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Research in Vietnam's uplands shows that poverty alleviation and environmental protection can be most readily achieved by communities building, protecting, and using their own assets more effectively. This approach starts by looking at what poor people already have, not what they lack. By contrast, government development policies often seek to modernize the rural sector through the introduction of new agricultural technology and improved marketing without taking existing local capacities into account. Such policies

often fail to achieve their objectives. Traditional composite swidden agriculture (CSA), by contrast, may be more environmentally sustainable and better able to enhance household food security than many "modern" agricultural systems. Therefore, improvement of existing systems of composite swiddening in combination with adoption of new ventures, such as cattle raising, may achieve greater success than attempts to replace swidden agriculture with completely new "modern" farming systems.

The problems of upland development in Vietnam

Vietnam's economy has grown at a remarkable rate. From 1990 to 1997, GDP increased at an average rate of 8% per year and per capita income rose from US\$ 220 in 1994 to US\$ 640 in 2005. Most impressively, the percentage of the population living in acute poverty declined from 57% in the 1980s to around 7% in 2005. Most of these gains, however, have occurred in the lowlands, while the uplands have lagged behind with correspondingly higher poverty rates. This is a matter of great national concern because 75% of Vietnam's land surface is classified as sloping land—the highest percentage in any Asian country. Indeed, China and Japan, which are commonly thought of as mountainous countries, have less than 50% sloping land. Vietnam's uplands contain many valuable natural resources, including most of the country's forests, and are home to 28 million people (nearly one-third of the national population) belonging to 50 different ethnic groups.

Since 1986 the Vietnamese government has adopted many upland development policies to encourage the formation of markets, remove restrictions on what farmers could grow, and increase transportation and information networks. Eradication of swidden cultivation, which many government officers believe is the main cause of environmental degradation and poverty in the mountains, has always been a central goal of upland development programs.

Hanoi Agricultural University conducts research in the uplands

In order to examine the impacts and effectiveness of agricultural policy, Hanoi Agricultural University (HAU), and especially its Center for Agricultural Research and Ecological Studies (CARES), has undertaken several major research programs in the mountains of Vietnam. Two of these studies—one focused on composite swiddening in a single hamlet in Hoa Binh Province, and the other looking at agricultural development and land use changes at different geographical scales in 3 districts in the Ca River Basin in Nghe An Province—are discussed in this paper. These studies have incorporated a wide variety of methods, including socioeconomic surveys, participatory surveys, satellite image analysis, and site-specific watershed and soil monitoring.

Composite swidden agriculture (CSA) in Tat hamlet

For the past 14 years HAU, in collaboration with scientists from the Center for Natural Resources and Environmental Studies (CRES) of Vietnam National University, the East–West Center in Hawaii, and Khon Kaen University, has been carrying out detailed studies in Tat hamlet in Hoa Binh Province in the northwestern mountains. Its Da Bac Tay ethnic minority group inhabitants have long practiced composite swidden agriculture (CSA). CSA integrates several types of land use—including permanent wet rice fields on valley floors, and rotation of swidden plots, tree gardens, and regenerating forest

patches on the hillslopes—into a single household resource system. Figure 1 shows a village in the Mai Chau district, in the same province as Tat hamlet, where farmers practice CSA. Our study has revealed the considerable potential that CSA has to enhance economic and environmental benefits for upland communities.

Socioeconomic benefits of CSA

CSA offers an indigenous model of relatively sustainable land use. Composite systems are fairly robust, in contrast to pure swiddening systems, which suffer rapid degradation in the face of increasing population pressure. CSA also offers considerable potential for intensification and generates a high level of equity among households. The income gap between Tat hamlet's richest and poorest households was the smallest gap found in a CRES, CARES, and East–West Center study done from 1998 to 2000, in which 5 communities in different parts of the northern mountains—of which only Tat hamlet employed CSA—were compared.

Environmental benefits of CSA

Despite the fact that the government considers swidden agriculture to be environmentally destructive, composite swidden systems appear to have much lower rates of soil loss than pure swidden systems. This partially explains the high sustainability of composite swidden systems. Furthermore, contrary to government claims, CSA does not cause severe deforestation. From 1952 to 2003, the population of Tat hamlet increased from 50 to 476 people, an increase of 850%, but the area covered by forest and regenerating forest decreased by only 6%. Moreover, since 1995 the area covered by forest and regenerating forest has increased by 7%, despite continued population growth in the hamlet. Furthermore, in this area there is almost no out-migration: only few people have moved out of Tat hamlet to Tay Nguyen, and 3 Muong families have moved in from areas flooded by the Hoa Binh reservoir.

The Ca River Basin study

On a larger geographical scale, another HAU study has examined changes in farm-

ing systems, natural resource management, and the environment since 1998 and at different geographical scales in a number of hamlets situated in 10 communes and 3 districts in the Ca River Basin in Nghe An Province, Central Vietnam. Some of the main findings of this study are presented below.

Inconsistent or unclear policy

Our data suggest that there is a disconnection between official policies and local understanding of the appropriate implementation of land use policies. For example, district officials in Tuong Duong district have allocated land differently from the methods deemed appropriate by the central government. People at the commune and hamlet levels often report that land allocation is incomplete; moreover, farmers are often unaware or have an incomplete understanding of policies implemented at the provincial and district levels. In one commune in Tuong Duong district, for instance, the commune officers report that 4 of 5 hamlets had land allocated in 1998/1999. One hamlet refused to allow the land allocation at that time; instead, land was allocated in 2001/2002, at which time a different allocation system was used by the district officials. Here we should understand the problem that local authorities face due to the many land policies and laws that have been issued over time (1993,

FIGURE 1 Rice paddy cultivation on the floor of the valley, Hoa Binh Province. (Photo by Tran Duc Vien)



TABLE 1 Officially defined and actual agricultural development projections for the upper Ca River Basin.

Official agricultural policy goals	Actual situation
<ul style="list-style-type: none"> • Decrease swidden/fallow systems 	<ul style="list-style-type: none"> • Swidden/fallow systems remain for rice and maize production (in some communes this is allowed only in modified forms or in limited areas)
<ul style="list-style-type: none"> • Increase sedentary agriculture (irrigated rice paddy, maize production on permanent upland fields) 	<ul style="list-style-type: none"> • Some expansion of irrigated rice paddy where conditions are favorable • Little expansion of maize production
<ul style="list-style-type: none"> • Increase pig raising and fish production via fish pond construction 	<ul style="list-style-type: none"> • Some pig raising for household use and market • Large increase in cattle raising for the market • Little expansion of fish production for the market

FIGURE 2 Government subsidized terraces in Tay Son Commune, Ky Son, Ca River Basin. (Photo by Stephen J. Leisz)



1998, 2000, 2003, and 2005). Official land allocation is supposed to allow everyone the chance to transfer and receive land use rights. In practice, commune and hamlet level officials do not recognize this option. Similar issues have been raised in relation to

the application of agricultural extension policies, especially in the area of irrigated rice production and animal husbandry.

Development trajectories

The main agricultural development extension efforts encouraged by government policies aim at decreasing or eliminating swiddening in favor of irrigated rice agriculture in upland valleys, and at subsidizing terrace construction (Table 1, Figure 2). In hamlets adjacent to the district town and/or those that have favorable conditions (adequate lowland areas, plentiful water), swidden systems are being replaced, as the irrigated paddy area is expanding. Results are not always positive: some of these hamlets are less food secure than they were when swidden agriculture was more widely practiced. However, it is sometimes recognized that all swiddening cannot simply be eliminated. In these cases, the swidden/fallow systems are allowed, but limited to specific areas within each hamlet. In other hamlets that are isolated or lack the necessary resources, swidden systems are continuing and, in a few cases, even expanding.

A comparison of food security and relative living standards of households suggests that, in those hamlets where swiddening is still widely practiced, households have greater food security and are better off overall (Figure 3). This finding raises questions about the desirability of the goal of eliminating swidden agriculture from the Ca River Basin.

The government has also encouraged aquaculture and pig raising. However, we did not observe a single case in which aquaculture has been extended beyond the production of fish for household consumption. Pig raising has received extension aid in almost every village studied, but is not a big money-maker for the villagers.

Instead, cattle raising, which has not been promoted by government extension efforts, is expanding and is the main source of cash income. In fact, of the villages studied, the one with the greatest cash income was a Hmong village in Ky Son district, where cattle raising and connections to cattle traders are well developed. The next most prosperous village is a Thai village in Tuong Duong district, where cattle raising has expanded significantly since the late 1990s. Both of these hamlets are isolated; the latter is accessible only by boat, but farmers walk their cattle 3 days to market and have managed to build a successful marketing network. Even villages that are over 45 kilometers from the nearest market are expanding their cattle herds and earn the biggest part of their cash income from cattle. There does not appear to be a change in division of labor, as children usually herd the cattle and are continuing to do so (Figure 4). If anything, farmers reported that they have less labor to perform, since raising cattle (in a free-range situation) is easier for them than clearing shifting cultivation fields.

Land use/cover changes

There was no rapid land cover change in any of the 3 districts we studied in the upper Ca River Basin. Land cover was relatively stable in our case study hamlets. An examination of satellite imagery from 1993 to 2003 shows that there was little or no incursion of swidden agriculture systems into forest areas. In some areas swidden agriculture is being abandoned, while in other areas it is being concentrated in specific areas of the hamlets. It is possible that these abandoned areas will revert to vegetation types that could be considered forest.

At the district level, our initial findings suggest that the area of swidden agriculture has remained relatively constant

from 1993 to 2003. In a few instances, forest has been cleared for swidden fields, but in many communes the pattern of land cover suggests that swiddening is being confined within a more limited area. In other areas swiddening has been abandoned in favor of irrigated rice fields or a mixture of irrigated rice fields and permanent upland fields.

Conclusions: changing the focus of upland development

On-site implementation of development policies often differs from official expectations. In many hamlets swidden-based farming systems persist, and in some cases are even expanding, in conjunction with the adoption of new livelihood practices such as cattle raising.

Swiddening is not the main cause of poverty or environmental degradation in upland Vietnam; rather, it is often a rational way of keeping poverty at bay under difficult circumstances. For a variety of reasons, swidden farmers are generally poor and belong to the most vulnerable groups in Vietnamese society. Changing farming

FIGURE 3 Thai meal to welcome visitors to a house in Son La Province: an example of food security increased by CSA. (Photo by Tran Duc Vien)



FIGURE 4 Children driving buffalo to the hillside before going to school, Son La Province. (Photo by Tran Duc Vien)

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practices to eliminate swidden agriculture, therefore, is no guarantee of poverty reduction and, in some cases, may actually increase vulnerability and environmental degradation. In places where pure swidden systems are producing excessive environmental degradation and/or failing to meet the needs of expanding human populations, however, composite swiddening may offer a viable alternative.

A number of policy recommendations can be derived from these conclusions:

1. Rural policy implementation in Vietnam should be further decentralized; essentially, local people should manage local resources as their own assets, and development should be driven by community input rather than from the top down.
2. The need to improve forest cover must be balanced against upland people's livelihood needs. The government should offer farmers multiple options that they can selectively adopt

to improve their existing farming systems, rather than single packages of new technology that they have to adopt as a whole.

3. Decentralization and local livelihood sustainability would both be enhanced by giving a bigger role to community organizations in natural resource management.

Future directions for research

Our research aims to work with communities to provide feedback to policy makers for the development of more economically and environmentally sustainable rural agriculture. To these ends, we are continuing to study upland agroecosystems, with particular emphasis on soil erosion and nutrient balance of agricultural systems, and to provide greater documentation and details on indigenous fallow management. In addition, we continue to examine rural household economics and community-based systems of natural resource management.

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