

Sustainable Development in the Thai Highlands: Some Experiences from the Thai-Australian Highland Agricultural Project

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***Summary:** Various development approaches in the Thai and other highlands evoke lessons from diverse experiences. In this paper, such experiences are overviewed, with the specific case of the Thai-Australian Highland Development Project reviewed as an example. In particular, the need for sound understanding of local circumstances and informed research are confirmed as critical elements for sustainable highland development. Eight general lessons from experiences of the past 40 years are presented.*

An overview statement of the world's highland regions usually reads something like the following:

Highlands or mountains have been recognized as important global regions in Chapter 13 on Agenda 21 at the 1992 United Nations' Earth Summit and by 2002 being designated the International Year of Mountains. An estimated 12 percent of the world's population – >700 million – resides in these regions and another 40 percent rely on mountain watersheds. Commonalities of highlands include:

- *Inaccessibility*
- *Environmental Fragility*
- *Political Marginality*
- *Cultural and Environmental Diversity.*¹

We all know that highlands are vulnerable ecosystems, that they are home to large numbers of people, that they service water and biodiversity while supplying food and landscapes. As nation-building projects around the world now move to fully integrate these once marginalized regions, there is a need to consider our collective experience with the hill peoples and their lifestyles. National perspectives commonly define hill populations as poor, exploitive of natural resources and alienated from education and health services. Past hill-dwellers may well have valued these aspects of their lifestyles and viewed themselves as enjoying freedom from excessive demands of civilization. But today's communication technologies have probably ended that era. This does not mean that past 'civilizing' programs for highland development – including agricultural projects – are now vindicated and can be widely implemented. Our science, including the social sciences, suggests that it is an opportune time to reflect and consolidate knowledge for future development advice. This is the aim of us gathering here in this conference – to consolidate past and current experiences, and to channel that knowledge into an innovative new graduate degree program of Chiang Mai University.

Today, any contemplated development must not only be 'sustainable', it must also meet the objectives of 'sustainable intensification'. It is instructive for us to consider what we mean by these ideals. First, they are ideals, which are by definition not practical – they are aspirations. Second, we must admit that we know far too little to be able label one technology sustainable and another not. Third, the practical aspiration behooves us to set some parameters on time and consequences. Then we

come to next word ‘development’, which is to be accomplished through ‘intensification’. In agriculture this usually means ‘making land more profitable or productive’. Another definition that might appeal more broadly is ‘improving by step-wise refinements’. Both of these quoted definitions are from dictionaries, and in my view are not incompatible. Of course the incorporation of ‘intensification’ with sustainability and development may sound harsh to purists, but please attend a little further and we will find that we are all seeking the same outcome. This results from ‘sustainable intensification’ for a given population being a means of releasing more land to environmental services.

This my first of some axiomatic points that I make through this paper – **‘sustainable development’ of the highlands simply means guiding enhanced long-term use in a manner that causes minimal negative impact.**

And in this paper, the ‘developments’ that concern us are agricultural. If we take this perhaps naïve approach, we find that the development activities in highlands around the world have much to offer to, and much to learn from, the experiences of the Thai highlands and their contiguous areas in Lao, Myanmar, Vietnam and Yunnan.

For example, in the European Alps subsidized agriculture may be seen as contributing to cultural heritage even though its productivity may be constrained by topography. In that situation, its ‘environment-friendly ... management depend(s) primarily on the farmer’s professionalism and/or an intensity of operation adapted to the location’.² The Thai highlands have provided direct experience of adapted low-intensity shifting cultivation succumbing to increased intensity with population pressure and some cropping techniques, yet it may not yet have addressed farming professionalism to the same extent as Europe.

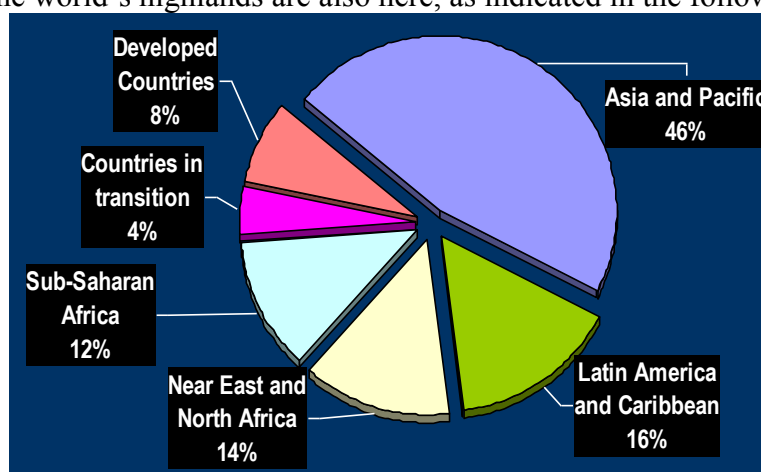
There is a mutual basis for learning here. Perhaps it is more constructive than proposing blanket recommendations for highlands, such as locking them up as mountain forests – which at present cover some nine million km² across the world. Mountain forests provide fresh water for domestic, hydropower, industrial and transportation purposes, and absorb some of the impact of lowland CO₂ emissions. This need not be argued, but is not sufficient reason for confrontations between environmental and cultural heritage idealists – rather a multifunctional approach that involves stakeholders and objectively examines alternative approaches is likely to provide something closer to ‘sustainable development’.

These two ingredients of stakeholder inputs and research formed the basis of the Thai Australia Highland Agricultural Project, about which I will speak in more detail later. In many ways that project was ahead of its time – for it was based on conducting and publishing both social and technical research, and it matched well-supervised enthusiastic young scientists with generous budgets. It differed from many of its 1970s contemporaries and 1980 successors in generating knowledge rather than abiding within a log-framed plan of development conceived during a ‘project design’ phase. I mention this since in many ways it symbolizes the approach to be taken now by the responsible Faculty of Agriculture here in creating a graduate degree for future highland practitioners. This is the opposite of what has been criticized as viewing ‘passive beneficiaries of trickle-down development or technology transfer’;³ it neither a romantic ‘bottom-up’ process nor even the nirvana of perfect knowledge of all

social and environmental variables across the vast highland and lowland regions of a huge catchment. It is simply the imparting of world knowledge and means of building on that knowledge before promoting imported, politicized or kneejerk solutions to specific issues. Well has it been said that ‘educated persons knows what they don’t know’. This is my second point – **that development must be informed by knowledge generated by research and experience.**

Both research and experience teach us that, in general, forests are one of the best land uses of the highlands – if there is no other economic pressure on the area. But where, highland residents have low incomes as a result of inadequate infrastructure, market access and land tenure, low-risk food production becomes an imperative that compromises forest protection. Simply legislating to protect forests has little effect in such circumstances. That is why – from the 1970s – it was advocated that forestry must form part of the research base for highland agricultural understanding. This led to such social experiments as payment of hill dwellers to manage forests in recognition of the slow growth rates of trees and the environmental and economic compatibility of grazing ruminants and other forms of agroforestry. The alternative, witnessed even more in Lao and Myanmar is relatively uncontrolled logging and displacement of residents, which has resulted from poor application of knowledge and poor governance. These are the same conclusions being arrived at today⁴ and which arise from the many conferences on highland and mountain development.⁵ But we are fortunate to now have active forest-related research from the CGIAR centres of the Centre for International Forestry Research (CIFOR),⁶ the World Agroforestry Centre (ICRAF),⁷ both of which put research and knowledge before development.

Before moving to discuss the Thai highlands specifically, it is instructive to remind ourselves that not only does most of the world live in this Asian region but that the majority of the world’s highlands are also here, as indicated in the following figure.



It is for these reasons that the International Centre for Integrated Mountain Development (ICIMOD) is located in Asia. ICIMOD is an intergovernmental centre serving eight Himalayan-influenced countries extending in the east to include Myanmar. ICIMOD works to ‘develop an economically and environmentally sound mountain ecosystem to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream now, and for the future’ – the same general aims as others. Included in its knowledge base is the Himalayan University Consortium, which includes the regional institutions of:

Bangladesh University of Engineering and Technology; CSK Himachal Pradesh Agricultural University; HNB Garhwal University; Kabul University; Karakoram International University; Kathmandu University; Kunming Institute of Botany; Lanzhou University; NWFP Agricultural University; Royal University of Bhutan; Tata Institute of Social Sciences; Tribhuvan University; University of Forestry, Yezin; Wildlife Institute of India, and Xinjiang Institute of Ecology and Geography.

ICIMOD's bailiwick is limited to the Hindu-Kush-Himalayan region and hence excludes Thailand. Nevertheless, its work is of relevance to Thailand not the least because these highland regions are contiguous. It offers experience and expertise, albeit influenced by donors as major stakeholders on which the Centre's existence depends. Thus it currently sees itself as interdisciplinary across such fields as 'gender and gender mainstreaming, governance, poverty alleviation, human resource development and capacity building, partnership and intervention, scaling up, and monitoring and evaluation, as well as being integrated within the knowledge management framework'; among its other objectives is 'increased international cooperation'.

Such are two examples of many other similar interested highland groups around the world, which leads to my third point – **there are diverse sources of relevant knowledge and experience around the globe.**

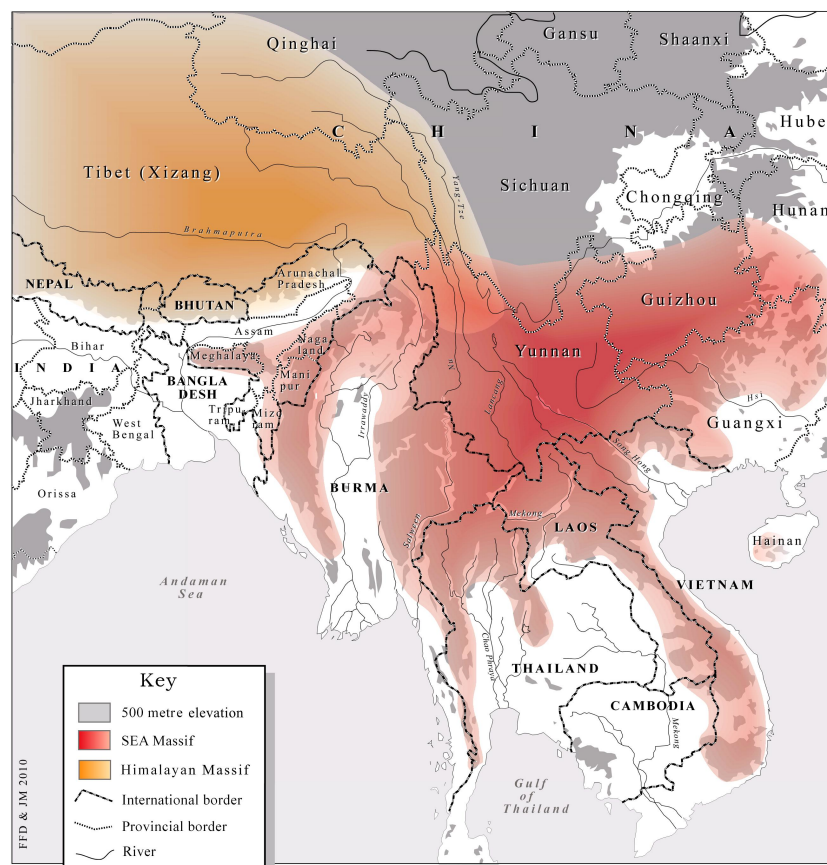
Moving closer to Thailand, I would like to briefly discuss evaluations of highland projects that have been conducted within the defined parameters of funding agencies. As one analysis from Yunnan¹⁰ – the Sustainable Highland Agriculture in South-East Asia Project (SHASEA) – notes, 'there is a general tendency to consider the completion of project activities as the full achievement of project objectives'. As this can ignore target beneficiaries, adoption-rate has been added to the evaluation task, yet adoption is dependent on other factors beyond mere technical superiority and includes the variables inherent in foreign project management. Add to this the complexity of multiple higher-level objectives such as sustainability, equity and institutionalization and it is clear that we must remain alertly discriminating when we read evaluation reports. With this discerning approach the conclusions of an evaluation of the SHASEA Project provides an example of what we might and might not know from experience. That evaluation claimed success in scientific and technical objectives of short-term improvements in crop productivity and reductions in soil and water losses but concluded that adoption would be higher 'if participatory approaches had been used from the outset' and there had 'been more involvement with regional policy-makers and extension officials throughout the program'. Perhaps. But I wonder how that could have been known from the project!

The study goes on to suggest 'good practice(s) for planning/designing', which include (I paraphrase): participatory research; stakeholders engagement; involving local research and development networks; participatory project planning; realistic objectives; ensuring continuity post-project; baseline surveys for later evaluation comparisons. In addition, it suggested that technologies should be chosen that have shown 'rapid returns and longer-term benefits' without demanding more labor or costs. In an ideal world where one fully controls all variables, this might work – but of course no such world exists, and this evaluation approach is locked into the very assumption that immutable project plans can somehow be correct. This study is no

better or worse than most, in fact it is a worthy attempt to learn within the constraints of a development mindset. But having said that, my overall critique leads to the fourth point – **that plans cannot be practical unless they include flexibility to change during implementation.**

Now let me return to Thai highlands specifically.

The Thai highlands are part of the contiguous areas above 300m altitude across Bangladesh, Cambodia, China, India, Lao, Myanmar, Thailand and Vietnam – the Southeast Asian Massif¹¹ as in the map¹² – which supports >100 million persons. This perspective brings us to a sociological more than a geographical issue since the Massif definition, like that of Zomia,¹³ was created from that perspective. Despite this social definition the area was never ruled as a single entity and in political terms has been used primarily as buffer space between major powers. For this reason the peoples of the region have sometimes been studied as isolated tribes and ascribed specific cultural traits and original myths that later prove to be shared and interchangeable with those of other highland groups and related to lowland groups. A recent thesis is that these and other anomalies are explicable if hill dwellers are understood as self-disciplined refugees from burdens of the civilized lowlands.¹⁴



Within Thailand, the highlands are north-south steep ranges mostly between 500 and 2,000m in altitude separated by the Nan, Ping, Salween, Wang and Yom rivers – as shown on the map.¹⁵ Distinct wet and dry seasons and cooler temperatures than the Thai lowlands produced montane rain forests, which have been largely replaced by secondary forests, forest plantations, *Imperata* grasslands and agriculture. Agriculture suited to the lifestyle of highland residents was based on shifting cultivation of food

crops, or opium and feed crops above 1,000m or so. Opium replacement objectives led to a series of aid-funded interventions, one of which was the project TAHAP to be discussed herein.



Sustainable Highland Development

The concepts of sustainability introduced earlier are debated long, piously and mostly to little benefit beyond aspiration, and occasionally self-discovery. My own contributions include ‘Sustainability: Elusive or Illusory’,¹⁶ and ‘Religion and Agriculture: Sustainability in Christianity and Buddhism’.¹⁷ But the philosophical conclusions of these – particularly the latter book – are better left aside here, where we need to ask in the language of ‘socioeconomic development’ what are we seeking to sustain. For the highlands, a confusion the literature could lead a reviewer to conclude several options, such as:

- sustainable opium production
- sustainable cultures and traditions
- sustainable watersheds
- sustainable political control

The term ‘development’ offers some clarification, since it includes economic and political overtures that orient sustainable development to national ends in which international influence is evident.

In discussing the Australian or any other project conducted 30-40 years ago, we do well to recall that ‘sustainability’ was not yet the fashion of international development, and that ‘development’ had a narrower and perhaps more elevated emphasis on helping people through technology than it does today. It also behooves us to question some romantic views of the highlands and the compromised lifestyles of their marginalized inhabitants. Such a romantic bias may be discerned in the following description written only ten years ago in 2004:¹⁸

Thirty years ago, no pickup trucks, no projects, no signs – and little national government presence at the village level. Opium was grown “from horizon to horizon”. People hunted, cleared land when they

needed it to plant and protected their crops from wildlife. People, households, and villages moved – a few miles, or across what are now marked borders. Caravans of long distance traders came to villages to buy opium. Today, people remember it as a time of wealth and freedom.

This description is mostly true, but not quite. By the early 1980s there were already roads to a few major highland sites – albeit roads subject to landslides and perilous in all weathers – and these were the roads used for projects of the UN, Australia, missionaries and others to access villages. The region was crisscrossed with steep walking trails and donkey/mule tracks. Caravans of traders were routine, as they were in the uplands and newly settled lowlands of Thailand, but the main difference in the highlands was that cross-border trade in opium, guns and jade also required equine caravans that were well-guarded by weapons far more effective than those used for casual hunting by highland dwellers. Opium was grown, but only at the higher altitudes (>c.1,000m), and was planted in association with corn in the small shifting cultivated plots that necessarily left the vast majority of the horizon dominated by, increasingly secondary, forest. To see opium “*from horizon to horizon*” one would have to have stood inside the elevated limestone plateau ringed by Doi Chang Dao, for elsewhere in the highlands, fields were mainly small and scattered.

Added to this correction of modern nostalgic projections would be a description of the agricultural life of the highland dwellers. This formed the subject of many anthropological and geographical research projects associated with the now-defunct Tribal Research Centre¹⁹ – the vestigial library of which has been rescued by the prescient Faculty of Agriculture here. Those studies relate the integrated role of livestock – cattle for wealth accumulation, trade, ritual sacrifice in times of need and as pack animals,²⁰ pigs as important sources of fat in the absence of other oils for cooking, light and lubrication,²¹ chickens as common sources of essential animal protein and small ritual sacrifices. The trade of opium for rice, seasonings and other food is likewise a part of an overall description – a factor surprisingly rediscovered in later crop-replacement project evaluations that had neglected the comprehensive literature of the Tribal Research Centre and earlier projects. The expressions of freedom mentioned in the above quotation may well have been the lingering memory of having rejected lowland civilization.²² But at the very same time, UN and other projects’ new crops included coffee, which was already revolutionizing highland agribusiness.²³

Notwithstanding criticisms of such romanticism, the thesis proposed by the viewpoint²⁴ is a valuable lens through which to view highland development – essentially as a means of increasing government control, which linked development with such measures as the quasi-military Border Control Police. The 1980s was also a period of paranoia about communists, and the uncontrolled highland border was a logical site for suspicion to settle. And this followed directly from extant policies to integrate rural communities into the nation.²⁵ In the highlands such actions coalesced with foreign aid objectives linked to rising drug problems in the West, and so political development was married to opium replacement in aid projects. Of course, introducing replacement crops and livestock enterprises to commercially substitute for opium was naïve or perhaps disingenuous – but it did widen options for livelihoods and development, and improved nutritional standards. So this is my sixth point – **the corporate memory of research and development can be unproductively short in**

aid environments.

Forty years ago, the Thai National Economic Development Plan 1972-76 adopted a land capability approach to designate zones in which administration of diverse government agencies could be coordinated under a lead agency. For the highlands this agency was the Department of Public Welfare (DPW) within the Ministry of Interior working through DPW's Tribal Research Centre. Various studies and the Royal Projects supported the approach, and key foreign-assisted projects of the 1970s included; the Integrated Forest and Land Use Project (FAO), UNPDAC Crop Replacement Project (UN), and the Thai-Australia Highland Agricultural Project (TAHAP).

Thai-Australia Highland Agricultural Project

In this section, TAHAP is introduced as a short case study to assist further understanding of highland development. The Australian-assisted project followed on from pasture work conducted from 1972 under the auspices of the Highland Agronomy Project, which was based on Australian tropical experience in introducing pasture legumes – notably *Desmodium intortum* – to the *Imperata cylindrica* grasslands. These grasslands had resulted from shifting agriculture were at that time imagined to be much more extensive than they in fact were. The work generated much useful technical information,²⁶ and while pasture development did not eventuate as a major innovation in the Thai highlands, the results provided commercially useful in other highland regions, notably Bhutan as indicated in another paper in this Conference by the scientist who was involved in both projects.²⁷ This prelude to TAHAP illustrates the dual aspects of my seventh point – **imported ideas of problems and solutions often misconceived real development needs, and development impacts are often well beyond the projects in which they were conducted.**

In 1976, TAHAP itself began. It was justified in political terms as a means of integrating highland dwellers into the wider Thai society and reducing reliance on opium farming. The project worked through the Thai Department of Public Welfare and the Faculty of Agriculture at Chiang Mai University with the objective described as:

*It was primarily involved in applied research to improve the livestock industry and subsistence food production of the hilltribe people of northern Thailand. A further objective was to assist in the training of extension officers of the Department of Public Welfare involved in highland development, and to help the Faculty of Agriculture at Chiangmai University increase its capacity to train scientists and to undertake research in the highlands.*²⁸

Crop agronomy focused on evaluation of grain legumes and rice-based or maize-based cropping systems. Upland rice varieties suited to higher altitudes were identified and among a range of pulses, pigeon pea (*Cajanus cajan*) emerged as the most adapted to the humid mountain environment. Pigeon pea was examined as both a subsistence and a cash crop in terms of late and early maturity, planting density, hedgerow planting, dwarf and other varieties, planting time, fertilizer regimes, pest resistance and intercropping. Unforeseen benefits from the program included

improved knowledge of the nutritional composition of highland diets that could better inform other research and development, and the utility of pigeon pea as a protein source for traditional highland pig production. Improved pasture research continued in parallel with that of crop agronomy and indicated specific soil nutrient deficiencies including sulphur and phosphorus on granite-derived soils.²⁹ However, the improved pasture vision of that era was clearly shown to be uneconomic in the Thai highlands, even though cattle were present in significant numbers.

In contrast to these preconceptions, the livestock research program began with a review of past sociological research and a long-term extensive interview-based survey of highland villages to define the social and economic roles of livestock and the problems as perceived by livestock owners. With the knowledge that cattle represented a status symbol, insurance against crop failures and a source for major ritual sacrifices – and that these roles were assigned priority over commercial gain – the technical research program was designed to identify means of addressing constraints in cattle production.³⁰ The research included means for field assessment of weight, detailed nutritional research with oesophageal and rumen fistulated animals, analysis of faecal, saliva, rumen fluid and serum samples of cattle under various nutrition supplementary treatments and metabolism-cage trials. Improved production resulted from improved intake associated with remediation of sodium and seasonal protein deficiencies.³¹ Other livestock research included detailed work with the ubiquitous traditional black pigs that were kept for fat, meat and as a form of savings. Improved production and reduced mortality was found to be possible from supplementing traditional banana stalk and residues of rice, bran and corn with pigeon pea for dewormed pigs on simple bamboo slat floors.³² Work with sheep introduced by other projects was less productive.

Other TAHAP work was related to forestry, extension and soils. Forestry was shown to benefit from similar fertilizers as crops and pastures, and to be compatible to a small extent with cattle grazing. Extension work revealed some incompatibilities with routine government services in the different cultural environments of the highlands and developed a two-way communication system in which officials and highlanders could discuss actual needs and issues.³³ Soils research supported the agronomic results and also indicated that the burning of cleared forests provided adequate crop nutrition for at least one year, with phosphorus availability, soil microbial activity and pH decreasing under subsequent years of cropping. However the greatest losses of soil productivity were from erosion,³⁴ which was curtailed by terracing and contour strips of useful bushes, including pigeon pea and *Gliricidia*.³⁵

TAHAP concluded at the end of 1980, and in the final report a total of 69 publications are listed for the five years from 1976.³⁶ In fact, this is an underestimate as more than 40 arose from the livestock research alone,³⁷ which engaged five (four Thai) of the 17 (13 Thai) project professionals. Publication numbers are seldom an indication of much; in this case, they confirm that the project had a primary research orientation, and this made it significantly different from its contemporaries and most subsequent highland development projects. And this leads to my eighth point – **development relies on real information from research, and development research relies on an understanding of the socio-economic values and constraints in order to design its technical experiments.**

Beyond TAHAP

The TAHAP was a small intervention in a politically charged environment. Border control, drugs, middle-class environmental sensitivities, nation building, ethnic friction, immigration and corruption transcended mere agricultural research projects. Yet the results of TAHAP and other investigatory projects have made their impact – often years later and in unexpected places.

Discussions of Thai highland agriculture today are informed by diverse information, and ideals. One bold attempt to reconcile such conflicting viewpoints³⁸ provides a snapshot that remains relatively current, and starts by acknowledging the continual changes in highland agriculture. Yet interestingly, it continues to include shifting agriculture, subsistence farming, upland rice, irrigated valley rice, maize and gardening with some livestock keeping. Modern lifestyles and development initiatives have added forest replanting, high value horticulture, off-farm work and mechanization served by improved transport systems. The analysis of Thai agriculture over several decades up until the late 1990s notes that ‘in order to solve those problems that are mainly of an agrotechnical nature, a sound research-and-extension strategy is needed ... to solve the problems that are more of a socioeconomic nature, appropriate policy regulations should be worked out’. Whether or to what extent such investment in agricultural development has been hampered by constraints on official land titles, citizenship, cultural diversity or special characteristics of government is extremely difficult to estimate. In any case, it is clear that great transition and significant investment has occurred in the face of these continuing constraints.

We may quickly review some major options of highland agriculture by considering current activities, and commenting on their apparent utility in terms of our opening definition of ‘sustainable development’ – guiding enhanced long-term use in a manner that causes minimal negative impact. This is summarized in the following table:

Activity	Highland History	Future?
Forest products	Practiced as long as the highlands have been populated	Reducing due to over-harvesting and if continued will require regulation or domestication of valued products.
Upland rice	Since highlanders populated the region.	Increasingly marginalized as unsuited to the environment, low yields and few technological breakthroughs, yet likely to be retained by poor subsistence families.
Irrigated rice	From valley floors expanded with increased security and access to intensive agricultural inputs.	Possible expansion to stable suitable areas with terrace construction where water is reliable and transport accessible.
Field crops	Maize long grown for reserve food and pig feed has been supplemented in recent decades by soybean, peanut, lablab, red kidney bean, wheat and barley grown commercially.	Continued expansion according to market prices.
Home	Integrated vegetable, herb and fruit production	Expansion of high-value

gardens	has been a minor occupation and herbs have potential for intensive high-value production.	intensive herb and similar production.
Livestock	Large livestock have long diversified income and risks, recycled nutrient, provided power while chickens and pigs have been essential to minimal nutrition – and all have served sacrificial rituals. Ruminants grazing otherwise unused grasslands may be productive with minor inputs, while production increases for other species often incur greater operating expenses.	Continuing production on a limited scale, including value-adding of cross-border animals with improved quarantine, probably integrated with other enterprises.
Fruit trees	From low-value preserved peaches, fresh fruit has become a major industry for litchi, plum, peach and apricot that provides returns from year 4.	Continued expansion, often as monocultures, with further road improvements serving competitive markets in Thailand and China.
High-value horticulture	Developed by private sector and development projects into highly valuable field vegetable, fruit and flower production in recent decades, often integration with other crops, reliable high returns have resulted from investment by farmers and middlemen.	Continued expansion, often as monocultures, with further road improvements serving competitive markets in Thailand and China.
Off-farm work	Long limited by lack of roads, this is a major means of supporting highland lifestyles today.	Continued expansion of work opportunities in both the highlands and elsewhere with remittances supporting families.

The challenge of protecting highland environments while developing productive agriculture remains. Perhaps the major lesson from TAHAP and all other projects is that such enterprises as those listed as expanding in the table above are not mutually exclusive and that mixed enterprises will be the norm for the immediate future. It may well be time to look objectively at the constraints perennially raised by foreign commentators, such as protecting traditions and ethnicities above allowing all persons the right to enter the market economies. The highlands are no longer geographically or economically marginal, inaccessible or dangerous, and as national governance becomes stronger, policies that promote commercial development and balanced environmental management may be expected to emerge. To arrive at this state, further research will be needed, accompanied by sound educational programs. In this conception, highland farmers will have neither more nor less rights than their lowland counterparts. And this my final point – **that despite the angst expressed in various studies, highland agricultural development has been a marked success over these 40 years.**

Conclusion

The highlighted points made through the paper effectively arrive at the conclusion, as follows. *Sustainable development in the Thai highlands means guiding enhanced long-term resource use in a manner that causes minimal negative impact. Such development must be informed by knowledge generated by research and experience, which may be come from diverse sources around the global highlands. Nevertheless, the plans essential for development cannot be practical unless they are flexible*

enough to change during implementation, and recognize that the corporate memory of research and development can be unproductively short in aid environments. The experience of Thai-Australian Highland Agricultural Project confirmed that preconceived research can also be wrongly targeted and that a project's impacts can often be well beyond those planned. It also indicated that not only does development rely on research, but that research in turn relies on an understanding of the socio-economic values and constraints. Yet notwithstanding myriad constraints, highland agricultural development has been a marked success over these 40 years.

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