A Livelihood Systems Approach to the Sustainable Development of Upland Farming Systems

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ABSTRACT

This paper does not pretend to address the specific issues of livestock development as a component of shifting cultivation development in the Lao PDR. The author has only second-hand experience in development of upland shifting cultivation systems through his ongoing supervision of the doctoral studies of a senior member of the Lao Department of Livestock and Fisheries and is certainly not a specialist in livestock. His experience is mainly in lowland rainfed agricultural development and the paper seeks to offer some perspectives from that experience to the context of the Lao uplands. As pointed out by Jodha (1991), the two systems share many of the characteristics and problems of the so-called Third Agriculture in being "complex, diverse and risk-prone" (CDR) (Chambers et al. 1989). The paper takes as its starting point a belief in the value of the Farming Systems Research and Extension approach as a basis for the sustainable development of these CDR systems. This is the assumption being followed in the above-mentioned thesis studies and which appears to be a more sophisticated approach to the development of the uplands. In addressing sustainability issues, the paper stresses the ecological dimension of the term, and ends by discussing its institutional context, and the need for development approaches to be implemented by governments of developing countries, not through the artificial means of foreign aid projects. In this regard, the author draws on the experience of the Asian Institute of Technology (AIT) Aquaculture Outreach Program (AOP) of which he is coordinator.

Farming Systems Research and Development

IT IS NOW generally accepted that traditional approaches to agricultural development involving the transfer of standard packages of technical recommendations derived largely from on-station research to a broad spectrum of farmers through conventional manpower-heavy extension services have failed in many regions of Asia. This is at least partly because such regions are characterised by CDR agriculture in which farmers are faced with fragile and unstable environments in which the livelihood of the family depends on the adoption of complex survival strategies involving a variety of different enterprises. The reductionism scientific method with its separate disciplines (and within them separate commodity specialisations) faces problems in dealing with such complexity and recommendations for technical improvement in one specific commodity area are often rejected by farmers because they do not fit in to the whole farm system. The environment also varies over remarkably short distances in a way that is difficult to replicate on the research station. Thus, even if the conditions on the research station do broadly correspond with those of the farmers’ situations, strategies developed for one area may be quite inappropriate for another area nearby. This is particularly the case in upland areas where such considerations as slope aspect add to the diversity.

The Farming Systems Research (FSR) approach to agricultural development has sought to address this problem. It seeks to identify different types of farming systems and their problems as a basis for technology development and transfer. These “type” systems form what are known as “recommendation domains” for which a particular technical package is designed. It is important to realize, however, that the key variables which distinguish recommendation domains from one another operate at two scales, not just at the scale of the individual farm production system, but also the (sub-) regional resources system which forms the broad context in which the individual farm operates.

The Search for Recommendation Domains

A paper by Lightfoot et al. (1993) serves to emphasise the need for two levels of analysis. The paper illustrates the movement in the farming systems approach over time. This began with a continuing focus on specific commodities, although taking into account the wider on-farm system; as such, it allowed the commodity specialist to claim to be following a farming systems approach. The second step was the move to a more holistic approach dealing with the whole farm and the interactions between the main subsystems. This has spawned a good deal of recent work in farm modelling, first among agricultural and then among resource economists (bio-economic modelling) with a view to optimising the use of on-farm inputs in integrated agriculture. This approach has been particularly favoured by those concerned with the overuse of agricultural...
chemicals under the "green revolution" technology package and has led to the emergence of such terms as "low-external input agriculture" (LEIA) or "ecological agriculture". This approach maintains the narrow focus on the farm production system, which in LEIA is seen essentially as a closed system (Figure 1a, 1b).

Figure 1(a): Commodity focus in farming systems. Figure 1(b): Whole farm focus in farming systems.

(adapted from Lightfoot et al. 1993)

The third step in the evolution of the farming systems approach widens the focus. It recognises that the farm production system is traditionally only one element of livelihood, that farmers also utilise resources outside of their own farms in the surrounding natural environment. Specifically farmers in CDR systems use forest and natural water resources to gather a host of materials for food, fuel, construction materials and other equipment and medicine (Figure 1c). Use of forests for fodder is, of course, a major issue that will be dealt with elsewhere in these Proceedings. As farming systems have intensified and become more specialised in lowland areas, especially in irrigated areas, the importance of these resources in the household livelihood system has declined and thus agricultural development specialists have tended to lose sight of them.

In the context of aquatic resources, intensification has tended to destroy the habitat of natural fish. However, in CDR areas they often remain of considerable importance. In a quite different CDR area to those being considered here, wetlands, agricultural development has consisted of drainage of problem soils, usually acid-sulphate, for rice or other cash crops. In fact AIT’s research in southeast Cambodia has begun to question this in relation to its effect on fishing. Families in this region may catch as much as one tonne of fish in rice fields and trap ponds in a year of good rainfall. Attempts to develop aquaculture in such circumstances are largely a waste of time and illustrate the problem of the commodity oriented, closed-system FSR perspective.

Traditionally in the farming systems research literature, the emphasis at the regional scale has been on agro-ecological zonation, stressing the physical resource elements in the farming system (Conway 1985), although many studies have failed to include this key contextual elements so that they have been of limited value for extrapolation into the wider development framework. However, even this is increasingly recognised is being an inadequate basis. The fourth and most recent perspective (Figure 1d) in farming systems sets resources assessment in a much wider framework, including such social and economic factors as market access, alternative employment opportunities and local implementation of national policy measures. In this view, the emphasis is not so much on the farm, as on the family as a management unit, which takes advantage of whatever opportunities are available, be they on farm or off-farm. The approach thus looks at livelihood systems, not farming systems per se.
The project that the author manages, the AIT Aquaculture Outreach Program, serves to illustrate the problems associated with the narrower natural resource systems perspective. The AOP began its work in northeast Thailand in 1988 on the assumption that low-cost aquaculture would depend on the availability of on-farm resources for inputs into the farm pond. It thus adopted four distinct study areas seen to be characteristic of the main agro-ecosystems of northeast Thailand as defined by Khon Kaen University (1987). However, while attempting to recognise natural resource potentials, the project failed to understand key socioeconomic variables that affected aquaculture. Thus, in the area of apparently greatest potential for aquaculture, in the Huay Luang irrigation area, the proximity to Udorn Thani city with its off-farm employment opportunities and the presence of several agribusiness enterprises promoting high-value short-term cash crops combined to limit the interest in low cost, but relatively high labour input and low (and slow) return aquaculture.

The situation in northeast Thailand has become more extreme in this retard over time. Since the AOP began, the Thai economy has entered a prolonged period of rapid economic expansion which has drawn labour, especially young people, away from the agricultural sector on a permanent basis. Almost no part of the country is insulated from the influence of the growth of the urban-industrial sector. Fewer and fewer families derive their total livelihood from agriculture, particularly as subsistence expenditures have increased. Thus enterprises offering the limited returns of the original aquaculture package are of little interest except as a stepping stone. The project has increasingly moved towards higher input technologies offering higher returns for less labour (a fast-food strategy).

The key issue in the definition of recommendation domains is of course the recognition of the variables which define them. Obviously, the forces which affect agriculture in the rainfed lowlands of northeast Thailand are not the same as those which influence the uplands of Laos, but the variables may be similar. Although people think of those uplands as isolated, this is a relative term. Already it is clear from the periodic markets springing up along Route 1 in the north of Luang Prabang province that there is considerable market access in some areas and the northeast Thai case serves to illustrate the dynamic of the situation. As improved highways across Indochina are being constructed, the previous isolation will be broken down and new livelihood opportunities offered. However, the process of improvement of access is not necessarily a positive one. Along with improvements in opportunity, may come threats to livelihood. Developments in northern Thailand offer a clear enough warning of this in the form of competition from external economic forces for use of land and water resources.

It is clear then that differential accessibility remains a key variable in the recognition of recommendation domains in upland areas. From the work already carried out by Mr. Parisak Pravongviengkham, others appear to include the population - natural resource balance, provincial land use policies level, obviously variables such as land resource and, possibly, ethnicity, although there is evidence that differences in practices among ethnic groups just as much reflect resource availability in different agroecologies and that such differences disappear with the movement of population to other ecologies. At the farm base, labour availability and family development are key factors, at least partly explaining socioeconomic status as a further key variable. These issues will not be described in detail, except for a comment on the differential impact of provincial land use policies. National policies towards restrictions on the use of forestland and resettlement seem to be implemented with considerable variation from province to province in the Lao PDR. Where implementation has been strict, such policies artificially limit the resource systems available to communities and individual families, effectively removing one or more elements in the resource system.

![Figure 1(c): Resource systems approach to FSRE](image1(c).png)  
![Figure 1(d): Livelihood systems approach to FSRE](image1(d).png)

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The Livelihood System Mix in Upland Agriculture

What does this framework mean in terms of the existing systems of upland agriculture in the Lao PDR? Figure 2 attempts to illustrate that in the upland areas, at least in northeastern Laos, swidden livelihood systems may be composed of a variety of enterprises, the presence or absence of which depends on the complex of factors discussed above. The model in the illustration mixes land and non-land resources, and a conspicuous deficiency is the absence of livestock. This, it is assumed, depends on the availability of land resources to supply fodder for grazing or from crop wastes (and on market access). These may be derived from several of the other sub-systems, especially the "hai", the "na" or paddy field and the forest. Mr. Parisak (these Proceedings) elaborates on the relative contribution to livelihood of these enterprise systems in the various parts of northern Laos. Suffice it to say that the figure does reflect that the upland systems are much more complex than most people had assumed and intervention which changes or removes one part the system has important implications for the whole.

Figure 2: Schematic model of components in a swidden-based livelihood system.

Search for the Appropriate Technology

The recognition of the different recommendation domains is only the first step in the farming systems approach to agricultural development. On the basis of analysis of the situation of the different systems, prospective development interventions have to be assessed. In the case of a specific component sub-system, such as livestock or aquaculture, as has been seen, a possible outcome of such an assessment is that there is little or no development potential and sector specialists should be willing to accept this.

One indication of potentials is the prior existence of a particular enterprise and an important outcome of the farming systems research approach is that more attention is being paid to what farmers are already doing and what they already know. The importance of indigenous technical knowledge (ITK) as a starting point for agricultural development is now widely accepted, as is the fact that farmers are engaged in their own experimentation and are making changes to their systems in response to changing circumstances. Arguably, careful monitoring of these adjustments by researchers may be equated with the implementation of on-farm trials for technology testing and verification and possibly more practical where the proof of the technology may take several years.

In recent years, the term "indigenous technical knowledge" has been criticised as placing too much emphasis on the technical aspects of agriculture. It is now being replaced by a more neutral "rural people's knowledge" which serves to draw greater attention to the fact that adaptations to the fragile environments in CDR systems were never purely technical, but also managerial. Thus, alongside strategic choices of crop variety and planting times, communities in fragile resource areas also developed safety net mechanisms in their social structures (labour exchange networks, flexible access to land rights, flexible debt repayment mechanisms). These mechanisms extended to strict regulations on the use of open access or common property resources In swidden cultivation, this traditionally involved a great deal of flexibility in allocation of land according to available labour resources in any particular year, even to the extent of allowing other communities with greater needs to work village land. Specialists in technology assessment have highlighted this in their subdivision of the components of a technology into hardware (the tangible technology itself) and software (subdivided into three components of humanware, orgaware and infoware). They argue that these components need to be in balance for the successful adoption of a technical innovation.
Esther Boserup in her classic thesis, The Conditions of Agricultural Growth (1965), argued that traditional agricultural communities were able to respond to conditions of growing population density by making adjustments to their systems. This could take place in a variety of ways: exogenous responses such as expansion of cultivated area and migration; or endogenous responses through improvements in technology and management. From the evidence of Mr Parisak’s study, both types of adjustments appear to be underway in the shifting cultivation systems of northern Laos. New enterprises are being added to the systems as suggested above, but at the same time endogenous adjustments are taking place which are moving from an extensive, non-regulated type of system to more controlled movement of land use managed by local (village and commune) authorities. In doing so, they may be offering important opportunities for such enterprises as livestock rearing and aquaculture.

An important advantage of careful assessment of these adjustments is that system improvement is likely to be easier if it involves only limited changes from what is already happening. Studies of adoption of innovation have stressed the importance of this characteristic in successful innovations, as well as the importance of interpersonal relationships in their diffusion. This has been at the heart of the argument that technologies which are appropriate in the sense of having been proved to fit into a farmer’s system can be disseminated rapidly from farmer to farmer without heavy extension inputs. The AIT Aquaculture Outreach experience appears to be supporting this view4.

The major question in relation to these indigenous adjustments is that their sustainability. Jodha (1991) has spoken of adjustments in upland agriculture in the Himalaya, which are actually bidding a steady downward spiral in system sustainability, mining resources in the short-term with potentially disastrous consequences in the medium. He has termed them “hidden” adjustments because they are not immediately obvious to the casual visitor; careful research is required to identify them and their consequences. It may be in this context that external technical assistance can make the biggest contribution to improving the productivity of the systems already being followed.

**Implementation of the Approach**

Farming systems research approaches are frequently criticised as impractical, because they involve such painstaking research at both the situation analysis and on-farm testing stages of the process. Much, however, depends on the methodologies used. The system analysis does require initial intensive research, but once key indicators to distinguish the different systems and the key factors in their operation have been identified, it should be possible to classify the broader context and reduce the burden of specific information collection. It must be understood also that any pilot interventions should be clearly set in the specific recommendations domains or “type contexts”, so that these become a potential model for similar areas and communities. In using the term “model” in this context, it is important to understand that it is used not in the sense of “ideal”, (Thai-Lao: sombuun baep), but rather in the sense of “example” (tua yang) which can be replicated in other areas if successful5.

An important dimension of this replication is that it can be done without the assistance of a foreign aid project, by the Lao authorities themselves. It is important to bear this in mind right from the start of the implementation of the approach, but is encouragingly something that is well understood in the Lao PDR. In the AOP, the initial attempt to establish a project with a separate field research team, much as had been used in Thailand, was roundly reelected by the Department of Livestock and Fisheries for an approach in which personnel worked in close association with the Provincial Livestock Section. This has proved extremely beneficial in identifying what is indeed possible in the farming systems approach and where capacity needs to be developed. It has also served to confirm some earlier views that a good deal of understanding of the local situation does exist at the local level (but usually in unwritten form, which needs to be formalised)6 which can be the basis of both recognition of systems and the development trends within them. As the initial portfolio of Rapid Rural Appraisal made clear7, ITK/RPK is not confined to farmers, but then many local “officials” are also farmers.

**Challenges**

The issue to be faced in advocating an expanded farming systems or livelihood systems approach to the sustainable development of upland areas in Laos is to develop the appropriate methodological tools for analysis, both of the existing, situation and of the sustainability of the technical and managerial adjustments being made in the upland systems by local communities in the face of new pressures. Hopefully, both AOP and Mr Parisak’s studies are leading researchers in this direction.

Such tools have to be usable by provincial and district staff of the Ministry of Agriculture and Forestry and not only of the Department of Livestock and Fisheries. If this is to be the case, of course there needs to be solid conceptual understanding of the need for a systems approach to the problem of upland development
throughout the Ministry, persuading people that this is not overturning the training of a lifetime, but contributing to improving the focus of that training. This is a task which will require training at all levels from policy makers to field workers and in a variety of modes for different groups according to their situation. The author believes that there is the will in the Lao PDR to take on this challenge.

References


NOTES

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2In fact, as Chambers and Jiggins (1987) have pointed out, this is often not the case. Research stations in CDR areas often create "artificial" conditions even in physical environmental terms so that experiments can be carried out within a fixed time frame.

3Although this is rarely a relevant issue in the third agriculture, where environmental instability makes such applications highly risky.

4Innovation studies also suggest that complex innovations requiring group decision may be much less acceptable than simple innovations aimed at individuals. In that changes in management of shifting cultivation require group decisions, it may be more difficult to accept these and diffuse them to other communities. Of course, this depends on the integrity of the community in question.

5The writer is grateful to Mr. Ted Chapman for pointing out the confusion sometimes created by the use of the term "model".

6The writer is grateful to Mr. Nick Innes-Taylor, AOP Program Manager in the Lao PDR, for this observation.

7One of the problems that has emerged in the use of non-formal survey methods is that too much emphasis has been placed on the knowledge of one particular group, the farmers.