knowledge or information retention and application

3) Measure the diversity of vegetable and fruit crops grown and total yield donated to food insecure families

4) Coordinate with FAO Regional Rice Initiative to conduct assessments and provide timely feedback on garden programming, crop production yields and areas of improvement

5) Faculty and students to visit villages that are actively using knowledge from the Gardens for Growth program; provide feedback, resources, and support as needed

6) Assess if family income has improved with farming/gardening/integrated production system skills and if malnutrition has been reduced in beneficiary homes
7) Monitor website metrics for engagement and improved sharing of knowledge of gardening and diversity of crops and nutritional benefit

**Long-term program sustainability plan**

The Gardens from Growth program supports national policy institutions (such as FAO) to create policies that protect biodiversity and promote agriculture use within production systems. By collaborating with Provincial, District, and Village levels, the program has a long-term vision to strengthen capacity and knowledge within rural villages to conserve agro-biodiversity, enhance productivity and promote agro-biodiversity friendly produce to provide a sustainable solution to food insecurity in these villages. With an initial “seed” fund to support the cost of seeds, fruit tree saplings, fish, frogs, and small livestock, plus nutrition education programs, the Gardens for Growth will a cost-effective method to help eliminate food insecurity and improve nutrition at the household and community levels in poor, rural areas of Lao. Once established, the program will acknowledge, promote, and support the role of women in smallholder production systems, as well as provide an opportunity for elderly or disabled family members to be productive and contributing members to the food security problem by harvesting insects.

The Gardens for Growth program also looks forward to remaining adaptable and fluid to make adjustments to programming as climate change continues to impact farming in Lao. Climate change awareness-raising and adaptation activities to embrace food and nutrition security as an essential component of climate vulnerability.

**Timeline**

<table>
<thead>
<tr>
<th>Project Component</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Quarter 2019</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Quarter 2019</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; Quarter 2019</th>
<th>4&lt;sup&gt;th&lt;/sup&gt; Quarter 2019</th>
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<tbody>
<tr>
<td>Meetings with key stakeholders in agriculture and food security</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Develop nutrition education curriculum</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Plant vegetable starts and seeds in greenhouse</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Begin construction on Integrated Production System</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Prepare in-ground beds for planting</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Purchase fruit tree saplings, seeds, materials for courses</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>First cohort of Gardens for Growth participants</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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**Budget**

<table>
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<th>Expense</th>
<th>Anticipated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Translation services</td>
<td>$1000 USD</td>
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<tr>
<td>Equipment (Tools/Netting)</td>
<td>$500 USD</td>
</tr>
<tr>
<td>Supplies (seeds/saplings/fish/pumps/hoses)</td>
<td>$2000 USD</td>
</tr>
</tbody>
</table>
Travel (to rural villages and communities for M & E) $1000 USD
Computer (2 PC’s with nutrient analysis software) $500 USD

<table>
<thead>
<tr>
<th>Total Budget from Grant</th>
<th>$5000 USD</th>
</tr>
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<tbody>
<tr>
<td>Construction of pond, in-ground beds, greenhouse, integrated production system, and water supply</td>
<td>$500,000 from U.S. Government</td>
</tr>
<tr>
<td>Total</td>
<td>$505,000</td>
</tr>
</tbody>
</table>

Contact Information:
Joanna Cummings, MS, RD, CNSC
cummijoa@ohsu.edu
+1-303-204-6444

References