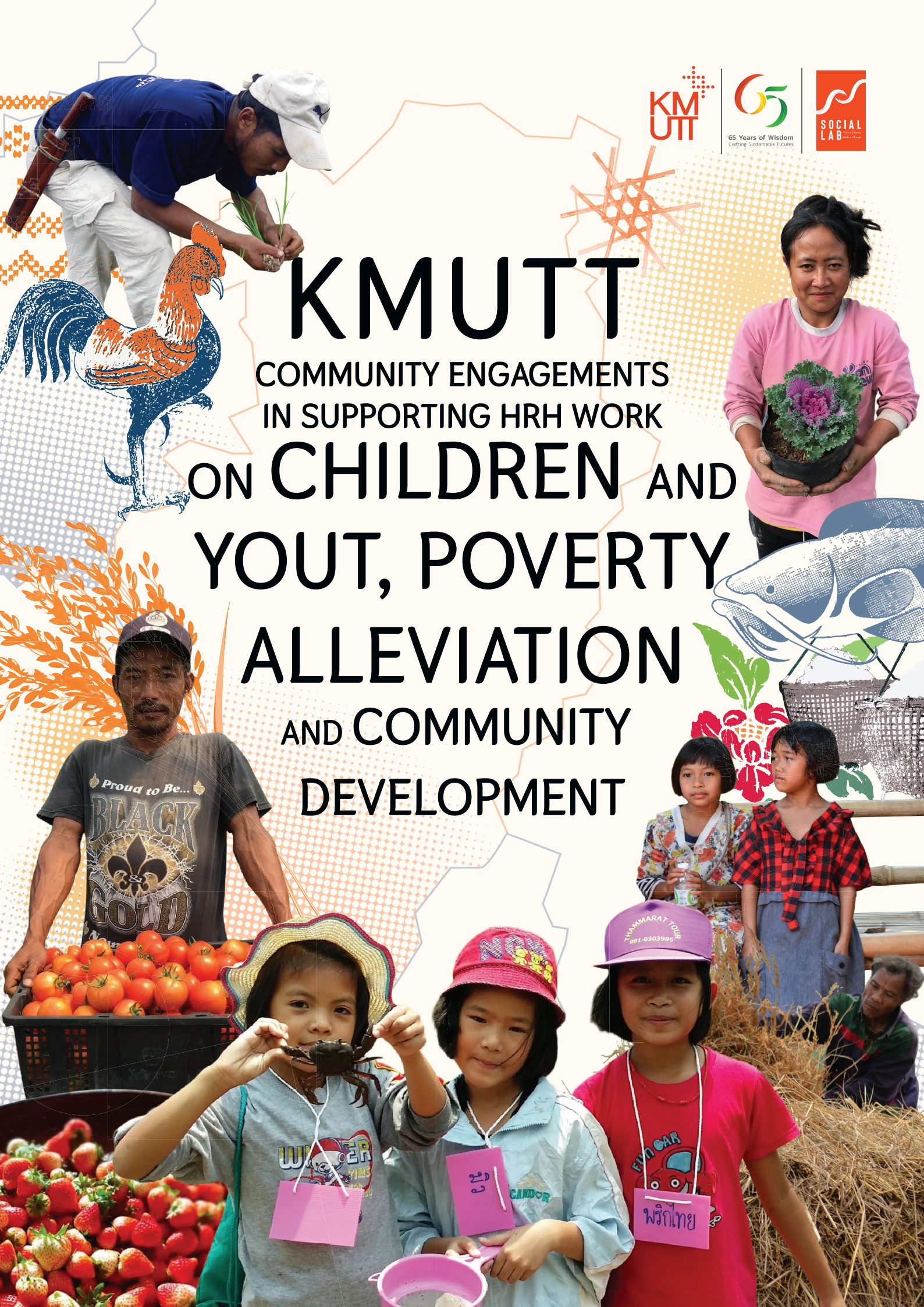
KMUTT

65 Years of Wisdom
Crafting Sustainable Futures

SOCIAL LAB

KMUTT

COMMUNITY ENGAGEMENTS IN SUPPORTING HRH WORK ON CHILDREN AND YOUT, POVERTY ALLEVIATION AND COMMUNITY DEVELOPMENT




KMUTT
65 Years of Wisdom
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CONTENTS

Development of Context-Responsive Vocational Skills Enhancing Livelihood Capacities in Highland Communities

of Bo Kluea District, Nan Province, Thailand

Support for Vocational Education Management in Remote Areas under Development Projects of Her Royal Highness Princess Maha Chakri Sirindhorn

Case Studies: Pua Technical College and Wiang Sa Industrial and Community Education College, Nan Province, Thailand

Lesson Extraction and Social Return on Investment (SROI) Assessment Vocational Education for Ethnic Minority Students in Highland Areas

of Nan Province, Thailand

Promotion and Support for Learning Development of Children and Youth in Remote Areas

The Project for the Promotion and Development of Thai Language for for Children in Remote Areas in development projects of HRH projects Schools, Nan Province, Thailand

Study of Factors Affecting Household-Level Poverty

Phu Fa Subdistrict, Bo Kluea District, Nan Province, Thailand

Quality of Life Development for the “Mlabri Phu Fa” Community

Phu Fa Subdistrict, Bo Kluea District, Nan Province, Thailand

Appendix

Background and working concept

King Mongkut's University of Technology Thonburi (KMUTT) began social engagement program in Nan Province—particularly in Bo Kluea District and Chaloem Phra Kiat District—in the early 1990s. The engagement aligned with the Development projects of Her Royal Highness Princess Maha Chakri Sirindhorn on development of children and youth in remote areas, and with the establishment and operation of the Phu Fa Development project (Development projects of Her Royal Highness Princess Maha Chakri Sirindhorn). The core concept is focusing to the school as a community hub: building technical and agricultural knowledge from early schooling, strengthening familiarity and collaboration with state mechanisms, and enabling the school (with teachers as key mediators) to become a reliable point of support for households and community members when facing challenges.

From initiating rationale to an operational development platform

A key milestone occurred after a royal visit to the Bo Kluea salt wells (Ban Bo Luang) on 11 February 1995, when the observed socio-economic disadvantages led to a royal initiative to provide assistance, beginning with education, conservation of natural resources, and the founding of the Phu Fa Development Center. Subsequently, in the early 1990s, KMUTT entered the area through the Office of the Royal Projects and supported students in nearly thirty royal-initiative schools across the two districts, in collaboration with partner agencies (including NSTDA units and multiple universities).

By 2002, KMUTT established an on-site coordination office at Ban Bo Luang (Bo Kluea Tai Subdistrict), with full-time resident researchers tasked with: coordinating stakeholders; translating local problems into workable questions; and linking these questions to academic and partner networks. This office later evolved into a formal coordination center supporting royal initiatives with two main target domains:

(1) Support for Phu Fa Development activities in the two districts.

(2) Support for child and youth development in remote areas across Nan Province, focusing on two school groups:

(i) Remote schools under the Basic Education Commission area

(ii) Buddhist monastic schools.

"out of sight, out of mind, out of people"

Diagnosing "Marginality" and constraints of school-centered development

KMUTT began collecting village-level socio-economic data and found that Nan's peripheral areas resemble other marginal regions: "out of sight, out of mind, out of people" not prioritized by the state; market mechanisms do not function effectively; and the broader society remains unfamiliar with these communities. In education, teacher turnover is frequent; teachers are insufficient in number and subject coverage, especially in science. As a result, a school-centered development model—although aligned with the royal concept—faces limitations due to lack of continuity, low morale, and limited support. In addition, health issues such as goiter and malnutrition were observed among community members

The five objectives of the Phu Fa Development Center

The Phu Fa Development Center (established 30 November 1999) was intended as a model center for learning and knowledge transfer to improve livelihood, quality of life and environment for target populations in Bo Kluea and Chaloem Phra Kiat Districts, with five objectives:

1. Improving quality of life of highland residents and serving as a development prototype.
2. Promoting suitable livelihoods aligned with local potential.
3. Acting as a center to consolidate and develop products aligned with market demand.
4. Enabling conservation-based tourism and learning of local nature and culture.
5. Advancing research and knowledge transfer for sustainable development and natural resource management.

1999-2009
DUAL-TRACK STRATEGY

Implementation period 1999 – 2009: dual-track strategy

During 1999–2001, work emerging from local questions took two main forms: (i) Strengthening schools as centers of development and learning. and (ii) developing community change leaders. Activities included teacher training across core subjects (math, physics, chemistry and biology) and applications of science to society and environment; initiatives to understand the "Geo-social" context; and issue-specific projects such as biodiversity surveys, local plant tissue culture (banana, tao palm and rattan) and monitoring of the Mang River resources—serving as starting points for developing science teachers as change agents through the education system.

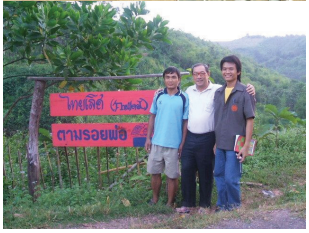
Three educational pathways were designed:

1. "Graduates Returning Home" (2001)
   to cultivate new community leaders from Bo Kluea with understanding of local social context.
2. "Science Teachers Returning Home" (2002)
   to cultivate new community leaders from Bo Kluea with understanding of local social context.
3. A distance-learning master's program in science education (2003)
   to upgrade in-service teachers without requiring relocation, with theses based on local problems in the two districts.

Parallel to education, KMUTT supported community processing groups through capacity -building in production planning, cost accounting, local GMP for food, and quality standardization—e.g., processing of tao palm and Indian gooseberry. It also supported school lunch agriculture activities (raising chickens, growing vegetables), and built basic IT capacity for monastic schools.

From 2004–2006, a major research program funded by the Ministry of Energy focused on building community capacity for sustainable energy and natural resource management, organized into three clusters: food security (e.g., warming systems for chicken houses and fish ponds), sufficient socio-economic capital (learning centers, high-efficiency stoves, solar home system maintenance, demand-supply energy databases) and human development grounded in sufficiency philosophy (Thai LERD; community master plans). Technical services also included dormitory design and GIS-based land-use planning for 2,000 rai at Phu Fa Development Center. The team increasingly used research to address emerging questions, assigning topics to academic networks and involving students in theses and studies (e.g., water demand-supply, local rice varieties).

A key lesson was the need for diverse strategies and expertise to match diverse local demands, while recognizing that some “wants” are not “basic necessities.”



A key lesson was the need for diverse strategies and expertise to match diverse local demands, while recognizing that some “wants” are not “basic necessities.” Therefore, the university emphasized socio-economic databases and evidence-based identification of real needs. During 2007–2009, systematic community databases were developed and updated (economy, society, happiness index, debt relief patterns, forest product use, water demand-supply, Lawa livelihoods), forming the foundation for later strategies and processes.

Overall, KMUTT’s work in Nan can be grouped into four domains:

1. Food security and alternative livelihoods.
2. Systemic science and technology learning in remote areas.
3. Quality of life of ethnic groups.
4. Academic services.

2010-2017
RICE INSUFFICIENCY

Implementation period 2010-2017: from “Rice insufficiency” to productivity, alternative livelihoods and youth learning ecosystem

In 2010–2017, socio-economic data indicated household rice insufficiency, incomes below expenditures, inadequate local food production, and inability to cover health and education costs; coping strategies included out-migration for low-skill labor. The work thus targeted two priorities:

(a) Increasing rice productivity—especially upland rice, the dominant production system—to reduce rice purchasing costs and improve food sufficiency.

(b) Creating alternative livelihoods after rice harvest suited to the local geo-social context.

For upland rice, collaboration with partner agencies implemented a five-step technology transfer and production of high-quality seed. Reported results included an average yield increase of 85% (from 130 to 240 kg/rai) among adopters, and emergence of two seed-producing farmer groups (21 members) capable of producing 10,000 kg/year and transferring knowledge to others.

For alternative livelihoods, the team selected intensive, small-area, high-value agriculture with more stable production and local markets (e.g., strawberries, cool-climate vegetables, ornamentals). Farmers learned management and technologies (seedling, soil improvement, cultivation, low-cost greenhouse construction, systematic work plans, accounting). Knowledge exchange forums supported income generation with estimated community circulation of 0.8–1 million baht/year, with the broader impact described as sustaining livelihoods locally while maintaining balance between people and nature.

In education and learning, systemic science and technology learning was promoted both in and out of school for students (in and out of formal education) and community members, using systems thinking toward sustainable community development. Notable activities included creating a youth space (“children and youth palace”—a positive gathering place) that mobilized youth projects aligned with local context (e.g., local markets, junior guides, youth entrepreneurship, Mang River exploration), building 21st-century skills through out-of-class learning with support from teachers, parents, and community, and linking outcomes back into school learning. The program also supported networks of opportunity-expansion schools to pilot education-for-livelihood (Darunsikkha group) and supported Pua Technical College in delivering vocational education in remote areas.

Opening the community as a learning and research space and delivering research questions (social lab)

Ethnic group quality-of-life development addressed Lua, Mlabri and others; for Mlabri (formerly forest-based and mobile), settlement and livelihood transitions required new skills, especially agriculture. From 2013 onward, KMUTT and local agencies supported livelihood and food production skills (rice farming, vegetables, raising chickens and fish, mushroom cultivation). By 2024-2025, 17 Mlabri households reportedly produced their own food, reducing food expenses by 231,300 baht/year and generating approximately 1.8 million baht/year income from employment and products such as handicrafts and forest honey.

Finally, the report emphasizes opening the community as a learning and research space and delivering research questions (social lab) to academics and students from KMUTT and other institutions for participatory academic work.

2017- 2024

TOURISM BOOM, COVID SHOCK AND RESKILL&UPSKILL
DATA LED TO TARGETED PROGRAMS

Implementation period 2017- 2024: tourism boom, COVID shock and reskill&upskill data led to targeted programs

From 2017 onward, the work responded to a surge of tourism in Nan Province, which brought economic opportunities and income generation for communities, while also facing a crisis from the COVID-19 pandemic. KMUTT collected data on upskill & reskill and household socio-economic conditions across 11 target villages in Bo Kluea to analyze and design subsequent projects. These included:

(i) vocational skill development for out-of-school children and youth.

(ii) vocational skill development aligned with highland community contexts (including informal labor among Lua ethnic communities in two villages).

(iii) development of community innovators to create livelihood and economic opportunities linked to the tourism value chain in Bo Kluea and Santi Suk (covering native chicken raising, catfish and tilapia raising, agro-processing, and bamboo-based value addition).

Thai Red Cross Society led Development projects of Her Royal Highness Princess Maha Chakri Sirindhorn initiative projects addressing weakness of Thai language study among rural students, especially ethnic groups.

Appropriate Technology Transfer for Indigenous Chicken Farming Enhancing Food Security and Supplementary Income in Highland Communities of Nan Province, Thailand

Appropriate Technology Transfer for Indigenous Chicken Farming Enhancing Food Security and Supplementary Income in Highland Communities of Nan Province, Thailand

Background and Rationale

Indigenous chicken farming has long been practiced by highland communities in Nan Province as part of household livelihoods, cultural traditions and local food systems. Chickens are commonly raised for household consumption and ceremonial purposes, with surplus production occasionally sold within nearby communities. Despite its cultural importance, traditional indigenous chicken farming in highland areas has generally been characterized by low productivity, high mortality rates, and limited economic returns.

Socio-economic assessments conducted in highland communities of Nan Province revealed that households rely heavily on externally sourced poultry to meet consumption demand, while local production remains insufficient. This situation presents both a challenge and an opportunity: although indigenous chicken farming is already embedded in local ways of life, it requires systematic technological support and capacity building to enhance productivity, improve food security, and generate supplementary income.

Structural Constraints in Traditional Highland Chicken Farming

The document identifies several constraints affecting indigenous chicken farming in highland environments:

- Climatic conditions
  particularly low temperatures and high humidity during winter and rainy seasons, which increase chick mortality and slow growth rates.
- Reliance on free-range systems
  without adequate housing or biosecurity measures, exposing chickens to disease and predators.
- High feed costs
  due to dependence on commercially produced feed transported from outside the area.
- Lack of production planning and technical knowledge
  limiting farmers' ability to manage flock size, growth cycles and market supply.

These constraints result in unstable production, making indigenous chicken farming unsuitable as a reliable livelihood strategy without targeted intervention.

"Appropriate technology"
reflects a deliberate choice to prioritize simplicity,
affordability, local adaptability and replicability

Objectives of Appropriate Technology Transfer

The initiative to transfer appropriate technology for indigenous chicken farming in highland areas was designed with the following objectives:

1. To increase productivity and survival rates of indigenous chickens under highland climatic conditions.
2. To strengthen household-level food security through reliable local poultry production.
3. To reduce dependence on externally sourced poultry and feed inputs
4. To create supplementary income opportunities compatible with local livelihoods and ecological conditions.
5. To develop local farmers as knowledge holders capable of sustaining and transferring improved practices.

The emphasis on "appropriate technology" reflects a deliberate choice to prioritize simplicity, affordability, local adaptability and replicability, rather than introducing complex or capital-intensive systems.

Technology Components and Adaptation to Highland Contexts

The technology transfer process focused on a set of interrelated innovations tailored to highland conditions:

1. **Improved poultry housing systems**
   Semi-open or semi-closed housing structures were introduced to protect chickens from cold temperatures, excessive moisture and predators, while maintaining adequate.
2. **Low-cost brooding and heating systems**
   Locally constructed heating devices—using materials readily available in the community—were promoted to improve chick survival during early growth stages, particularly in areas without access to electricity.
3. **Local feed formulation**
   Farmers were trained to formulate poultry feed using locally available raw materials, reducing reliance on expensive commercial feed and lowering production costs.

These technological components were designed to be easily assembled, maintained, and modified by farmers themselves, ensuring long-term usability and scalability.

This approach enabled farmers to gradually build confidence, adapt technologies to household conditions, and develop problem-solving skills relevant to their specific environments.

Technology Transfer and Learning Process

The transfer of appropriate technology was implemented through a participatory and experiential learning process, emphasizing learning -by-doing rather than one-way instruction. Farmers engaged in hands-on training, on-farm experimentation, and continuous observation of production outcomes.

Key elements of the learning process included:

- Step-by-step introduction of technologies aligned with farmers' existing practices.
- Systematic recording of survival rates, growth performance, and costs.
- Collective reflection and knowledge exchange among participating farmers.
- Ongoing technical support and mentoring by university researchers and partner organizations.

This approach enabled farmers to gradually build confidence, adapt technologies to household conditions, and develop problem-solving skills relevant to their specific environments.

Outcomes and Developmental Significance

The transfer of appropriate technology for indigenous chicken farming led to several important outcomes:

- Improved survival rates and growth performance of indigenous chickens.
- Increased availability of poultry for household consumption, contributing to enhanced food security.
- Reduced production costs through local feed formulation and improved management.
- Generation of supplementary income from surplus chicken sales within local markets.

Beyond economic and nutritional benefits, the initiative strengthened local capacity for innovation, positioning farmers as active agents in development rather than passive technology recipients.

Implications for Area-Based Development and Research

This initiative demonstrates that indigenous livestock systems, when supported by appropriate technology and participatory learning processes, can play a significant role in strengthening food security and livelihoods in highland and remote areas.

For academic audiences, the case highlights several research-relevant themes, including:

- The interaction between traditional practices and scientific knowledge in technology adoption.
- The role of appropriate technology in reducing vulnerability under climatic constraints.
- Mechanisms of community-based learning and peer-to-peer knowledge transfer.
- Pathways through which small-scale livestock systems contribute to household resilience.

Within the broader area-based development framework in Nan Province, indigenous chicken farming serves as a foundational component linking culture, food systems, and local economies, while offering a scalable model for similar highland contexts

Development of Highland Catfish and Tilapia Farming Systems Bo Kluea District, Nan Province, Thailand

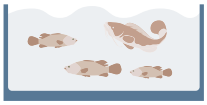
Development of Highland Catfish and Tilapia Farming Systems Bo Kluea District, Nan Province, Thailand

Background and Problem Context

Fish constitutes an essential source of animal protein for households in Bo Kluea District, Nan Province. However, despite high consumption demand, local fish production in this highland area has historically been extremely limited. Household-level socio-economic data indicate that communities in Bo Kluea collectively spend approximately 1.96 million THB per year on purchasing fish from external markets, while income generated from local fish farming accounts for only 22,960 THB per year, or about 1.2 percent of total fish consumption value.

This significant dependence on imported fish reflects structural constraints that limit aquaculture development in highland environments. As a result, fish consumption relies almost entirely on external supply chains, increasing household expenditures and reducing local economic circulation.

Spend approximately
1.96 million THB
per year on purchasing
fish from external markets



Local fish farming
yields only 22,960
THB PER YEAR
representing approximately
1.2% of total fish
consumption value.

Structural Constraints of Highland Aquaculture

The document identifies three major constraints that hinder fish farming in Bo Kluea District:

1. Topographical constraints
   The mountainous terrain and scarcity of flat land prevent the construction of conventional earthen ponds typically used in lowland aquaculture.

2. Seasonal water limitations
   Water availability fluctuates significantly, with shortages occurring during the dry season, making continuous fish production difficult under traditional systems.

3. Low water temperature during winter
   Cold conditions during winter reduce fish feeding activity and growth rates, resulting in prolonged production cycles and economic inefficiency.

These combined constraints render standard aquaculture technologies unsuitable for highland contexts and necessitate the development of adapted systems designed specifically for mountainous and cold environments.

The project emphasizes appropriateness, feasibility and sustainability, prioritizing technologies that can be managed by households with limited land, water and financia

Project Objectives

In response to these challenges, the project on the development of catfish and tilapia farming systems in Bo Kluea District was initiated with the following objectives:

1. To enhance household food security by increasing local fish production.
2. To reduce dependence on external fish supply and associated household expenditures.
3. To develop aquaculture systems compatible with highland ecological conditions.
4. To create opportunities for supplementary household income through surplus fish production.

The project emphasizes appropriateness, feasibility, and sustainability, prioritizing technologies that can be managed by households with limited land, water, and financial resources.

Local fish farming

Three primary constraints to fish farming in Bo Kluea District: limited flat land due to mountainous terrain, pronounced seasonal water shortages that disrupt continuous production, and low winter water temperatures that suppress feeding and slow growth.

Experts provide agricultural advisory services to farmers.

In response to these constraints, the project to develop catfish and tilapia farming systems in Bo Kluea District was launched to strengthen household food security, reduce reliance on external fish supplies, establish aquaculture models suited to highland ecological conditions, and generate supplementary income through surplus production.

The project emphasizes appropriateness, feasibility and sustainability, prioritizing technologies that can be managed by households with limited land, water and financia

Technology Development: Recirculating Aquaculture Systems (RAS)

To address land and water constraints, the project introduced recirculating aquaculture systems (RAS) tailored for highland use. RAS technology enables the reuse of water within the system through filtration processes, allowing fish culture in relatively small tanks with minimal water exchange.

A distinctive feature of the system described in the document is the use of locally available plant species as biological filters to absorb nitrogenous waste, which would otherwise accumulate to levels harmful to fish. This approach reduces reliance on complex mechanical filtration, lowers operational costs, and enhances system resilience under remote-area conditions.

By implementing RAS, households can:

- Significantly reduce water consumption.
- Maintain fish culture during dry seasons.
- Establish production units near residential areas for easier daily management.

Importantly, the structures are designed to be low-cost, locally constructed, and easily replicable, ensuring accessibility for small-scale farmers in highland communities.

Temperature Regulation through Polyhousing Technology

To mitigate the effects of low winter temperatures, the project applied polyhousing technology, involving the construction of greenhouse-like structures over fish tanks or ponds. These structures serve to retain heat, stabilize water temperature, and protect fish from adverse climatic conditions.

Polyhousing technology enables:

- Improved growth rates during cold periods.
- Reduced stress and mortality among fish.
- More predictable and continuous production cycles throughout the year.

Importantly, the structures are designed to be low-cost, locally constructed, and easily replicable, ensuring accessibility for small-scale farmers in highland communities.

Control Hi-Temp

Involving the construction of greenhouse

The project focuses on catfish and Nile tilapia

Target Species: Catfish and Nile Tilapia

The project focuses on catfish (Clarias spp.) and Nile tilapia (Oreochromis niloticus), selected for their adaptability, market demand, and suitability for small-scale household production.

Both species are familiar to local consumers and can be integrated into household food systems, providing reliable protein sources while allowing surplus production to be sold within local markets.

Implementation Approach and Learning Process

The project adopts a learning-by-doing approach, emphasizing hands-on experimentation and gradual skill development among participating households. Farmers receive guidance on system construction, daily operation, water quality management, feeding practices, and basic record-keeping.

Rather than promoting a standardized model, the project encourages adaptation to household-specific conditions, reinforcing local ownership of technology and knowledge. Continuous monitoring and problem-solving are integral components of the implementation process.

Technology and local learning systems
can strengthen food security and economic resilience
in marginalized highland regions.

Expected Outcomes and Development Significance

Through the development of adapted catfish and tilapia farming systems, the project aims to achieve the following outcomes:

- Increased availability of locally produced fish for household consumption.
- Reduced household expenditure on externally sourced fish.
- Improved nutritional security in highland communities.
- Creation of supplementary income opportunities through local fish sales.
- Enhanced community capacity to manage climate- and resource-constrained food systems.

Beyond immediate livelihood impacts, the project contributes to broader area-based development goals, demonstrating how appropriate technology and local learning systems can strengthen food security and economic resilience in marginalized highland regions.

Positioning within the Area-Based Development Framework

Within KMUTT's area-based development framework, the highland aquaculture project complements other flagship initiatives related to indigenous livestock, crop production, and community learning systems. Together, these interventions contribute to a diversified and resilient local food system, reducing structural dependency on external markets.

For academic audiences, this project provides a valuable case for studying technology adaptation, food security, and learning processes in environmentally constrained contexts, offering potential for longitudinal research on sustainable highland aquaculture and rural development.

Scaling up livelihood development for Mlabri Phu Fa

Table 1. Results of Catfish Farming Using Poly-housing Technology

(Experimental period: November 2023 – April 2024)

Parameters	Earthen Pond (Control)	Poly-housing Pond (Treatment)
Culture period (days)	138	138
Pond volume (m^3)	2	2
Initial number of fish (individuals)	200	200
Initial average weight (g)	9	9
Final average weight (g)	139	236
Feed Conversion Ratio (FCR)	1.8	1.1
Dissolved oxygen (mg/L)	3.3	3.0
Ammonia (mg/L)	0.5	0.7
Survival rate (%)	82	89

Table 2. Cost–Benefit Analysis of Catfish Farming Using Poly-housing Technology

(Experimental period: November 2023 – April 2024)

Item	Control 1	Control 2	Control 3	Treatment 1	Treatment 2	Treatment 3
Pond size (m^3)	4	4	4	4	4	4
Culture period (days)	138	138	138	138	138	138
Total fish harvest weight (g)	24,019	22,524	22,038	44,635	40,838	39,963
Total feed used (g)	38,367	38,367	38,367	41,850	41,850	41,850
Total value of fish harvested (THB)	1,681.33	1,576.68	1,542.66	3,124.45	2,858.66	2,797.41
Fingerling cost (THB)	600	600	600	600	600	600
Feed cost (THB)	1,151	1,151	1,151	1,256	1,256	1,256
Net profit / loss (THB)	**−69.68**	**−174.33**	**−208.35**	**1,268.95**	**1,003.16**	**941.91**

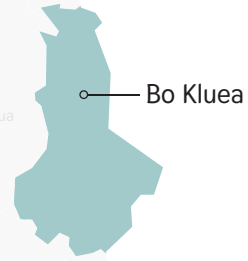
Note

- Control ponds were operated without poly-housing.
- Treatment ponds were operated with poly-housing.

Breeding and Restocking of Hillstream Loach (Pla Man) Conservation-Oriented Aquaculture for Creek in Bo Kluea District, Nan Province, Thailand

Breeding and Restocking of Hillstream Loach (Pla Man) Conservation-Oriented Aquaculture for Creek in Bo Kluea District, Nan Province, Thailand

Background and Ecological Context



Hillstream loach, locally known as Pla Man, is a native freshwater fish species inhabiting fast-flowing streams in highland areas of northern Thailand, including Bo Kluea District, Nan Province. This species plays an important ecological role in upland stream ecosystems, particularly in maintaining substrate cleanliness by grazing on algae and biofilm attached to rocks.

In recent years, local observations and field assessments have indicated a decline in hillstream loach populations in creek within the Bo Kluea area. The reduction is attributed to multiple interacting factors, including environmental changes, habitat disturbance, and increasing pressure on aquatic resources. These trends raised concerns regarding the long-term sustainability of local aquatic biodiversity and ecosystem health.

In response, a project was initiated to develop breeding techniques for hillstream loach with the objective of releasing juvenile fish back into natural streams, thereby supporting population recovery and ecological balance.

Objectives of the Breeding and Restocking Initiative

The project on breeding hillstream loach was designed with conservation-oriented objectives:

1. To develop knowledge and techniques for the artificial breeding of hillstream loach under controlled conditions.
2. To increase the availability of juvenile fish for restocking creek in highland areas.
3. To contribute to the conservation and rehabilitation of native fish populations.
4. To strengthen community awareness of aquatic biodiversity and freshwater ecosystem conservation.

Unlike livelihood-oriented aquaculture initiatives, this project emphasizes ecological restoration and biodiversity conservation, aligning with broader natural resource management goals in the area.

This project emphasizes ecological restoration and biodiversity conservation, aligning with broader natural resource management goals in the area.

Species Characteristics and Breeding Challenges

Hillstream loach exhibits specific biological and ecological characteristics that pose challenges for artificial breeding. The species is adapted to cold, well-oxygenated, fast-flowing waters and relies on rocky substrates for feeding and shelter. These habitat preferences make conventional aquaculture systems unsuitable for its reproduction and early development.

The project therefore required careful consideration of environmental conditions, including water flow, temperature, dissolved oxygen levels, and substrate composition, to simulate natural stream habitats within controlled breeding environments.

This approach reflects a restocking strategy grounded in conservation principles, rather than stock enhancement for harvest.

Breeding Process and Technical Approach

The breeding initiative focused on developing appropriate and context-specific techniques to support reproduction and early life stages of hillstream loach. Controlled breeding environments were established to mimic natural stream conditions as closely as possible.

Key elements of the breeding process included:

- Selection of broodstock from local creek.
- Preparation of breeding tanks designed to replicate flowing-water conditions.
- Maintenance of suitable water quality parameters consistent with highland streams.
- Protection and nurturing of eggs and larvae through early developmental stages.

Through iterative experimentation and observation, the project generated practical knowledge on managing the species under artificial conditions, contributing to the feasibility of producing juveniles for conservation purposes.

Release into creek

Juvenile hillstream loach produced through the breeding process were released into selected natural streams within Bo Kluea District. Release sites were chosen based on habitat suitability, including water quality, flow characteristics, and substrate conditions.

The release of juveniles aimed to reinforce existing populations rather than replace natural reproduction, supporting gradual population recovery while maintaining ecological integrity. This approach reflects a restocking strategy grounded in conservation principles, rather than stock enhancement for harvest.

Release of juveniles aimed hillstream loach produced through the breeding process were released into selected natural streams

The hillstream loach breeding project reinforces the importance of aligning livelihood development, food systems, and biodiversity conservation to achieve sustainable and balanced outcomes.

Outcomes and Conservation Significance

The breeding and restocking initiative generated several important outcomes:

- Demonstrated the technical feasibility of breeding hillstream loach under controlled conditions.
- Increased the number of juveniles available for release into natural habitats.
- Supported local efforts to conserve native fish species and freshwater biodiversity.
- Contributed to knowledge development on conservation-oriented aquaculture for highland ecosystems.

Beyond immediate ecological outcomes, the project also served as a learning platform for researchers and local stakeholders, highlighting the role of scientific knowledge in supporting environmental stewardship.

Implications for Long-Term Conservation and Research

This initiative illustrates how targeted breeding and restocking programs can complement broader watershed and natural resource management strategies in highland areas. For academic audiences, the project offers a basis for long-term research on topics such as:

- Population dynamics and recovery of native freshwater species.
- Effectiveness of restocking strategies in highland stream ecosystems.
- Interactions between habitat conditions and survival of released juveniles.
- Integration of conservation aquaculture within area-based development frameworks.

Within the context of Bo Kluea District, the hillstream loach breeding project reinforces the importance of aligning livelihood development, food systems, and biodiversity conservation to achieve sustainable and balanced outcomes.

Development of Context-Responsive Vocational Skills Enhancing Livelihood Capacities in Highland Communities of Bo Kluea District, Nan Province, Thailand

Development of Context-Responsive Vocational Skills Enhancing Livelihood Capacities in Highland Communities of Bo Kluea District, Nan Province, Thailand

Background and Rationale

Highland communities in Bo Kluea District, Nan Province, face persistent constraints in accessing stable employment and income opportunities. Geographic isolation, limited local labor markets, seasonal livelihoods, and restricted access to formal education and training systems contribute to structural vulnerability, particularly among youth, ethnic groups, and informal workers.

Socio-economic data collected at the household level indicate that many residents rely on low-skilled, short-term, or migratory labor, often outside the community. While such strategies provide temporary income, they frequently result in social dislocation, skill stagnation, and long-term insecurity.

In response, a project was initiated to develop vocational skills aligned with the specific socio-economic, cultural, and ecological context of highland communities, with the objective of enabling residents to generate livelihoods locally and sustainably.

Objectives of the Vocational Skills Development Project

The project aimed to achieve the following objectives:

1. To enhance employable and livelihood-relevant skills among community members in highland areas.
2. To design vocational training programs responsive to local economic activities and resource bases.
3. To reduce dependency on external labor markets by strengthening local income-generation capacities.
4. To support inclusive participation of youth, ethnic groups, and informal workers in skill development.
5. To link vocational skills development with broader area-based development strategies.

These objectives reflect a shift from generic vocational training toward context-responsive and place-based skill formation.

This approach recognizes that vocational training is most effective when it is situated within lived realities, enabling immediate application and reinforcing relevance.

Conceptual Approach: Skills Development within Community Contexts

The project conceptualizes vocational skills not as isolated technical competencies, but as integrated capabilities embedded within community systems. Skills development was therefore designed to align with:

- Local livelihood structures and seasonal calendars.
- Available natural resources and ecological conditions.
- Cultural practices and community norms.
- Emerging economic opportunities, particularly those linked to tourism and local value chains.

This approach recognizes that vocational training is most effective when it is situated within lived realities, enabling immediate application and reinforcing relevance.

Target Groups and Inclusion Strategy

The project targeted multiple groups within highland communities, including:

- Youth who had exited the formal education system.
- Informal workers with limited access to structured training opportunities.
- Ethnic minority community members seeking livelihood diversification.
- Individuals affected by economic disruptions and employment instability.

An inclusive strategy was adopted to ensure participation across age groups, genders, and social backgrounds, reflecting the principle that skills development should function as a mechanism for social inclusion and equity.

This alignment strengthened the relevance of training programs and enhanced the potential for local economic circulation, rather than leakage to external actors.

Design and Implementation of Skills Development Activities

Vocational skills development activities were designed based on empirical community data and participatory consultation processes. Training areas were selected according to local demand, feasibility, and potential for income generation within the community context.

Key features of implementation included:

- Modular training formats allowing flexible participation.
- Hands-on, practice-oriented learning emphasizing real-world application.
- Integration of skills training with ongoing community livelihood projects.
- Collaboration with local institutions, vocational schools, and development partners.

Rather than delivering one-time training sessions, the project emphasized progressive skill accumulation, enabling participants to build competence incrementally.

Alignment with Tourism and Local Value Chains

A significant dimension of the project involved aligning vocational skills development with local value chains, particularly those associated with highland tourism. As tourism expanded in Bo Kluea District, new opportunities emerged in areas such as food preparation, processing of local products, service provision, and craft-based activities.

Skills development initiatives were therefore designed to enable community members to participate more effectively in tourism-related economic activities, while maintaining control over local resources and cultural identity.

This alignment strengthened the relevance of training programs and enhanced the potential for local economic circulation, rather than leakage to external actors.

The project provides a basis for long-term research on skills formation, labor transitions, and community resilience in highland and marginalized settings

Outcomes and Livelihood Implications

The vocational skills development project contributed to several key outcomes:

- Increased skill levels among participants, enabling engagement in locally viable occupations.
- Improved capacity of households to generate income within the community.
- Reduced reliance on external and migratory labor.
- Strengthened linkages between skills, livelihoods, and community development initiatives.

Beyond immediate economic effects, the project supported confidence-building, agency, and adaptive capacity, particularly among youth and marginalized groups.

Lessons Learned and Research Implications

The experience of vocational skills development in Bo Kluea District highlights several lessons relevant to both practice and research:

- Skills development must be context-specific to achieve sustained livelihood outcomes.
- Integration with local development strategies enhances relevance and uptake.
- Flexible and modular training formats are critical in communities with seasonal and informal livelihoods.
- Universities and development institutions can act as facilitators of skills ecosystems, linking training, livelihoods, and innovation.

For academic audiences, the project provides a basis for long-term research on skills formation, labor transitions, and community resilience in highland and marginalized settings.

The project contributes to a more resilient and inclusive development trajectory for highland communities

Positioning within the Area-Based Development Framework

Within the broader area-based development framework in Nan Province, context-responsive vocational skills development serves as a bridge between education and livelihoods. It complements interventions in food security, aquaculture, livestock, and conservation by equipping community members with the capabilities required to sustain and adapt these activities.

By embedding skills development within local systems, the project contributes to a more resilient and inclusive development trajectory for highland communities in Bo Kluea District.

Support for Vocational Education Management in Remote Areas under Development Projects of Her Royal Highness Princess Maha Chakri Sirindhorn

Case Studies: Pua Technical College and Wiang Sa Industrial and Community Education College, Nan Province, Thailand

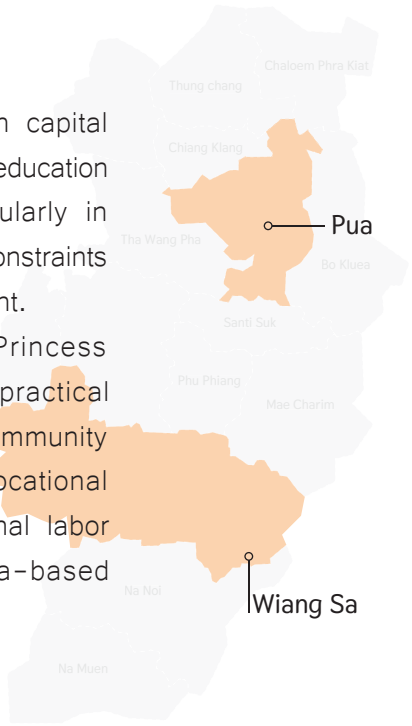
Support for Vocational Education Management in Remote Areas under Development Projects of Her Royal Highness Princess Maha Chakri Sirindhorn

Case Studies: Pua Technical College and Wiang Sa Industrial and Community Education College, Nan Province, Thailand

Background and Rationale

Vocational education constitutes a critical mechanism for human capital development in remote and marginalized areas, where access to higher education and formal employment pathways is limited. In Nan Province, particularly in highland and geographically isolated districts, many young people face constraints in continuing general education and transitioning into skilled employment.

Under the Development Projects of Her Royal Highness Princess Maha Chakri Sirindhorn, vocational education is emphasized as a practical and inclusive pathway that links education directly with livelihoods, community development, and local economic systems. Within this framework, vocational institutions are expected not only to produce skilled workers for external labor markets, but also to support local skill formation aligned with area-based development needs.



Objectives of Vocational Education Support

The support for vocational education management in remote areas was designed with the following objectives:

1. To expand access to vocational education for students from remote, highland, and disadvantaged communities.
2. To strengthen the capacity of vocational institutions to deliver context-relevant and practice-oriented training.
3. To align vocational curricula with local livelihoods, community needs, and regional development strategies.
4. To enhance the role of vocational colleges as key nodes in area-based development ecosystems.
5. To support the Development projects of HRH projects of reducing educational inequality and improving quality of life for children and youth in remote areas.

Case Study 1: Pua Technical College

Pua Technical College serves as a major vocational education provider for students from Bo Kluea District, Chaloem Phra Kiat District, and surrounding highland areas. A significant proportion of students come from economically disadvantaged households and ethnic minority communities, making vocational education a crucial pathway for skill acquisition and social mobility.

Support activities focused on:

- Strengthening institutional capacity for vocational education delivery in remote contexts.
- Enhancing curricula to reflect local socio-economic and environmental conditions.
- Promoting hands-on and work-based learning approaches relevant to community livelihoods.
- Supporting instructors through academic collaboration and technical capacity development.

Through these efforts, Pua Technical College was positioned as an institution capable of bridging education and community development, enabling students to apply vocational skills within local contexts rather than relying solely on external employment opportunities.

Table 3. Summary of Vocational Students' Educational Outcomes

(Cohorts 1–6)

Cohort	Academic Year	Field of Study	Number of Students (persons)			Graduates (persons)	Current Status / Outcomes
			Year 1	Year 2	Year 3		
1	2017	Electrical Power	19	10	8	8	·Employed in private sector: 2 ·Self-employed (technical work): 1 ·Engaged in agriculture within community: 5
2	2018	Automotive Mechanics	18	10	7	7	·Self-employed (technical work): 3 ·Engaged in agriculture within community: 4
3	2019	Automotive Mechanics	21	17	6	6	·Continuing education (Vocational Diploma level): 1 ·Engaged in agriculture within community: 3 ·Military service: 2
4	2020	Automotive Mechanics	16	11	5	5	·Continuing education (Vocational Diploma level): 3 ·Employed in private sector: 2
5	2021	Automotive Mechanics	12	4	4	4	·Assisting family agricultural activities: 4
6	2022	Automotive Mechanics	8	5	2	2	·Employed in private sector outside the area: 2
Total 2017–2022			94	57	32	32	

Explanatory Notes The data indicate a high number of students leaving the education system before graduation, amounting to 60 students, or approximately 45% of total enrollment.

- Academic challenges.
- Family and household constraints;
- The need to leave school to engage in income-generating activities in order to support parents or guardians.
- Misalignment between general education pathways and students' interests or aptitudes.
- Behavioral and personal challenges among students.

Addressing these challenges requires collaborative efforts among KMUTT, Pua Technical College, parents, and community stakeholders to jointly identify preventive measures and support mechanisms. These include:

- Provision of educational and career development funds.
- Establishment of effective student support and mentoring systems.
- Enhanced parental and community participation in supporting students to complete their education.

Bridging education and community development

Case Study 2: Wiang Sa Industrial and Community Education College

Wiang Sa Industrial and Community Education College plays a complementary role in providing vocational education to students from rural and semi-rural areas of Nan Province. Under the Royal Initiative framework, the College functions as a platform for producing skilled workers while also supporting community-based economic activities.

Support for Wiang Sa College emphasized:

- Development of practice-oriented vocational programs aligned with regional development needs.
- Enhancement of teaching and learning processes in technical and industrial fields.
- Integration of vocational education with community service and local development initiatives.
- Collaboration with partner institutions to strengthen institutional learning and adaptability.

These interventions reinforced the College's role as a community-embedded vocational institution, capable of responding flexibly to changing local labor and livelihood conditions.

Local economic resilience and inclusive development

Integrating Vocational Education with Area-Based Development

A defining characteristic of vocational education support under the Royal Initiative Projects is its integration with area-based development strategies. Rather than operating as isolated educational institutions, vocational colleges are embedded within broader development systems that include schools, community enterprises, universities, and local government agencies.

KMUTT's role in this integration involved:

- Linking vocational education programs with ongoing community livelihood projects.
- Facilitating collaboration between vocational colleges and development partners.
- Supporting experiential learning opportunities in real community settings.
- Reinforcing pathways from vocational education to local employment and entrepreneurship.

This integrated approach ensures that vocational education contributes directly to local economic resilience and inclusive development.

Outcomes and Developmental Significance

The support provided to vocational education institutions in remote areas contributed to several key outcomes:

- Improved access to vocational education for students in remote and disadvantaged areas.
- Enhanced relevance and quality of vocational training programs.
- Strengthened capacity of vocational colleges to respond to local development needs.
- Improved employability and livelihood readiness among graduates.

Beyond individual outcomes, vocational education emerged as a structural component of area-based development, linking education policy with livelihoods, skills formation, and community resilience.

Strategic investment in human capital

Lessons Learned and Implications for Long-Term Research

The experience of supporting vocational education under Royal Initiative Projects offers several insights relevant to academic research and policy development:

- Vocational education in remote areas is most effective when aligned with local socio-economic and ecological contexts.
- Institutional collaboration enhances the adaptability and sustainability of vocational education systems.
- Practice-oriented and community-embedded learning strengthens student engagement and applicability of skills.
- Vocational colleges can function as development institutions, not only as training providers.

For researchers, the Nan Province experience provides opportunities to examine long-term trajectories of vocational graduates, the relationship between skills training and local economic transformation, and the governance of education–development linkages in marginalized regions.

Positioning within the development projects of HRH projects-Based Development Framework

Within the development projects of HRH projects e–based development framework, support for vocational education in remote areas represents a strategic investment in human capital. By strengthening vocational institutions such as Pua Technical College and Wiang Sa Industrial and Community Education College, the initiative contributes to reducing educational inequality while fostering skills pathways that support sustainable and inclusive development.

This chapter complements earlier discussions on literacy, vocational skills development, and household-level poverty analysis, collectively illustrating how education systems can be designed to serve as engines of long-term area-based transformation.

Lesson Extraction and Social Return on Investment (SROI) Assessment Vocational Education for Ethnic Minority Students in Highland Areas of Nan Province, Thailand

Lesson Extraction and Social Return on Investment (SROI) Assessment Vocational Education for Ethnic Minority Students in Highland Areas of Nan Province, Thailand

Background and Rationale

Students from ethnic minority groups living in highland areas of Nan Province face multiple layers of disadvantage in accessing education and employment. Geographic isolation, household poverty, language barriers, and limited access to post-basic education constrain their opportunities for skill development and long-term livelihood security.

To address these challenges, a vocational education support initiative was implemented for ethnic minority students in highland areas, funded by the Education, Learning, and Career Development Fund of KMUTT. Beyond providing financial assistance, the initiative aimed to strengthen students' capabilities, reduce structural inequality, and enable sustainable livelihood pathways.

Given the long-term and multidimensional nature of these objectives, the program incorporated a process of lesson extraction and Social Return on Investment (SROI) assessment to evaluate not only economic outcomes, but also social and developmental value generated through vocational education.

Objectives of Lesson Extraction and SROI Assessment

The lesson extraction and SROI assessment were conducted with the following objectives:

1. To document key lessons learned from supporting vocational education for ethnic minority students in highland contexts.
2. To assess the social value generated by educational investment beyond direct financial returns.
3. To analyze changes in students' life trajectories, skills, and opportunities.
4. To provide evidence for improving future program design and funding mechanisms.
5. To inform policy discussions on inclusive education and human capital development.

This approach reflects an understanding that educational interventions produce long-term social outcomes that cannot be captured solely through short-term economic indicators.

Lesson extraction and Social Return on Investment (SROI)

Scope and Target Group

The assessment focused on ethnic minority students from highland communities in Nan Province who received scholarships and educational support to pursue vocational education. These students typically came from households with limited economic resources and faced significant barriers to continuing education.

Support covered not only tuition and living expenses, but also learning continuity, skill development, and transition into employment or livelihood activities. The assessment therefore considered outcomes at both individual and household levels.

Methodological Approach to Lesson Extraction

Lesson extraction was conducted through a systematic review of program implementation processes and observed outcomes. Key dimensions examined included

- Accessibility of vocational education for ethnic minority students.
- Relevance of vocational skills to local and regional labor markets.
- Continuity of learning and student retention.
- Transitions from education to employment or income-generating activities.
- Changes in self-confidence, aspirations, and social participation.

This qualitative analysis aimed to identify mechanisms of change, rather than merely cataloging activities or outputs.

Social Return on Investment (SROI) Perspective

The SROI assessment framework was applied to capture the broader social value created by investing in vocational education for ethnic minority students. The analysis considered how educational support contributed to outcomes such as:

- Increased employability and income potential.
- Reduced household economic vulnerability.
- Improved capacity for self-reliance and decision-making.
- Enhanced social inclusion and reduced inequality.
- Long-term benefits to families and communities through skilled human capital.

By examining these outcomes, the assessment highlights that returns on educational investment extend beyond individual beneficiaries to generate intergenerational and community-level impacts.

Key Findings and Observed Outcomes

The lesson extraction and SROI assessment identified several significant outcomes:

- Vocational education support enabled ethnic minority students to complete education pathways that would otherwise be inaccessible.
- Students acquired practical skills aligned with employment and livelihood opportunities.
- Graduates were better positioned to enter the workforce, generate income, or support household livelihoods.
- Educational attainment contributed to increased self-esteem, social recognition, and agency among students.
- Households experienced indirect benefits through reduced dependency and improved future prospects.

These findings demonstrate that vocational education functions as a transformative intervention, altering life trajectories rather than merely providing short-term assistance.

Table 4. Summary of Vocational Certificate (Cert.) Students

(2017–2019)

Academic Year (B.E.)	Field of Study	Number of Students Vocational Certificate level			Number of Students Vocational Diploma level		
		Total Students	Graduated	Not Graduated	Continued to Diploma Level	Graduated	Not Graduated
2017	Electrical Power	19	8	11	5	4	1
2018	Automotive Mechanics	18	7	11	3	3	0
2019	Automotive Mechanics	21	6	15	1	1	0
TOTAL		**58**	**21**	**37**	**9**	**8**	**1**

Notes and Interpretation

The data indicate that almost all students who completed the Vocational Certificate level (Cert.) were able to continue and complete the Vocational Diploma level (Dip.)(8 out of 9 students).

This suggests that students from highland ethnic communities possess learning capacity comparable to students in lowland areas.

The primary constraints are not academic ability, but rather time for adaptation, adjustment processes, and access to opportunities.

Educational Management Approach

The educational management approach of Pua Technical College applies the core vocational curriculum of the Office of the Vocational Education Commission, adapted to suit the highland context of Bo Kluea District, Nan Province.

The education system is divided into two phases:

- Year 1 (Cert.): Students study at the Bo Kluea Learning Center, Nan Province.
- Years 2–3 (Cert.): Students continue their studies at Pua Technical College, Nan Province.

Teaching and learning emphasize practice-based learning, allowing instructors to design learning activities appropriate for students from ethnic minority backgrounds who may have limited prior academic foundations but demonstrate strong learning capacity through hands-on practice.

During their studies, students receive close supervision and support from academic advisors, who monitor attendance, accommodation, and integrated learning activities.

In the first year, students reside in accommodation provided by the Bo Kluea Learning Center. From the second year onward, students live off-campus, which increases challenges related to supervision and living expenses, sometimes leading to financial difficulties.

Outcomes for Graduates

For students who successfully completed their studies during the academic years 2017–2019:

- 6 graduates were able to work in technical occupations, earning an average monthly income of 7,000–15,000 THB.
- 14 graduates returned to engage in agriculture with their families in their home communities, earning approximately 6,000 THB per month.
- 1 graduate continued further study at the Higher Vocational Diploma level (Advanced Diploma).

Beyond income generation, students were able to apply knowledge gained from vocational education to support themselves and their families, while also developing social skills and adaptive capacity.

Living and studying in urban environments required students to adjust to different cultures and ways of life, presenting challenges that ultimately strengthened their resilience, social competence, and readiness for future employment and life.

Several key lessons emerged from the assessment:

- Financial support alone is insufficient; comprehensive educational assistance is required to ensure student success.
- Vocational education is particularly effective for ethnic minority students when aligned with realistic employment pathways.
- Long-term investment in human capital yields cumulative social benefits that exceed initial costs.
- Systematic evaluation frameworks, such as SROI, are valuable for capturing the full impact of educational programs.

These lessons reinforce the importance of designing vocational education initiatives as inclusive, sustained, and outcome-oriented interventions.

Implications for Policy, Funding, and Research

The findings from the lesson extraction and SROI assessment have several implications:

- For policy: vocational education should be recognized as a strategic tool for reducing educational and socio-economic inequality in highland and ethnic minority contexts.
- For funding: education funds should incorporate long-term outcome evaluation to capture social returns on investment.
- For research: longitudinal studies are needed to track graduates' life trajectories, employment stability, and community impacts over time.

The experience in Nan Province provides a foundation for long-term research collaboration on inclusive education, social investment, and human capital development in marginalized regions.

Systemic and sustainable development outcomes.

Positioning within the Area-Based Development Framework

Within the broader area-based development framework, the lesson extraction and SROI assessment demonstrate how vocational education support for ethnic minority students contributes to systemic and sustainable development outcomes.

By linking educational investment with social impact evaluation, the initiative underscores the role of universities not only as education providers, but also as stewards of social value creation, ensuring that public and philanthropic resources generate meaningful and lasting returns for individuals, families, and communities.

Promotion and Support for Learning Development of Children and Youth in Remote Areas The Project for the Promotion and Development of Thai Language for for Children in Remote Areas

in development projects of HRH projects Schools, Nan Province, Thailand

Promotion and Support for Learning Development of Children and Youth in Remote Areas The Project for the Promotion and Development of Thai Language (Speaking, Reading, and Writing Skills) for for Children in Remote Areas

in development projects of HRH projects Schools, Nan Province, Thailand

Background and Educational Context

Children and youth in remote and highland areas of Nan Province—particularly those attending schools under development projects of HRH projects School—face persistent challenges in acquiring foundational Thai language skills, including speaking, reading, and writing. These challenges are especially pronounced among students from ethnic minority backgrounds, where Thai is not the primary language used in households and communities

Limited access to educational resources, teacher shortages, geographical isolation, and socio-economic constraints further exacerbate learning gaps. Without timely intervention, deficiencies in foundational literacy can accumulate, undermining students' ability to progress academically, access vocational education, and participate effectively in social and economic life.

Within the Royal Initiative framework, the development of Thai language literacy is therefore regarded as a core prerequisite for lifelong learning and inclusive development, rather than a narrowly defined academic objective.

Objectives of The Promotion and Development of Thai Language Program

The Promotion and Development of Thai Language Program was designed with the following objectives:

1. To strengthen foundational Thai language skills—speaking, reading, and writing—among children and youth in remote and highland schools.
2. To reduce educational inequality affecting students in Royal Initiative schools.
3. To support learning continuity and prevent long-term educational disadvantages.
4. To enhance the capacity of schools in remote areas to address foundational learning gaps.
5. To contribute to the broader goals of human development and social inclusion under the Royal Initiative Projects.

These objectives reflect an understanding that literacy is both an educational foundation and a development enabler.

Target Schools and Learners

The program targeted schools under development projects of HRH projects Schools in Nan Province, particularly those located in remote and hard-to-reach areas. The primary beneficiaries were children and youth who exhibited difficulties in Thai language acquisition, especially students whose first language differed from Thai.

By focusing on schools already serving vulnerable populations, the program aimed to ensure that literacy interventions reached learners most at risk of falling behind or exiting the education system prematurely.

Core prerequisite for lifelong learning
and inclusive development

Program Design and Implementation Approach

The Promotion and Development of Thai Language Program was implemented through a structured yet flexible approach that emphasized learning support over remediation. Key features of program design included:

- Targeted assessment of students' Thai language proficiency.
- Tailored learning activities addressing specific gaps in speaking, reading, and writing.
- Integration of literacy development into regular school activities rather than isolated interventions.
- Collaboration among teachers, education agencies, universities, and partner organizations.
- Continuous monitoring and adjustment of learning strategies based on student progress.

The program prioritized early and sustained intervention, recognizing that foundational skills must be developed progressively and reinforced over time.

Role of Institutional Collaboration

Implementation of the program relied on collaboration among multiple institutions involved in education under Royal Initiative Projects. Universities played a supporting role by providing academic input, coordination, and knowledge integration, while schools remained central actors in delivering learning support.

This collaborative arrangement enabled the pooling of expertise and resources, ensuring that literacy development efforts were context-sensitive and aligned with local realities.

Outcomes and Learning Significance

The Promotion and Development of Thai Language Program contributed to several important outcomes:

- Improved Thai language proficiency among participating students.
- Enhanced confidence and participation in classroom learning.
- Strengthened capacity of teachers and schools to address foundational literacy challenges.
- Increased awareness of the importance of early literacy intervention within remote education systems.

Although the program focused on basic skills, its broader significance lies in preventing the long-term accumulation of learning deficits that can limit students' future educational and livelihood opportunities.

Learning support over remediation.

Lessons Learned from Literacy Development in Remote Areas

Several key lessons emerged from the implementation of the program:

- Foundational literacy must be addressed early to enable subsequent learning and skills development.
- Literacy interventions in multilingual contexts require sensitivity to linguistic and cultural diversity.
- School-based and system-level support are both necessary for sustained improvement.
- Collaboration among educational institutions enhances effectiveness and scalability.

These lessons underscore the importance of viewing literacy development as a systemic investment, rather than a short-term remedial activity.

Implications for Long-Term Development and Research

The experience of the The Promotion and Development of Thai Language Program offers valuable insights for long-term research and policy analysis, including:

- The relationship between early literacy and later educational attainment in remote and ethnic minority contexts.
- Effective models of literacy support within development projects of HRH projects–based education systems.
- The role of universities as facilitators of learning ecosystems rather than direct service providers.
- Strategies for reducing educational inequality through foundational skill development.

For academic audiences, the program provides a basis for longitudinal studies examining how early literacy interventions influence educational trajectories, vocational participation, and social inclusion over time.

Positioning within the Area-Based Development Framework

Within the broader area-based development framework in Nan Province, the Thai Speaking–Reading–Writing Program represents a foundational human development intervention. By strengthening literacy at an early stage, the program supports coherent linkages between education, skills development, and livelihoods addressed in other components of the Royal Initiative Projects.

Together, these interventions illustrate how education systems can function as engines of inclusive and sustainable development in remote and marginalized regions.

Study of Factors Affecting Household-Level Poverty Phu Fa Subdistrict, Bo Kluea District, Nan Province, Thailand

Study of Factors Affecting Household-Level Poverty Phu Fa Subdistrict, Bo Kluea District, Nan Province, Thailand

Background and Rationale

Household-level poverty in highland and remote communities is a complex and multidimensional phenomenon that cannot be adequately understood through income indicators alone. In Phu Fa Subdistrict, Bo Kluea District, Nan Province, households face structural constraints related to geography, limited livelihood options, restricted access to public services, and vulnerability to external shocks.

Recognizing these complexities, the project "Study of Factors Affecting Household-Level Poverty in Phu Fa Subdistrict" was initiated to generate empirical evidence that could support more accurate diagnosis of poverty and inform area-based development planning. The study forms part of a broader effort to strengthen evidence-based decision-making under development projects of HRH projects–based development framework in Nan Province.

Objectives of the Study

The study was conducted with the following objectives:

1. To analyze key factors contributing to household-level poverty in Phu Fa Subdistrict.
2. To examine the relationships between livelihoods, expenditures, food security, and well-being.
3. To identify structural constraints that limit households' ability to escape poverty.
4. To generate household-level data to support targeted and effective development interventions.

Through these objectives, the study sought to move beyond generalized assumptions about poverty and toward a context-specific and data-driven understanding of household vulnerability.

Analytical Approach and Data Scope

The analysis focused on collecting and examining socio-economic data at the household level, covering dimensions relevant to everyday living conditions and long-term resilience. Key aspects of analysis included:

- Household income sources and income stability.
- Expenditure patterns, particularly food-related expenses.
- Livelihood activities and seasonal employment.
- Access to natural resources and productive assets.
- Debt and coping strategies used during periods of hardship.

By examining these interrelated factors, the study aimed to identify patterns and drivers of poverty that persist across households and over time

Key Findings on Household Poverty Factors

Findings from the study indicated that household poverty in Phu Fa Subdistrict is influenced by a combination of structural and livelihood-related factors, rather than by a single cause. Prominent factors include:

- Limited and unstable income-generating opportunities within the local area.
- High household expenditures are relative to income, particularly for food and basic necessities.
- Dependence on external markets for essential goods.
- Vulnerability to seasonal and environmental fluctuations affecting livelihoods.
- Constrained access to education and skills development pathways that could enable livelihood diversification.

These factors interact to reinforce household vulnerability, making it difficult for families to achieve sustained economic security without targeted support.

Implications for Area-Based Development Planning

The findings of the household poverty study provide critical input for evidence-based development planning in Phu Fa Subdistrict and surrounding highland areas. By identifying specific poverty drivers, development interventions can be more precisely designed and sequenced to address underlying constraints.

For example, insights from the study informed prioritization of interventions related to food security, livelihood diversification, vocational skills development, and educational support. The household-level perspective also enabled differentiation among households, supporting more targeted and equitable allocation of resources.

Significance for Research and Policy

From an academic and policy perspective, the study demonstrates the importance of household-level analysis in understanding poverty dynamics in remote and highland contexts. It highlights that poverty reduction strategies must be grounded in empirical evidence that reflects local realities and lived experiences.

The Phu Fa Subdistrict case provides a foundation for longitudinal research on poverty trajectories, household resilience, and the effectiveness of area-based interventions over time. It also underscores the role of universities and research institutions in bridging data, policy, and community action.

Positioning within the Area-Based Development Framework

Within the broader area-based development framework in Nan Province, the household poverty study functions as a diagnostic component that informs subsequent interventions across education, livelihoods, skills development, and social inclusion.

By integrating poverty analysis into ongoing development practice, the project reinforces a model in which data-driven understanding precedes action, enhancing the effectiveness and sustainability of development efforts in highland and marginalized communities.

Quality of Life Development for the “Mlabri Phu Fa” Community

Phu Fa Subdistrict, Bo Kluea District, Nan Province, Thailand

Quality of Life Development for the "Mlabri Phu Fa" Community Phu Fa Subdistrict, Bo Kluea District, Nan Province, Thailand

Background and Social Context

The Mlabri Phu Fa community is an ethnic minority group residing in Phu Fa Subdistrict, Bo Kluea District, Nan Province. Historically, the Mlabri practiced a nomadic hunter-gatherer lifestyle closely connected to forest ecosystems. Their livelihoods, social organization, and cultural practices were shaped by mobility, reliance on natural resources, and limited engagement with formal state systems.

Over time, structural changes—including environmental regulations, reduced access to forest resources, and broader socio-economic transformation—significantly constrained traditional ways of life. As a result, Mlabri households faced heightened vulnerability related to food security, income instability, limited access to education, and restricted livelihood options.

In response to these challenges, a quality-of-life development initiative was implemented for the Mlabri Phu Fa community, grounded in the principles of human dignity, cultural sensitivity, and gradual adaptation.

Development Approach and Working Principles

The quality-of-life development process for the Mlabri Phu Fa community was guided by several key principles:

- Gradual transition:
  Recognizing the need for step-by-step adaptation from forest-based livelihoods to more settled forms of living.
- Food-first strategy:
  Prioritizing food security as the foundation for stability and well-being.
- Learning-by-doing:
  Emphasizing practical skill development through hands-on activities.
- Cultural respect:
  Avoiding abrupt disruption of identity, traditions, and social relations.
- Continuous support:
  Ensuring long-term accompaniment rather than short-term intervention.

These principles shaped both the design and implementation of development activities.

Human dignity, cultural sensitivity, and gradual adaptation.

Livelihood and Food Security Interventions

Central to the initiative was the strengthening of household food production and basic livelihood skills. Activities included:

- Rice cultivation for household consumption.
- Vegetable gardening adapted to local conditions.
- Raising poultry and fish for food and supplementary income.
- Mushroom cultivation and other small-scale food production activities.

These interventions enabled households to gradually reduce reliance on external food sources and improve nutritional security. The emphasis was placed on self-production for consumption first, with surplus production considered a secondary benefit.

Skills Development and Economic Participation

Beyond food security, the initiative supported Mlabri households in developing skills relevant to income generation and economic participation. These included:

- Participation in wage-based employment linked to local development activities.
- Production of handicrafts and value-added products reflecting local knowledge and materials.
- Collection and processing of forest-based products where appropriate and permitted.

Income generated through these activities contributed to improved household stability and reduced vulnerability to economic shocks.

Outcomes and Observed Changes in Quality of Life

By the later stages of the project, the initiative demonstrated several notable outcomes:

- Improved household food self-reliance, reducing expenditure on purchased food.
- Increased and more stable household income from diversified sources.
- Enhanced confidence and self-esteem among community members.
- Strengthened social integration with surrounding communities and institutions.
- Reduced dependency on external assistance.

Importantly, these changes occurred without undermining cultural identity, illustrating that quality-of-life improvements and cultural preservation can be mutually reinforcing.

Lessons Learned from the Mlabri Phu Fa Experience

The Mlabri Phu Fa case offers several lessons for quality-of-life development among indigenous and ethnic minority communities:

- Development interventions must prioritize trust-building and long-term presence.
- Food security serves as a critical entry point for broader socio-economic transformation.
- Skills development should be aligned with realistic livelihood opportunities.
- Culturally sensitive approaches enhance sustainability and community ownership.
- Success should be measured through qualitative and social indicators, not income alone.

These lessons underscore the importance of human-centered development frameworks in working with highly marginalized populations.

Summary of the Relocation Journey

2007
First Group of Mlabri Relocation

- **Nine young Mlabri from Ban Huay Hom, Phrae Province** moved temporarily to stay near the Phu Fa Development Center in Bo Kluea to **learn agriculture and farming skills.**

2009
Families Begin Relocating Together

- Relatives and families from Ban Huay Hom **migrated,** totaling **60 people**, and built temporary houses near Phu Fa.
- The Phu Fa Cultural Learning Center was established as **a shared learning space for local people.**
- Adults worked in government wage-based employment programs.

2010
Formal Learning Center Established

- The Non-Formal and Informal Education Office (NFE) opened Phu Fa Cultural Center as a learning site.
- Literacy programs and **equivalency education up to lower secondary level** were offered.
- **Transplanted Mlabri learned handicraft and weaving skills,** taught by elders from Ban Huay Hom.

2011
Tourism-linked Development Begins

- **Government agencies invested in developing** the Phu Fa Cultural Center as a tourism learning hub.
- Young community members began selling **handicraft and honey.**
- **15 families gained employment** through the Royal Projects and watershed programs.

2013
Unsuccessful Land Expansion Attempt & Capacity Building

- Some Phufa residents attempted to **expand settlement and farming areas into Ban Huay Lu, but were unsuccessful,** returning to Phu Fa.
- **KMUTT began intensive, structured partnership with the community.**
- **Six community Mlabri** received royal scholarships to study agricultural extension at KMUTT.

2014
Early Livelihood Planning and Land Access

- Conducted socio-economic **baseline surveys with the community.**
- Community drafted their first **food and livelihood development plan.**
- Began **mapping land within the cultural center** for vegetable and crop farming.
- Families started renting land in Ban Nakok for rice farming.

2015-2016
Diversified Farming & Improved Food Security

- **Community carried out multi-crop farming:** chicken raising, fish culture, vegetable plots (KMUTT-supported funding).
- **Income generated through honey production** and natural products (with KMUTT support).
- **New houses were built using local and** donated materials near the cultural center.
- **Children began formal schooling** at Ban Huay Hom School and Bo Kluea School.

2017-2018
Transition to New Settlement

- Government agencies presented land-access options, and supported community to manage new farming areas at Ban Huay Kra Yen.

2019-2020
From Learning to Enterprise

- **First cohort graduated with bachelor's degrees from KMUTT, returning to** develop agriculture.
- Honey products gained GI certification and were showcased in fairs and exhibitions.
- Government funding supported development of water and electricity systems in Ban Huay Kra Yen.
- **Some youth entered vocational and technical education pathways** and apprenticeships.

2021-2023
Establishing Permanent Homes & Strengthening Livelihoods

- **Constructed the first permanent houses** at Ban Huay Kra Yen, marking the start of long-term settlement and community development.
- **Community members continued traveling** between Phu Fa and Huay Kra Yen as farming, learning, and development activities expanded across both locations.
- **Graduates from vocational programs** secured employment,and youth trainees in technical tracks began entering the workforce.

2024
Full Community Migration Under Formal Agreement

- **Community received donations and** government grants of 1.6 million THB **under an 18-month settlement agreement.**
- **The community formally relocated from Ban Huay Kra Yen to Ban Nakok, building permanent homes.**
- Honey products sold every weekend at the Phu Fa Cultural Center.
- **Community relations events held every 3 months.**

Implications for Research and Policy

For academic and policy audiences, the Mlabri Phu Fa initiative provides a valuable case for examining:

- Transitions from traditional livelihoods to settled socio-economic systems.
- Pathways to self-reliance among indigenous communities.
- Interactions between culture, livelihoods, and well-being.
- Long-term impacts of area-based and participatory development approaches.

The experience also highlights the role of universities and development institutions as facilitators of learning, adaptation, and social inclusion, rather than prescriptive agents of change.

Positioning within the Area-Based Development Framework

Within the broader area-based development framework in Nan Province, the quality-of-life development of the Mlabri Phu Fa community represents a social inclusion pillar that complements interventions in education, food security, vocational skills, and poverty reduction.

By addressing structural vulnerability through integrated and culturally appropriate strategies, the initiative contributes to a more inclusive and resilient development trajectory for highland communities in Bo Kluea District.

Community–University Collaborative Implementation Framework

King Mongkut's University of Technology Thonburi (KMUTT) has been working continuously in the Mlabri Phu Fa area for more than a decade, beginning with community resettlement in 2009

In 2013, systematic learning about the specific characteristics of the Mlabri ethnic group began through multidimensional community data collection.

Beyond generating community data, this process also resulted in the development of 5–10 local research assistants, which significantly strengthened participatory collaboration and mutual learning between the university and the community.

The collaborative operational framework between KMUTT and the Mlabri Phu Fa community is structured around six key domains: livelihoods, community data systems, health, public utilities, education, and natural resource use, with detailed implementation plans summarized in the table below.

Table 5. Joint Implementation Plan between the Mlabri Phu Fa Community, KMUTT, and Partner Networks

Working Domain	Activities	Targets / Expected Outcomes
Livelihood Development	1. Agricultural livelihoods: chicken farming, fish farming, mushroom cultivation in sheds, vegetable cultivation, rice farming, fruit tree cultivation, high-value crops, catfish farming 2. Other livelihoods: forest honey trading, handicraft production, food processing	· Income generated from agricultural and supplementary livelihood activities · Minimum income from supplementary livelihoods not less than 2,000 THB per month · Target household income not less than 6,500 THB per household, sufficient for current social conditions
Community Data System	1. Photography and visual documentation 2. Baseline community data collection 3. Household accounting 4. Forest resource utilization records 5. Documentation of Mlabri sub-groups	· Comprehensive data available for analysis, classification, and reporting · Community data reports produced every 6 months
Health	1. Nutrition and food knowledge dissemination 2. Health care and monitoring	· Health check-ups every 6 months · Dental services every 6 months · Improved health awareness and preventive health behavior · Regular access to basic health services

Table 5. Joint Implementation Plan between the Mlabri Phu Fa Community, KMUTT, and Partner Networks

Working Domain	Activities	Targets / Expected Outcomes
Public Utilities	1. Water supply systems for household use 2. Water supply systems for consumption 3. Water systems for agriculture and electricity 4. Community-based water management systems	· Sustainable and community-managed water and electricity systems · Appropriate and equitable access to public utilities
Education	1. Promotion of education for all age groups according to interests 2. Individual education plans for community members 3. Formal education and short-term vocational training to enhance occupational skills	· Increased educational participation across age groups · Improved vocational and life skills aligned with livelihood needs
Natural Resource Use	1. Development of plans for forest resource utilization and management 2. Establishment of agreements, boundaries, and rules for resource use 3. Community-based environmental stewardship	· Sustainable use of forest resources · Shared responsibility for community and environmental conservation

Additional Livelihood Outcomes

Following the establishment of agricultural water systems, the Mlabri community was able to cultivate rice on 11 rai, producing approximately 5,500 kilograms of rice.

This yield was sufficient for approximately five months of household consumption, reducing rice purchase expenses by 82,500 THB, and increasing rice productivity per unit area by more than 20% compared to previous conditions.

Indigenous chicken farming was developed through the construction of two standardized chicken houses (3 × 4 meters each), each capable of raising 100 chickens.

The community received training in farm management, feed formulation, vaccination, disease control, and sanitation.

At present, three production cycles have been completed, with two cycles sold within the community, yielding approximately 158 kilograms of chicken meat and generating income of 41,760 THB, while reducing reliance on external poultry sources.

Fish farming for household consumption and local distribution was also developed. Two ponds were constructed:

- Pond 1 (112 m^3) for Nile tilapia breeding (1,000 fish), producing approximately 500–600 kilograms for gradual household consumption.
- Pond 2 (225 m^3) for polyculture of multiple fish species.

Appendix

Timeline :

Working to Solve Rice Insufficiency in Doi Phu Fa, Bo Kluea, Nan

1999 · No Permanent Team

2002 · Permanent team 3–5 staff
· Sent faculty researchers, engineers, and agricultural specialists to work in communities.

2005 · Permanent team 5–7 staff
· Research students

1999–2001

First Entry to the Area

Target:
Children in remote villages; schools with frequent teacher turnover; children lacking continuing education

Approach:
Establishing schools as centers for development.

Activities:

- Teacher training: core learning subjects (mathematics, science, chemistry, biology) through problem-based learning.
- Classroom projects to address local issues, e.g., food security, nutrition, safe drinking water, waste sorting.
- School-based science exhibitions using local materials (e.g., banana stalks, clay models),
- Showing student learning outcomes.

2002–2004

Establishing Field Coordination Centers

Key contributions:

- Designed a model for school-based research and community development in remote upland contexts.
- Supported education for food security through vegetable and livestock projects.
- Built foundational partnerships with national science agencies, including BIOTEC and NSTDA.
- Created the first collaborative university-school initiative in Nan.
- Seed success factors:
  (1) research-backed intervention
  (2) integration with science curriculum
  (3) student participation
  (4) collaboration with villages.
- School-community collaboration led to solutions in nutrition, health, and early childhood stimulation: school lunch, chicken-and-egg program, kitchen garden projects.

2005–2009

Establishing Community Baselines

Target:
Communities facing varying levels of food scarcity needing differentiated solutions.

Approach:
Field studies + participatory data collection to understand the realities of rice shortage.

Work results:

- Students co-conducted field research in upland farming, shifting cultivation, and indigenous cropping systems.
- Community learning projects developed on themes such as nutrition, food preservation, household savings, and small livestock.
- Launched seed bank learning centers combining science curriculum with field practice.
- KMUTT collaborated in founding Thailand's first ThaiLERD model sites (Learning for Empowerment in Rural Development).
- Digitized study areas using GIS to map 2,000 rai of production land.

Summary of Impact Across 20 Years

- From rice shortage → self-reliance → emerging surplus
- Schools became centers of learning, research, and innovation
- Children & youth became development actors, not beneficiaries
- Farmers raised yields, protected soils, and conserved seeds

2010 · Permanent team 5–7 staff · Graduate students

2010–2017

Building Capacity of Local People in Food Production and Livelihoods

Target:

Rice sufficiency

Approach:

Increase yields + develop supplementary livelihoods

Achievements:

- Increased rice productivity through science-based field practice with KMUTT + NSTDA.
- Vocational integration: strawberry runners, ginger, medicinal herbs, cabbage, leafy greens.
- Household-level agroforestry: fish ponds, duck rearing, silvopasture models.
- Introduced value addition and micro-enterprises under youth clubs and women's groups.
- Local innovations: terracing, contour cropping, seed selection, soil-saving trenches.
- Supported farmer networks to exchange techniques across communities.
- Piloted agro-tourism visits to school farms, tea village, and strawberry terraces.
- Coordination with government agencies and local leaders led to province-wide expansion.

2018 · Permanent team 5–7 staff · 1 doctoral-level student

2018–Present

Tourism & Livelihoods Integration

Target:

Tourism pathways + community opportunities + shocks (COVID-19)

Approach:

Upskill & reskill for community adaptation and income resilience

Achievements:

- Built a database of livelihoods and tourism assets in Bo Kluea–Santisuk.
- Launched place-based innovation: school-as-tourism-node model.
- Connected highland communities to tourism markets through students as guides, cooks, hosts, and storytellers.
- Increased livelihood security through food + tourism hybridity (farm stays, local wisdom tours, tea village).
- Integrated "Thai Reading & Writing" project with tourism narrative under the MOVE initiative (Nan–Ratchaburi).
- Youth groups are now leading guided walks, local product sales, and business planning.

Traditional knowledge + science → hybrid highland farming systems

Household income diversified through agriculture + eco-tourism

Knowledge continues cycling through new generations

Chapter 1: Strengthening Food Security and Alternative Livelihoods

Background and Rationale

Based on the socio-economic data of households collected by KMUTT since 2010, it was found that many households experienced rice shortages for household consumption, with income levels lower than household expenditures.

Community food production—particularly rice, livestock, and vegetables—was insufficient to meet household needs. In addition, expenditures related to health care and education exceeded the community's capacity to manage them. As a result, households relied on sending family members to work outside the area to earn wages. However, most people from highland communities had low educational attainment and limited skills, resulting in low wages.

To address these challenges, the development strategy was structured around two main components:

1. Increasing upland rice productivity to ensure sufficient rice for household consumption and reduce expenditure on rice purchases.
2. Creating alternative livelihoods to generate income from both agricultural and service sectors appropriate to the local socio-cultural context, while reducing environmental degradation and conserving natural and cultural resources.

Increasing Upland Rice Productivity

Phu Fa Subdistrict, Bo Kluea District, Nan Province, is a core operational area of the Phu Fa Development Center. Upland rice cultivation is primarily practiced for household consumption.

Surveys conducted by KMUTT between 2010–2012 indicated that, on average, approximately 350 households per year cultivated upland rice on a total area of about 3,500 rai per year.

Rice productivity was low, averaging 230 kg per rai, resulting in an annual rice deficit of approximately 200 tons.

Households were therefore required to spend around 3 million THB per year on rice purchases.

KMUTT applied research findings by Dr. Pathama Sirithanya (Rajamangala University of Technology Lanna) from studies conducted during 2009–2012. These findings were used to conduct research and transfer technology to upland rice farmers in Phu Fa Subdistrict from 2010–2019.

The intervention focused on producing high-quality upland rice seeds (Phu Fa glutinous rice) and transferring five-step upland rice productivity enhancement technology, including:

1. Land preparation
2. Use of quality seed
3. Planting methods
4. Crop management and care
5. Selection and purification of seed for future planting

Research and Technology Transfer Phases

Implementation was divided into three phases:

2009–2010

Phase 1

Research on upland rice productivity improvement in Bo Kluea District, conducted jointly by Rajamangala University of Technology Lanna (Lampung Campus) and KMUTT.

2010–2011

Phase 2

Graduate students from KMUTT conducted thesis research on seed selection, farmer acceptance of productivity-enhancing technologies, and factors affecting upland rice yield in Phu Fa Subdistrict.

2012–2019

Phase 3

Expansion of research, testing of upland and lowland rice varieties suitable for local conditions, and establishment of a community rice seed bank in collaboration with the Phu Fa Development Center and Rice Research Centers.

Table 6. Summary of Upland Rice Productivity Enhancement and Technology Transfer

Activity Area	Key Actions
Research and Testing	· Yield performance testing of upland and lowland rice varieties · Selection of varieties suitable for highland conditions
Seed Development	· Production of high-quality upland rice seed (Phu Fa glutinous rice) · Support for community-based seed production
Technology Transfer	· Five-step upland rice productivity enhancement technology · Training and field demonstrations for farmers
Community Systems	· Establishment of a community rice seed bank · Data collection on rice production and seed use
Land Improvement	· Land adjustment and terracing for upland rice · Soil improvement and water management

Results and Outcomes

From the implementation of upland rice productivity enhancement between 2009–2019, farmers who used quality seed and applied the five-step technology achieved average yield increases of approximately 92%, from 230 kg per rai to 350 kg per rai.

Although total rice production was still insufficient to fully meet community consumption needs, there was a clear improvement in:

- Average yield per rai.
- Availability of quality rice seed.
- Improved field management practices.
- Reduced use of chemical inputs. contributing to improved health and environmental conditions.

Lessons Learned

Key lessons from the implementation include:

- The most influential factor affecting rice productivity was field management, including weed control, fertilization, and water management.
- Technologies that were easy to adopt —particularly the use of appropriate rice varieties—were more readily accepted by farmers.
- Farmers increasingly adopted Phu Fa glutinous rice seed, obtaining seed through borrowing or purchasing from community seed producers and gradually developing the capacity to save and select their own seed.
- Productivity enhancement technology and quality seed use increased rice yield by more than 50%, even though overall production remained constrained by declining upland rice cultivation areas.

Conditions for Successful Technology Transfer

Successful transfer of upland rice productivity enhancement technology requires consideration of:

- Consistency with farmers' traditional cultivation practices and acceptance.
- The presence of lead farmers.
- Participatory learning processes that integrate practical experience with new knowledge.
- Farmer involvement at every stage of implementation.

Timeline :

Tackling Rice Shortage in Doi Phu Fa, Bo Kluea, Nan

2006 — 2009 — 2010 — 2011 — 2019

2006–2009

Transferring Applied Agricultural Technology and Upland Rice Trials

by Dr. Pimpimol Chitchumnong, KMUTT Nan–Lampang Project, funded by NSTDA

- Identified and supported 4 core pioneer farmers in Ban Bo Kluea Nuea and Ban Bo Kluea Tai.
- Reached 80 farmers and provided hands-on planting practice to 43 households.
- Introduced 5 seed-variety and production innovations in field trials.
- Expanded upland rice cultivation to 90 rai (≈14.4 hectares).
- Yield increased to 150–200 kg/rai.

2006–2010

KMUTT NRM/CRM Students Conduct Field Research

Documenting key issues and knowledge related to rice insufficiency

- Studied indigenous upland rice cultivation practices and shifting agriculture systems.
- Documented techniques and knowledge of seed selection, field preparation, and household-based seed conservation.
- Recorded farmers' problem-solving strategies, water access challenges, and constraints of steep-slope agriculture.
- Compiled a foundational database now used in planning rice sufficiency programs in Doi Phu Fa, Bo Kluea.

2009–2012

Establishing a Baseline Database on Rice Production in Doi Phu Fa

- Total community land: 21,976 rai
  Rice production area: 3,500 rai/year
  - 3,000 rai in upland rice
  - 500 rai in paddy
- Population: 2,933 people, 673 households
  Rice consumption: 733,250 kg/year
  Production: 439,618 kg/year
  Shortage: 293,632 kg/year
  (≈ 250 kg/person/year deficit)

2010

Relevant Partners Begin Joining the Effort

- KMUTT Nan & Lampang, jointly with the Upland Rice Research and Training Center, trained 21 farmers on improved upland rice production methods. Yield increased to 260 kg/rai with seed yields up to 500 kg/year.
- The Department of Agricultural Extension worked with farmers to cultivate upland rice across 130 rai, achieving an average yield of 150 kg/rai.

2011–2013

Organizing Knowledge and Increasing Production

KMUTT + Local Science Village Fund + Ministry of Science and Technology

- 50 farming families involved, across 465 rai.
- Average upland rice yield increased to 260 kg/rai.
- Stock of improved upland rice seed expanded through 8 varieties.

2012–2019

Strengthening Farmer Capacity and Expanding Quality Seed Systems

KMUTT + Local Funds + NSTDA

- 22 farmers from two communities participated (Ban Nam Ho and Ban Huay Bo).
- Farmers improved seed selection and storage systems.
- Seed yield increased to 37,103 kg per year.
- Upland rice cultivated across 401 rai, improving community food supply.
- Average yields (depending on land type and improved practices): 92% of plots achieved 130–250 kg/rai.

Chapter 2: Development of Alternative Livelihoods

Table 7. Development of Alternative Livelihoods by Period (2007–2024)

Period	Context	Implementation Approach	Results / Outcomes
2007 – 2009	Community assessment revealed rice insufficiency for household consumption, high expenditure on external food purchases, limited local income opportunities, and constraints in skills, knowledge, capital, and market access. Villagers relied on out-migration for wage labor.	KMUTT initiated alternative livelihood promotion, focusing on post-rice-season crops to generate supplementary income. Pilot trials included strawberry cultivation, with technical support from a former Royal Project manager. Additional crops promoted included winter vegetables, beans, sweet corn, and vegetables, with production linked to Royal Project supply chains.	· Farmers lacked skills in intensive agriculture. · Strawberry trials yielded low productivity and low prices due to limited markets and small production volumes. · Promotion of post-rice crops did not achieve sustainable income due to insufficient skills, limited land, and lack of market access.
2011 – 2014	Bo Kluea District began to emerge as a tourism destination. Demand increased for strawberries and agricultural products for tourism markets.	Demonstration plots for strawberry cultivation were established as learning sites for farmers and tourists. Knowledge exchange occurred between visiting tourists and local farmers. Initial expansion involved 15–20 farming households. Community members also displayed strawberries in bags in front of houses for sale to tourists.	· Strawberry cultivation was feasible in certain areas. · Farmers produced quality strawberries in limited locations. · Income generation from strawberry sales ranged from 100,000–150,000 THB per year in pilot communities, with gradual expansion to other areas.
2015 – 2016	In lowland areas at elevations of 300–800 meters, strawberry cultivation faced climate-related risks, including rainfall during flowering, inconsistent cold periods, and short winter seasons.	Due to repeated crop failures and low profitability, strawberry cultivation was discontinued in unsuitable areas.	· Strawberry production was not economically viable in lower-elevation areas. · Farmers ceased cultivation after recurring losses.
2017 – 2024	Tourism expanded rapidly, while the COVID-19 pandemic disrupted livelihoods and markets.	Strawberry production continued in suitable highland areas, with 10–13 farmers producing approximately 30,000 plants per year, fully self-financed. Most produce was sold to tourism operators in Nan Province, with KMUTT supporting seedling distribution. Additional livelihood development included winter vegetable cultivation, coffee processing, and expansion to two new communities.	· Stable strawberry production in suitable areas. · Farmers generated consistent income from tourism-linked markets. · Expanded livelihood options beyond strawberries, increasing resilience during economic disruptions.
2018 – 2024	National and regional funding support became available.	Funding support enabled livelihood and skills development for disadvantaged groups: 1) Vocational skills development for out-of-school youth 2) Vocational skills development for ethnic labor groups in two communities.	· Improved vocational skills among youth and ethnic labor groups. · Enhanced employability and livelihood diversification.
2021 – 2024	Focus on community innovation and value-chain development linked to tourism.	Implementation of a Community Innovation Development Project to create livelihood and economic opportunities connected to tourism value chains in Bo Kluea–Santisuk areas. Capacity building focused on four areas: indigenous chicken farming, fish farming, agricultural product processing, and value addition.	· Farmers developed skills in livestock, aquaculture, processing, and value addition. · A total of 125 community members enhanced their livelihood capacities across Bo Kluea and Santisuk districts.

Timeline :
Livelihood Development

2007

Establishing a Baseline for Local Socio-economic Data

Findings from community baseline survey:

- Rice production was insufficient.
- Households could not produce enough food for themselves.
- Food expenses were high, requiring purchases of rice and other basic items.
- Education-related household expenses were a burden for many families.

2010

Supporting Production of Strawberry Cultivation in Ban Huay Khon Machor

- Began with 2 pilot farmers cultivating strawberries.
- Initial production yielded about 14,000 strawberry runner plants.
- Expanded to an additional 20 farmers, reaching production volume of 80,000–100,000 kg.
- Generated total farmer income of approximately 320,000–420,000 THB per year.

2015

Promoting Learning in Highland Vegetable Farming

Ban Ao Klang

- Organized learning cycles supporting 21 farming households.
- Groups cultivated cabbage, chayote, leafy greens, ginger, etc.
- Strengthened local farmer networks for growing and selling vegetables.
- Increased income per household to 5,000 THB per harvest cycle.
- Tested soil preparation, compost, and seedling propagation techniques suitable for highland areas.

2017

Expanding High-Altitude Vegetable Production

Ban Yod Doi Kham and Ban Na Pae

- Seven households from Ban Na Pae cultivated Japanese snow peas and leafy greens, generating income of 19,620 THB annually.
- Six households in Ban Yod Doi Kham cultivated Japanese snow peas, earning household income of approximately 18,225 THB per year.

2007 2008 2010 2011 2015 2017 2021 Present

2008–2009

Promoting the Cultivation of Alternative Crops

Building capacity to produce food and generate income

- Introduced crop cultivation for income and food security, focusing on selected vegetables. Supported 3 farmer models who demonstrated cultivation techniques for peer learning.
- Enabled 40 participating families to grow crops with an estimated annual value of 400,000 THB.
- Supported farmers to grow medicinal herbs; 3 example farms successfully produced herbs for household use and commercial sale.
- Facilitated expansion by training youth and women to cultivate home gardens for food and income, increasing household food security.
- Supported farmers with startup funds of 10,000 THB per family. Some families generated additional income of 10,000 THB per crop cycle and reduced spending on food by 2,000 THB per season.

2011

Expanding Strawberry Cultivation and Agro-tourism

Ban Huay Thon and Bo Kluea District

- A pilot farmer in Ban Huay Ton produced about 20,000 strawberry runner plants per year,followed by three more growers who also produced runners. Demonstrated grafting, propagation, and berry seedling nursery techniques.
- KMUTT supported community planting of 2,192 strawberry seedlings, which grew into a major local enterprise.
- 46 families participated in harvesting strawberries.
- Revenue grew exponentially through sales and value-added products. Income exceeded 200,000 THB annually and contributed significantly to local economic circulation and new livelihood opportunities.

2021

Community Innovation and Livelihood Development

Linking agriculture, economy, and tourism
Bo Kluea–Santisuk, Nan Province

- Established farmer producer groups to enhance agricultural innovation.
- Supported new commercial crops including tomatoes, chayote, ginger, passion fruit, and citrus fruits.
- Farm groups grew approximately 10 tons of produce annually, valued at 50,000 THB per crop.
- Livestock and aquaculture groups raised native pigs and local chickens, as well as hybrid species. Revenue ~400,000 THB per year.
- Adopted hybrid recirculating aquaculture systems (RAS poly-housing) to increase fish and livestock productivity in limited land areas.
- Enabled youth and farmers to raise fish fingerlings, generating income of ~10,000 THB per production batch.

2.1 Promotion of Strawberry Cultivation as an Alternative Livelihood in Bo Kluea District

2.1.1 Background and Rationale

KMUTT, in collaboration with local communities and partner organizations, has promoted strawberry cultivation as an alternative livelihood in Bo Kluea District since 2008 to the present.

The objective has been to create alternative income opportunities after the rice farming season, particularly for Lua ethnic farmers and other highland communities, whose main livelihood depends on upland rice cultivation.

The promotion consists of two producer groups, namely:

1. Strawberry runner (stolon) production for sale.
2. Fresh strawberry production for consumption and sale.

Strawberries were selected as the first alternative crop because:

1. Tourism in Nan Province and Bo Kluea District has expanded continuously.
2. Strawberries have high market value and strong demand from tourists.
3. Suitable production areas are located at elevations above 1,000 meters above sea level, which match Bo Kluea's ecological conditions.
4. KMUTT researchers possess long-term experience and professional networks in strawberry research and extension, including collaboration with Royal Project initiatives since the early 1990s.

2.1.2 Group 1: Strawberry Runner (Stolon) Production for Sale

2010 – Present

At the initial stage of the project, strawberry runners had to be sourced from outside the area, such as the Royal Project Foundation and runner producers in Chiang Mai Province. However, this approach faced significant constraints, including:

- Contamination by plant pathogens from external sources.
- Losses during long-distance transportation.
- Limited control over runner quality.

Consequently, toward the end of the 2007s, the project shifted to capacity building for local runner production, training Lua farmers and local residents to produce runners independently.

During the 2019–2020 production season, 12 Lua farmers in Ban Huai Buak, Bo Kluea Nuea Subdistrict, participated in runner production. KMUTT provided technical guidance covering:

- Production planning.
- Runner propagation techniques.
- Assessment of flower and plant readiness.
- Post-production handling and marketing management.

The average annual output was approximately 26,500 runners, sold at 4 THB per runner, generating 106,000 THB in total income.

The primary market was located within Nan Province, reducing transportation costs and strengthening local value chains.

2.1.3 Group 2: Fresh Strawberry Production

2008 – Present

KMUTT initiated fresh strawberry cultivation as an alternative livelihood to strengthen both food production capacity and cash income generation.

Initial Pilot Phase (2008)

The first trial was conducted in 2008 at Ban Pa Khab, using a 2-ngan demonstration plot, with three farmers responsible for plot management. Subsequently, cultivation expanded to several villages due to the rapid growth of tourism, with researchers and local academics acting as mentors.

Villages involved over time included: Ban Na Kok, Ban Pa Suk, Ban Phak Eak, Ban Bo Luang, Ban Sawa, Ban Sa Lae, and Ban Kor Kwang.

Expansion and Tourism Integration (2011)

In 2011, KMUTT established a fresh strawberry demonstration plot and supported Ban Bo Luang in producing strawberries both for commercial sale and landscape enhancement.

This initiative resulted in the creation of a "Strawberry Road," where strawberries were grown in pots and along roadsides to enhance the tourism atmosphere.

A total of 46 households participated, generating circulating economic value exceeding 200,000 THB.

Climatic Constraints and Area Consolidation (2016-2019)

Between 2012–2016, climate variability—particularly unstable cold periods—reduced the economic viability of fresh strawberry production in many areas of Bo Kluea. From 2017 onward, promotion of fresh strawberry cultivation was therefore limited to Ban Kor Kwang, Bo Kluea Tai Subdistrict, located at approximately 1,300 meters above sea level, where climatic conditions remained suitable.

Table 8. Development of Alternative Livelihoods by Period (2007–2024)

Year	Implementation Details	Remarks / Observations
2009	8 farmers (Ban Pa Khab, Ban Na Kok, Ban Phak Eak) planted 10,000 plants; yield 200 kg (avg. 20 g/plant); value 50,528 THB	Initial trial phase
2010	8 farmers planted 3,950 plants; yield 189 kg (avg. 45 g/plant); value >50,000 THB	Pest and disease problems (red mite, anthracnose)
2011	3 farmers planted 5,192 plants; yield 392 kg (avg. 76 g/plant); establishment of demonstration plot; "Strawberry Road" with 46 households, 2,192 potted plants, value >200,000 THB	Tourism-linked production
2012	No fresh fruit group; runner production by 5 farmers, 18,860 runners, value 60,000 THB	Shift to runner quality improvement
2013	Fresh fruit: 31 farmers, 10,374 plants, yield 852.8 kg, value 219,228 THB; potted strawberries 2,700 pots, value 137,000 THB	Peak expansion period
2014	Fresh fruit: 20 farmers, 8,500 plants, yield 796 kg, value 184,560 THB; potted strawberries 4,000 pots, value 195,000 THB	Strong tourism demand

Table 8. Development of Alternative Livelihoods by Period (2007–2024)

Year	Implementation Details	Remarks / Observations
2015	Fresh fruit: 25 farmers, 32,780 plants, yield 1,449 kg (avg. 44 g/plant	Climate instability begins
2016	Fresh fruit: 9 farmers, 13,000 plants, yield 384 kg, value 58,825 THB; runner production 29,000 runners, value 87,000 THB	Reduced participation
2017	Fresh fruit limited to Ban Kor Kwang: 5 farmers, 4,150 plants, yield 231 kg, value 69,300 THB	Suitable area consolidation
2018	Fresh fruit: 6 farmers, 6,000 plants, yield 912.8 kg, value 121,320 THB; runner income 106,000 THB	Technical skills improved
2019	Fresh fruit: 10 farmers, 5,024 plants, yield 940 kg, sold 290 kg (value 43,500 THB); 650 kg unsold due to COVID-19	External shock (tourism collapse)

2.1.4 Learning Outcomes and Knowledge Development

Despite fluctuations in production and income, the learning process resulted in significant capacity development among farmers:

- Improvement in technical skills related to plot preparation, fertilization, pruning, and disease management.
- Increased average yield per plant from 152 g/plant to 187 g/plant.
- Gradual transition from G1 to G2 runner varieties, and use of G3 varieties for fresh fruit.
- Enhanced understanding of production planning and cost management.

However, persistent challenges remained, including:

- Inconsistent fertilization and plant management.
- limited attention to pruning and flower thinning.
- Inability of farmers to independently manage markets.
- Reduced labor availability due to rice farming being the primary occupation.

2.1.5 Summary of Economic Outcomes

Overall, during the current implementation period:

- Runner production generated approximately 106,000 THB per season for 12 households, or about 8,800 THB per household.
- Fresh strawberry production generated 121,320 THB per season for 6 households, or approximately 20,200 THB per household.

2.2 Promotion of Cold-Climate Vegetable Cultivation as an Alternative Livelihood in Bo Kluea District, Nan Province

2.2.1 Background and Rationale

During the cold season from late 2014 to early 2015, KMUTT conducted pilot trials of cold-climate vegetables, particularly salad-type leafy vegetables such as red oak lettuce, green oak lettuce, green cos, butterhead, and other varieties.

The trials were implemented in demonstration plots integrated with strawberry cultivation, with 2 main purposes:

1. To test the feasibility of cultivating cold-climate vegetables in Bo Kluea District.
2. To improve the landscape of agricultural plots so that they could also function as tourism attractions within Bo Kluea District.

The demonstration plots were located near Ban Bo Luang, where vegetables cultivated during the trial period attracted strong interest from tourists, restaurant owners, and accommodation providers. The produce could be sold not only locally in Bo Kluea but also to restaurants in Mueang Nan District and Pua District.

Within a period of two months (February–March 2015), the trial generated income exceeding 25,000 THB.

2.2.2 Feasibility Assessment and Project Initiation

Results from the pilot trials indicated that salad-type vegetables are well suited to the cold climate of Bo Kluea District, where temperatures remain low throughout much of the year. Market demand was also found to be strong and stable.

Based on these findings, in mid-2015 KMUTT initiated a formal project to develop a learning process for cold-climate vegetable cultivation as an alternative occupation for highland farmers in Bo Kluea District, Nan Province.

At the initial stage, 11 households from 3 villages participated in the project:

- Ban Bo Luang – 2 households
- Ban Nong Nan – 3 households
- Ban Kor Kwang – 6 households

Farmers from Ban Bo Luang and Ban Nong Nan participated primarily as learners using shared demonstration plots. However, due to land limitations and the need to reserve plot areas for strawberry trials, these two villages participated for only two production cycles.

In contrast, Ban Kor Kwang, which utilized communal land within the village, continued intensive learning and experimentation. Farmers in this village had no prior experience with salad-type vegetables and required approximately three years of continuous learning before gaining sufficient skills in both production and marketing. Over time, membership increased, and farmers began applying the acquired knowledge to other vegetable crops.

2.2.3 Site Suitability and Selection of Ban Kor Kwang

Ban Kor Kwang was identified as highly suitable for cold-climate vegetable production due to:

- Its elevation of approximately 1,300 meters above sea level.
- Year-round cool temperatures.
- Availability of communal land for learning-by-doing activities.
- The presence of farmers interested in experimentation and collective learning.

These factors made Ban Kor Kwang the core learning village of the project.

2.2.4 Project Objectives

The project aimed to:

- Promote an appropriate agricultural learning process aligned with local ecological and social conditions.
- Enable farmers in Bo Kluea District to acquire practical skills in producing market-demanded, high-value cold-climate vegetables;
- Strengthen farmers' capacity to manage production, planning, and marketing independently.
- Create supplementary income opportunities compatible with existing livelihoods.

2.2.5 Implementation Approach and Learning Methodology

The project applied Participatory Action Research (PAR), emphasizing farmers as active learners and co-implementers.

Learning Process

The learning process consisted of:

- Joint analysis and planning with farmers.
- Hands-on experimentation in real production settings.
- Collective reflection and synthesis of lessons learned.

Learning Methods

Methods used included:

- Practical knowledge transfer with emphasis on learning-by-doing.
- Record keeping and cost accounting.
- Group meetings for knowledge exchange.
- Study visits to relevant learning sites.

2.2.6 Year 1 Implementation (2015)

In the first year, KMUTT provided initial production inputs, including:

- Vegetable seedlings
- Chemical fertilizers
- Small greenhouse structures

Researchers worked closely with farmers from soil preparation through planting, irrigation, fertilization, pest and disease control, and harvesting. Farmers first practiced together in shared plots before gradually establishing their own plots.

KMUTT also supported production planning, ensuring weekly harvest continuity and alignment with market demand.

For marketing, KMUTT purchased produce from farmers, handled packaging, and distributed vegetables to customers such as restaurants, hotels, resorts, local shops, and tourists in Bo Kluea, Pua, and Mueang Nan Districts.

2.2.7 Year 2–3 Implementation and Expansion

Year 2 (2016)

As farmers gained experience and confidence, they began planning production and marketing more independently, with KMUTT researchers acting as close mentors for nearly one year.

Year 3 (2017)

Farmers assumed full responsibility for:

- Investment
- Production planning
- Marketing management

In B.E. 2560, the project expanded to two additional villages in Bo Kluea Tai Subdistrict:

- Ban Nam Phae
- Ban Yot Doi Watthana.

A total of 50 households from 3 villages participated:

- Ban Kor Kwang – 22 households
- Ban Nam Phae – 15 households
- Ban Yot Doi Watthana – 13 households

Table 9. Project Performance Data by Year and Village (2015-2019)

Period	Ban Kor Kwang	Ban Nam Phae	Ban Yot Doi Watthana
2015	Farmers: 6 households Crop group: salad vegetables, potted ornamentals Model: KMUTT supported some production inputs (seedlings, fertilizer, small greenhouse) and assisted with production and marketing planning Income: 88,882 THB	-	-
2016	Farmers: 19 households Crop group: salad vegetables and potted ornamentals Model: KMUTT supported seedlings and greenhouse plastic; farmers began investing and planning production and marketing with KMUTT as mentor Income: 177,285 THB	-	-
2017	Farmers: 15 households Crop group: salad vegetables, potted ornamentals, and organic vegetables Model: farmers fully implemented independently Income: 246,249 THB	Farmers: 8 households Crop group: high-value vegetables (pumpkin shoots, Japanese sweet potato) and general vegetables Model: partial input support and marketing guidance Income: 23,067 THB	Farmers: 7 households Crop group: high-value vegetables (pumpkin shoots, Japanese sweet potato) Model: input support and planning assistance Income: 18,225 THB
2018	Farmers: 120 households Crop group: salad vegetables, potted ornamentals, and general vegetables Model: farmers fully independent Income: 548,410 THB (salad 250,000; general vegetables 120,000; ornamentals 67,330)	Farmers: 15 households Crop group: pumpkin shoots, chayote, general vegetables Income: 54,170 THB	Farmers: 13 households Crop group: group: pumpkin, chayote Income: 23,440 THB
2019	Farmers: 22 households Crop group: salad vegetables, potted ornamentals, general vegetables Income: 497,500 THB	Farmers: 15 households Crop group: chayote Income: 28,675 THB	Farmers: 13 households Crop group: local pumpkin Income: 20,550 THB

2.2.8 Summary and Lessons Learned

The project demonstrates that systematic learning processes, combined with appropriate technologies and market-oriented planning, enable highland farmers to successfully develop alternative livelihoods.

Ban Kor Kwang emerged as a model village due to:

- Srong core farmer leadership.
- Openness to learning and experimentation.
- Ability to transfer knowledge among members.
- Effective use of limited land (approximately 3–4 rai) to generate year-round income.

Farmers reduced production costs by producing compost and liquid fertilizers from locally available materials, managed marketing independently, and expanded into new products such as potted ornamentals and organic vegetables.

Between B.E. 2563–2567, the Ban Kor Kwang group transitioned from safe-production practices to organic vegetable production, registered as a community enterprise, joined the provincial organic network, and obtained Participatory Guarantee System (PGS) certification.

In contrast, Ban Nam Phae and Ban Yot Doi Watthana selected crops already familiar to the community, such as chayote and local pumpkin. Although income per unit was lower, farmers valued the ability to sell surplus produce beyond household consumption, marking a significant livelihood transition.

Timeline :
of Learning and Youth Development Activities

2007 — 2009 — 2011

2007–2008

Establishing Youth Groups for the Development of Thinking and Learning Capacities

- A total of 37 members participated, consisting of youth from Khon Kok Community, Ban Na Saeng, and Khab Mu Kiak.
- Engaged in creative and community-benefit activities such as forest planting, seedling cultivation, and caring for reforestation plots.
- Learning activities included training in creative thinking, systems thinking, and collaborative community problem solving.

Youth developed and prototyped simple innovations and presented their outcomes, such as mushroom cultivation, conservation of aquatic species in forest streams, home vegetable gardening, and producing organic fertilizer.

2009–2017

Establishing Field Coordination Centers

Youth platforms for empowerment and development

- A total of 81 members from four villages participated — Ban Nakok, Ban Phak Pheuak, Ban Nakhwang, and Ban Bo Luang. Created a community learning space equipped with books, computers, internet access, learning media, and games, to enable children to access resources, collaborate, participate in community service activities, and engage in enrichment learning programs.

2011–2019

"Little Tour Guides Program"

Community learning enabling children to tell local stories, host visitors, and become youth tour guides — creating income, building local pride, and developing a sense of belonging

- 25 members participated from Ban Bo Luang.
- Studied information about local history, identity, and resources, and produced a community brochure promoting Ban Bo Luang.
- Received training to become youth tour guides and to serve as facilitators for community-based learning activities.
- Applied classroom learning through real-world practice by guiding visitors through various community sites— rice fields, villages, schools, and other learning areas.
- Strengthened school–community relationships with children serving as representatives to welcome visitors.
- Generated more than 100,000 baht in annual income.
- Children gained first-hand experience in youth-led tourism operations.

2014 — 2019 — Present

2014–2021

Activities: “Local Learning and Young Entrepreneurs”

Hands-on vocational and entrepreneurial learning through projects integrated with science.

Showcased through student-run shops and tourism exhibitions

- A total of 182 children and youth from 12 schools and 24 villages participated.
- Children and youth received training in business plan writing with teachers serving as mentors. They presented their business plans to request funding support of 3,000 baht from a review committee consisting of representatives from local government agencies (e.g., public health officers, sub-district administrative organizations, and hospitality and culinary sectors).

- Products generated income for children and youth, such as sesame rice snacks, soap, and fruit beverages.
- Annual accumulated revenue circulated in student business spaces amounted to over 300,000 baht per year.
- Student artwork was exhibited and sold at the “Kad La-on” marketplace.

2019

Curriculum-based Youth Development Program “Little Tour Guides” and School-based Tourism Development

Timeline :

Community Learning, Youth Development and Social Innovation

1999 2000 2006

1999

Initiation of Learning Support in Remote and Highland Areas

Initial learning support activities were implemented in remote and highland areas to strengthen educational opportunities for children and youth, particularly in schools facing shortages of teachers and learning resources.

- Support for learning activities in remote schools
- Collaboration with local schools to address teacher shortages
- Enhancement of basic learning opportunities in isolated communities

2000 - 2006

Capacity Building for Teachers and School Management

Learning development focused on strengthening teacher capacity and improving school management systems in remote areas.

- Support for science teachers who did not graduate in science fields
- Development of learning management systems in remote schools
- Capacity building for school administrators and teaching staff

2007

Development of Learning Networks and Curriculum Innovation

Learning networks were established to support curriculum development and collaborative learning among schools in remote and highland areas.

- Development of cluster-based curricula among groups of schools
- Strengthening collaboration among teachers across schools
- Promotion of shared learning resources and teaching practices

2010

Strengthening Education Networks in Remote Areas

Educational networks were strengthened to support learning continuity and transitions toward vocational education for children and youth in remote areas.

2008 — 2009 — 2010 — 2020 — Present

2008

Linking Education with Vocational Pathways

Educational activities were linked with vocational learning pathways to prepare students for further education and future occupations.

- Promotion of vocational learning activities at secondary school level
- Collaboration with vocational institutions to support skill development
- Integration of academic learning with practical skill training

2009

Learning Processes Linked to Livelihood Development

Learning activities were designed to connect education with livelihood development and occupational skills relevant to community contexts.

- Project-based learning linked to local livelihoods
- Skill development activities for children and youth
- Learning through real-life practice and community engagement

2020–Present

Inclusive Learning and Literacy Development in Remote Schools

Learning support activities were expanded to address educational inequality and literacy gaps among children and youth in remote areas.

- Promotion of Thai language skills (speaking, reading, writing)
- Learning support for vulnerable children and youth
- Collaboration with royal initiative schools and partner organizations

Chapter 3: Quality of Life Development of the Mlabri Ethnic Group

3.1 Background of the Mlabri Ethnic Group

The Mlabri are an ethnic group traditionally known as hunters and gatherers. Historically, they lived in forested areas along the northern borders of Thailand and the Xayaburi region of the Lao People's Democratic Republic. According to oral histories, the Mlabri relied on seasonal movement along forest and river corridors to access food sources, relocating when environmental conditions changed or when potential threats arose.

In the past, the Mlabri lived entirely from forest resources. They harvested only what was sufficient for short-term consumption—typically one day or one period—without stockpiling food. As a result, they had little need for food preservation or permanent dwellings. Their lifestyle was characterized by frequent mobility, small family units, and loose kinship-based groupings formed primarily for safety and mutual support. These characteristics limited their ability to practice settled agriculture, which requires sustained labor, land tenure, and long-term planning.

Historical records from Thai administrative reports during the reigns of King Rama VII and VIII document the presence of Mlabri groups in northern Thailand more than a century ago, confirming the long-standing continuity of this way of life.

3.2 Transition Toward Permanent Settlement in Nan Province

The first significant transition of the Mlabri toward permanent settlement in Thailand occurred during 1989–1990, when groups began to settle in the area of Phu Fa, Bo Kluea District, Nan Province. This marked the beginning of a gradual shift from nomadic subsistence to semi-settled living.

In 1987, prior to large-scale settlement, nine Mlabri youths from Ban Huai Hom (Phrae Province) participated in vocational training organized by the Nan Provincial Office of Skill Development. These youths were under the care of Mr. Friedhard Lipsius, a German national with long-standing involvement in the New Tribes Mission (NTM), who had maintained close relationships with the Mlabri for over 20 years. His role was widely regarded as that of a senior guardian figure within the Mlabri community.

Subsequently, these youths were brought to participate in vocational training activities at the Phu Fa Development Center in Bo Kluea District. In 1990, additional Mlabri families—many of whom were relatives of the original youth group—migrated to join them, increasing the population to approximately 48 people.

3.3 Establishment of the Phu Fa Cultural Center

Following a royal visit by Her Royal Highness Princess Maha Chakri Sirindhorn, a royal directive was issued to establish the Phu Fa Cultural Center in 1990. The Center was designated as a space for:

- Education and learning
- Academic research,
- Conservation of traditional ways of life, and
- livelihood development for ethnic groups, including the Mlabri, residing in the Phu Fa area.

Several government agencies provided support for the establishment of permanent living conditions, including assistance with housing, the creation of learning facilities, non-formal education (NFE) centers, and training related to tourism. Nature study trails and interpretive signage were also developed to promote environmental learning.

The land used by the Phu Fa Cultural Center lies within the Phu Fa Development Project area and was allocated by the Royal Forest Department. Approximately 800 rai of land was transferred from nearby villages, of which 12 rai were designated for livelihood activities and 7 rai for residential use by the Mlabri.

The surrounding forest includes mixed deciduous forest, evergreen forest, dry evergreen forest, and grassland ecosystems, providing food plants and wildlife that could be harvested under village regulations.

3.4 Early Livelihood Adaptation and Challenges

During the initial settlement period (1987-1989), the Mlabri relied primarily on income and subsistence support from the Phu Fa Development Center and the Royal Forest Department. They began experimenting with vegetable cultivation for household consumption, compost production, and maintenance of the Center's facilities.

However, most of the Mlabri youths involved at this stage had no prior experience in agriculture or handicrafts. Attempts to introduce handicraft production—led by external trainers—resulted in misunderstandings regarding compensation and benefit-sharing, which caused internal conflicts. As a result, approximately 40 Mlabri individuals relocated from Ban Huai Hom to the Phu Fa Development Center area.

3.5 Financial Support and Community Organization

Between 1991–1993, Mlabri families living at the Phu Fa Cultural Center received financial assistance from a royal initiative fund, amounting to 2,080 THB per household per month for 13 households. In return, one representative from each household was required to work at the Center for 13 days per month, performing tasks such as tree planting and site maintenance. During their remaining time, families were permitted to collect forest products for subsistence.

Those who did not work at the Center could earn income through employment with the Phrae Forest Protection Office (Unit 14), which operates near the Cultural Center. Daily wages were approximately 200 THB per day, primarily for nursery work and reforestation activities.

During this period, the Mlabri began forming a community committee, led by Ms. Aranya Chawaprai, with household heads serving as committee members and four elders acting as advisors. The idea of community organization was introduced by academic and forestry professionals working in Nan Province.

3.6 Attempts at Agricultural Resettlement and Their Limitations

Between 1994–1995, the Mlabri population at Phu Fa increased to 15 households (52 people). At the same time, land under the Quality of Life Development for Forest Restoration Project, supported by the Royal Forest Department, became available at Ban Huai Lue, Sa Nian Subdistrict, Mueang Nan District.

The Mlabri attempted to resettle in Ban Huai Lue, cultivating rice and practicing agriculture. However, this attempt was unsuccessful due to cultural differences, family separation, increased alcohol consumption among men, and declining well-being. Many community members reported dissatisfaction and stress, leading them to return to the Phu Fa Cultural Center and begin constructing more permanent housing there.

3.7 Transition Toward Community Self-Reliance (1995-1999)

From 1995 onward, KMUTT and partner organizations supported a transition toward community self-reliance. This began with participatory data collection, enabling the Mlabri to analyze their own household income and expenditures. The analysis revealed heavy dependence on external support, particularly for food.

In response, the community initiated experiments in agriculture, including rice cultivation, vegetable growing, livestock raising, and small-scale fishing. These activities gradually built skills and enabled the Mlabri to achieve partial self-sufficiency.

3.8 Infrastructure Development and Permanent Settlement (1999-2004)

In 1999, land at Huai Khwaen (approximately 124 rai) was purchased to support permanent settlement. Long-term loans were arranged to facilitate land acquisition. Funding support from Mubadala (later renamed Valuera) enabled infrastructure development, including water systems and solar electricity.

The community began cultivating approximately 10 rai of land for rice and fruit trees. A phased housing construction plan was implemented, starting in 2002. Initially, houses were built using recycled materials from Phu Fa to reduce costs. Later, community consensus led to the construction of stronger, disaster-resistant houses.

By 2004–2006, most community members continued to travel between Huai Khwaen and the Phu Fa Cultural Center, contributing labor collectively during house construction.

3.9 Consolidation and External Support (2004–2005)

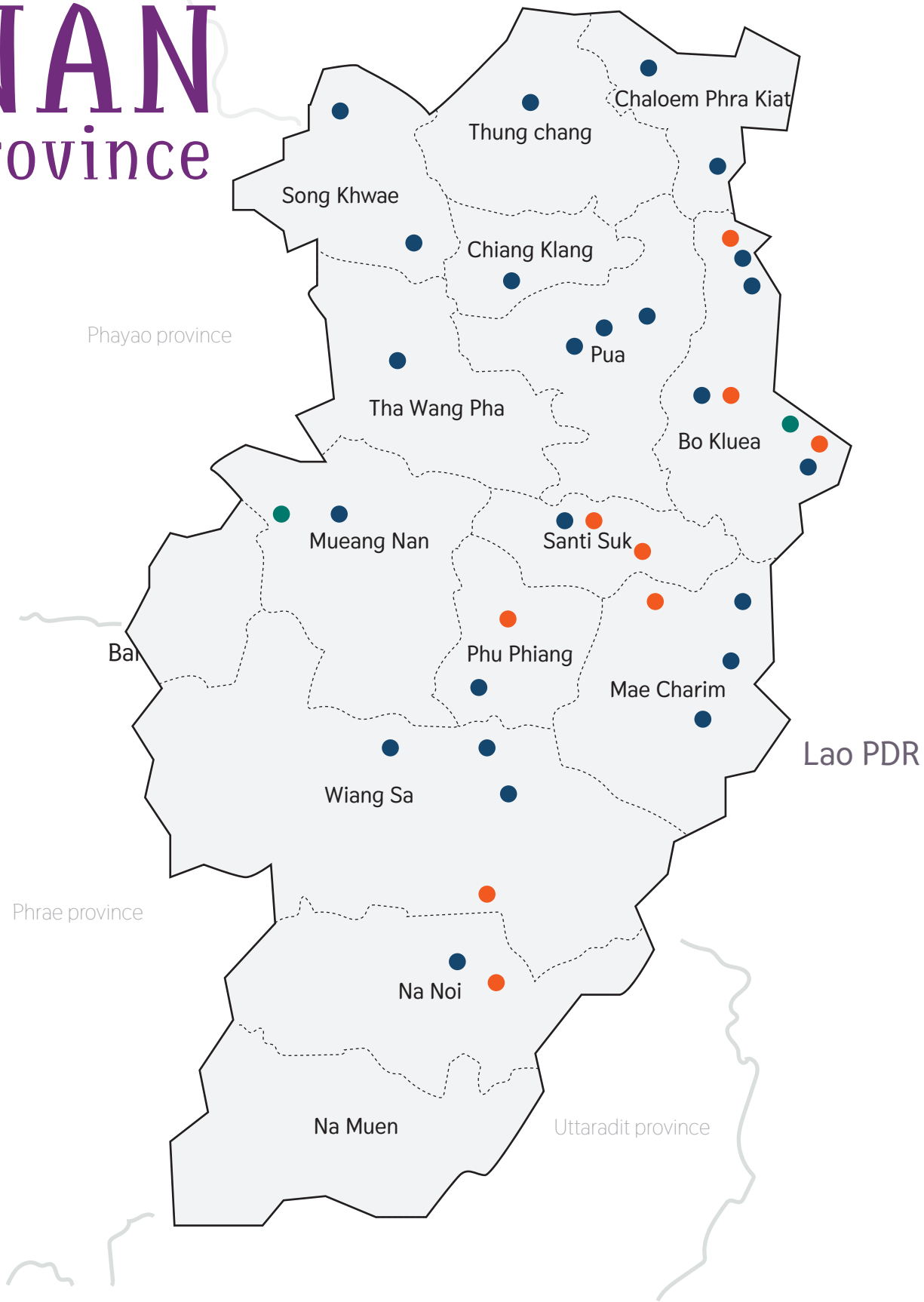
In mid-2004, the Mlabri participated in handicraft exhibitions in Chiang Mai Province, where they established connections with the Community Organization Development Institute (CODI) and private foundations. Financial support enabled the construction of 18 houses, with approximately 1.5 million THB allocated for building materials and equipment.

By early 2005, all 18 Mlabri households relocated permanently to Huai Khwaen. Seven individuals were employed at the Phu Fa Development Center, while others continued working with the Forest Protection Office. The Phu Fa Cultural Center remained an important site for welcoming visitors, hosting networks, and showcasing Mlabri handicrafts. Community members also rotated responsibilities for cleaning and site management on a weekly basis.

Concluding Remarks

The experience of the Mlabri in Nan Province illustrates the complexity of transitioning from a nomadic hunter-gatherer lifestyle to settled community living. Sustainable development required long-term institutional support, culturally sensitive approaches, participatory learning, and gradual livelihood diversification. The Phu Fa Cultural Center played a critical role as both a transitional space and a long-term hub for learning, research, and community development.

NAN Province



- Strengthening Food Security and Alternative Livelihoods, Development of Alternative Livelihoods
- Enhancing Systemic Science and Technology Education in Remote Regions
- Quality of Life Development of the Mlabri Ethnic Group

Rice Production in Doi Phu Fa

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