

REVIEWING AGROFORESTRY AND AGROFOREST MARKETS IN VIETNAM'S UPLANDS

Agroforestry Development Situation in Vietnam's Uplands

Agroforestry practices have existed in Vietnam and in many countries throughout the world for a long time. Among others, these systems include traditional shifting cultivation typical of ethnic minority groups and home gardens seen in many rural landscape ecologies. From the 1960's, a Garden-Fish Pond-Livestock model was intensively developed and spread over the country by farmers in the northern provinces in parallel with the good production competition movement. This model has been modified into various forms, which are suitable for each specific ecological region. Then Forest-Garden-Fish Pond-Livestock and hill garden models are also strongly developed throughout the upland regions. Additionally, projects of non-governmental organizations and other international projects have introduced many sustainable cultivation technologies for sloped land in which there are agroforestry models.

In the last twenty years, the Vietnamese Government and the Communist Party implemented agroforestry policies for rural development in the mountainous regions of Vietnam. The process of managing, implementing fixed cultivation, sedentarization, and developing economic zones in the past, and recent programs such as the 327 program, the five-million hectare forest program (the 611 program), farm development, hunger elimination, and policies focusing on poverty reduction are all related to the development of agroforestry systems. Recently, the knowledge and information of agroforestry have also been summarized and evaluated by the scientists from different aspects. However, research on the relation between agroforestry, socio-economic, and ecological development concludes that the agroforestry market is inadequate and un-uniformed at micro and macro levels.

Although research on agroforestry systems and development were implemented in the world for a long time, these systems were not introduced into Vietnam until the early 1970s. Nowadays, there are many types of agroforestry concepts and definitions. In this case this scientific term is used as an opened concept. In general, agroforestry is a term for land-use systems in which perennial trees (timber trees) are grown along with agricultural crops or livestock, using the spatial arrangement or rotation; however there are ecological and economic interactions of these components within the system.

Agroforestry systems classifications are based on their structures, functions, socio-economic, and ecological benefits. In the slope land areas, the agroforestry system is divided into two main categories: traditional agroforestry systems and innovative agroforestry.

Category 1: Traditional Agroforestry Systems

These systems were developed and accumulated over many generations, plus they were tested over time. They are popular with ethnic minority groups living near or in the forests. In other words, traditional agroforestry systems were developed by local farmers. It is proven that agroforestry theories are new; however, this cultivation practice by farmers was created a long time ago. Many agroforestry technologies were summarized, existed and tested by

farmers over hundred years. Traditional agroforestry systems in Vietnam's upland contain these following types:

(1) Fallow/Innovated Shifting Cultivation System

It is said that using this system, it regenerates the forest by using slash and burn cultivation. This long-standing form of agroforestry overcame the negative effects of continuous shifting cultivation, and it creates favorable conditions to restore soil nutrients. Furthermore, farmers rotate swidden fields based on estimated time. This cultivation technique of sustainability has worked for many years. The key point of sustainability of this technology is the amount of time the land lies fallow. Farmers often collect products on their fallow land. For example, in Tay Nguyen, farmers consider fallow fields a storage place where they can collect vegetables, firewood, fruits, foodstuff and medicinal plants. When population density is sparse and cultivated land is large, the land can remain fallow for a long time. However, in existing circumstances, there is a dense population along with a land allocation policy that limits the amount of cultivated land to farm households. To overcome the lack of cultivated land, farmers in many places grow crops/trees during the fallow period, which improves the soil nutrients. Additionally, this practice not only reduces the fallow period but also so provides firewood to the farmers. Local authorities and farmers in places such as Nghe An and Son La provinces began swidden land planning and allocated cultivation land into plots to rotate cash crops and crops/trees that restore soil fertilizer. The cultivation period is 2 to 5 years depending upon the number of rotation plots, total swidden areas and growth capacity of fertilized soil crops/trees.

(2) Forest and Terrace System

The forest and rice terrace system existed for many centuries and was adopted in several northern mountainous and central mountainous regions in Vietnam. This system reduces soil erosion and takes the initiative in irrigation. It has an important role in preserving irrigation water and regulates the water supply to rice terraces, preventing of landslides and offering forest products, because of its advantages to farmers, these systems have been highly considered by the government (to transform the swidden fields into rice terraces, the government is providing farmers with 5 million Vietnamese Dong/hectare).

(3) Composite Swidden System

This is a popular technique of the Tay in Da Bac, and other ethnic minorities living near the valleys. This system consists of three main components including forest rotation-swidden fields on hillsides-paddy rice in valleys; combined with livestock raising and collecting non-timber forest products from forests. This system seems fairly sustainable when population density is about 100 people per km².

(4) Traditional Home Garden

In the agroforestry system, the home garden is traditional throughout the rural areas of Vietnam. The home garden system consists of perennial and annual crops, animal husbandry and aquaculture components. Furthermore, these components are combined to take advantages of soil productivity and surface spaces. This system also includes time consumption and household labor to produce foodstuff, and generate household income. However, this system in the upland regions is not as developed as in the lowland regions.

(5) Forest Garden

Forest gardens grow perennial and fruit trees that supply highly value products. However, this system often fluctuates from 0.3 to 0.5 hectares, and sometimes there are several hectares per household. Most forest gardens are usually next to households' residential land. Normally, the structure of forest gardens has a primary timber storey which is only one type of tree. Furthermore, there is a lower crop storey that is intercropped with the timber. Based on ecological conditions, traditional experience and custom, as well market demands of each region, farmers grow material trees or special trees such as *dien* bamboos (*tre dien*) in Phu Tho, *luong* in Thanh Hoa and Hoa Binh, cinnamons in Yen Bai, Thanh Hoa and Quang Nam, *tram* in Phu Tho, *boi loi* in Tay Nguyen provinces, cashews in the Mekong River delta, coconuts in Binh Dinh, anises in Lang Son, etc. In addition, they plant other crops in the lower storey to take advantage of land and solar energy such as food crops (rice, maize, cassava, bean, etc) and medicinal plants (gingers, saffron, lemongrasses, etc). The land allocation policy and programs (the 327 and 661 programs) support farmers adopt widely all over Vietnam's upland to improve bare land and bare hills, and to increase household income.

(6) Perennial Tree Garden

This system grows perennial trees intensively. This system often uses land ranging from 0.5 to several hectares. Perennial trees with multiple purpose trees are largely grown to create shadow, windbreak and take advantages of other products. Households are located in the valleys which are near or far from the perennial tree garden, but they have favorable water and transportation conditions for daily activities and trading. This system established under the form of farms or plantations to trade highly value products of perennial trees. The system's structure consists of high storey of trees to produce primary commodities such as coffee, cacao, pepper, rambutan, etc. Annual crops are often grown between tree rows in the early years to take advantages of the land and they reduce weeds. Ecological storey is grown to cover land, reduce surface flow, and regulate water to keep it moist for the main storey. This system is common throughout the southern provinces where they have expansive and fertile land that is suitable for perennial trees.

(7) Fruit Garden

This traditional land-use system is found next to residential land. It often comprises from 3 to 4 main storeys. The upper/top storey includes large and light preferred fruits such as durians, coconuts, mango, jackfruits, litchi, longan, etc. The middle storey includes average and shading fruits such as mangosteens, *dau da*, sapotas, orange, mandarin, custard-apple, etc. The lower storey includes small and short, and shading fruits such as cacao. The bottom storey could include medicinal plants.

(8) Garden-Fish Pond-Livestock

This system is very common throughout Vietnam, from lowlands to uplands. The average area of this system is about from 500 to 1,000 m² per household, even up to 2,000 to 5,000 m². The system's upper storey includes multi-purpose timber trees or fruit trees. The lower storey includes fruit trees, root crops or medicinal plants, and a small vegetable garden. Besides fruit garden, this system also consists of livestock and fish pond.

(9) Forest-Garden-Fish Pond-Livestock

In fact, this system is derived from the Garden-Fish Pond-Livestock system and has long been developed in some upland areas. This system combines forest, fruit tree garden, fish pond and livestock.

(10) Forest-Cash Crops-Paddy Rice

This system is often established in relatively large upland areas. Natural or planted forests are located at the top of the hill. Irrigation system has been built to supply water for cash crops in terrace field and paddy fields in valleys.

Category 2: Innovative Agroforestry Systems

Innovation of agroforestry systems are often introduced and developed in some areas by outside technicians. Hence, they are different from traditional agroforestry systems that were created by the local people in the uplands. In these agroforestry systems, the types of trees and biological diversification level are simpler than those of traditional systems. In addition, innovative systems apply advance land use technologies. Recently, these systems have been introduced into Vietnam, but they haven't been tested over long time. Currently, many innovative agroforestry systems have been introduced and adopted in different slope land regions in Vietnam.

(1) Alley Cropping

This type of cultivation method uses trees/crops are planted in contours in the slope lands. This system was just introduced into Vietnam, and it became popular in the past ten years. This system includes hedgerows and cash crops that are grown between hedgerows. Normally, the distance between hedgerows is around one meter. Those hedgerows are comprised one to two timber trees or perennial bush rows and are periodically pruned to create sun light for cash crops. Hedgerows are grown by improved the soil for the trees. These trees create favorable condition for better crops developing; offer soil organic elements due to decaying debris dropped from trees/leaves dropping; and supply farms with timber, firewood and other utilities. This agroforestry practice is applied in slope land areas. This system, known as SALT1-SALT4 models is based on the proportion among the agricultural crops, perennial trees and livestock. The hedgerows are grown in contours and the distance between these rows of trees varies on the slope hill. This model offers various advantages, for instance, reducing surface flow, supplying feed sources for livestock or humus to restore soil fertilizer. With this technology, after a couple of years, it will form natural storeys. In contrast, this system has weaknesses, for example, it needs more capital, technology, and labor, therefore, it hasn't encourage d farmers adopt this model. Due to the above reasons, in Vietnam, these models have been applied in areas where projects support farmers seedlings and technologies such as in Hoa Binh, Nghe An, Son La, etc. However, they have not been fully developed

(2)Green Fence/ Boundary Planting

This model is very popular in Vietnam's rural regions. Legume is grown to be used as fences, thus preventing buffalos from destroying farms, and establishing clear boundaries among different owners of that area.

(3) Windbreaks and Shelterbelts

This system consists of timber and bush trees that are planted in alleys to protect soil from damaging winds and reduce wind erosion. The structure of shelterbelts and the distance among shelterbelts depends upon what trees/crops are planted such as agricultural crops, perennial trees, fruit trees. In Vietnam, windbreaks and shelterbelts are planted widely on fields, especially in Tay Nguyen and this system is mainly used for coffee.

(4) Taungya

Taungya is applied in many forest projects in Vietnam. This technology is used to recover natural forests that were depleted. This system helps the farmers reduce management costs, increase benefits and protect environment. However, this system also has disadvantage that is short cultivation period. Hence, farmers sought other similar land to continue cultivate when the forests haven't closed their canopies. If the local authorities have no plans and instructions, the farmer would continue to slash and burn the forests for cultivation. Vietnam implemented programs recovering bare lands and hill programs and including the 661 program, farmers in many places have adopted this model, for example, in Son La Province the model intercrops swidden rice, maize and tecknonia granis in the first 2 or 3 year when forests haven't closed their canopies yet, or in some places, for instance in Hoa Binh, farmers sow melia seed in parallel with cash crops in the beginning years when melia hasn't closed its canopy .

Recently, farmers have applied technologies inactively that developed innovative agroforestry systems. The multiplication of these systems for other farmers still gets many difficulties in which seeking the market for products is limited. Almost all of communities adopt poor technologies. Hence, farm products have not been guaranteed about their markets and price. That is why innovative agroforestry farms have been developed unstably.

THE MARKET FOR AGRO-FORESTRY PRODUCTS

The production practices as well as many researches show that agro-forestry system is the form that utilizes natural resources synthetically to meet the requirement for the development of sustainable rural areas in the uplands. Agro-forestry products in these mountainous areas are much diversified and can be divisible into major groups as follows:

1. Timber Forest Products

The market for timber products in Vietnam mainly is mainly used for exporting and industrial use such as producing paper, pillars, and construction materials for the domestic consumption. The exports include *go dam*, plank, industrial round timber, *van dam*, plywood, processed timber, *van lang* wood, printing paper, cardboard, and paper powder. Presently, Vietnam's largest export market is China and Japan. The market in ASEAN is also large, but ineffective. The traditional market such as the Russian and East European markets have not been developed; however North American and West European markets have not established any market transactions

The export turnover of timbers and forest products is unstable and it fluctuates. Between 1990-2001 the export turnover in 1991 was the highest, gaining \$443.029 thousand (US dollars); whereas that in 1998 was the lowest, accounting \$82.561 thousand (US dollars). Over several years the growth rate of export turnover was negative (in 1992: -5.7% and in 1994: -73.43%). The volume of timbers exported in 1990 was in a very large quantity worth about \$430,022 thousand (US dollars); meanwhile the turnover of timbers exported in 2001 significantly reduced to \$122,471 thousand (US dollars, creating the disparity of \$307,511 thousand (US dollars). In recent years, under the innovation policy, Vietnam have carried out measures to manage and protect forests as well as issued some closer export policies. As a result, the export turnover has been stably seen and increasing. The export turnover was \$82,561 thousand (US dollars) in 1998, \$125,052 thousand (US dollars) in 1999, also \$125,052 thousand (US dollars) in 2000, and slightly reduced to 122,471 thousand (US dollars) in 2001 (Source: FAOSAT). The positive growth rate of export turnover reflects that the export value of one year is higher than that of a previous year.

In recent years, one of the characteristics in the international forest product trade is the upward tendency in processed timber products in the export structure. Due to the fact that the processing industry in Vietnam has been underdeveloped, timber forest products have not been suitable to common characteristics of the international forest product market.

2. Non-Timber Forest Products

Currently the forest policies offer positive achievements in recovering natural resources; however, several problems related to the unstable situations of people's lives in the uplands have risen from the implementation of those policies. The closed forest policy issued by the government partly limits the main source of the people's income. Therefore, to ensure the lives, local people have to direct towards the exploitation of non-timber forest products (NTFPs). In spite of that, the Government of Vietnam has not issued any of legal documents to manage and consume these products; therefore, the market for NTFPs is unstable and has not ensured product consumption. The consumption of NTFPs primary depends on the buyers and exporting these products are inconsistency to some neighboring countries like China.

Management of the market all over the nation only focuses on conserving precious spices endemic spices and extinction risked spices. Currently, there are no rules for NTFP management; products are not sold at the given price. Products are dispersed and transferred to several intermediate stages. Due to the lack of governmental intervention, the monopoly power of the buyer is causing a market failure and a barrier to limit the entries of new participants in the market. Consequently, local people do not know who the clients are, what are their needs, availability of the products, how many products to be ordered, what types of product they will receive and for how much. Local people often consider that everything exploited from forests belongs to the Gods; therefore, they intensively exploit them without the plan in order to reach immediate objectives of enrichment. This is one of the causes behind the depletion in NTFPs.

However, in some places under the implementation of projects or programs with technical instructions and market information, some types of NTFPs recovered and developed not only protect forest natural resources but also improve the living standard for local people living near the forest. Examples include the medicinal plant development project carried out in Tam Dao, Ba Vi, and Sa Pa.

3. Products from Fruit Trees

The terrain that lies on the high mountainous belt with specific climate regions and the area is very large and quite fertile provides the Vietnam uplands with many advantages in developing some types of high-value special fruit trees relevant to the subtropical and temperate zones of goods trees. These orchards comprised of plums and anises in Lang Son, oranges in Nghia Lo and Dien Bien, peaches in Sa Pa and persimmons in Da Lat. Additionally the domestic market is promising since there are about 16 millions urban people having the needs of fruits everyday. However, the fact shows that the development of fruit trees in Vietnam has not so far met the demand of domestic market both in the quality and quantity. In addition to the annual quantity of fruits domestically produced, fruits have been imported from several other countries. These products tend to be consumed in larger quantities. Nevertheless, the lack of information, the deficiency in short-term planning on material zones and processing establishments, and the poor transportation systems are constraints that causes the fruit products not to be consumed and they are not sold a cheap price. Some zones were planned for trees; however, local farmers did not know where to sell their products; and ultimately they destroyed them and replaced them by other types of trees.

In terms of export, due to the lack of marketing activities to establish markets, quality product, the style have not met the demand including the preferences of foreign clients, and the export market for fruits of Vietnam is unstable due to its small size.

4. Products from Industrial Crops

In the past few years, the shift of production structure towards commodity orientation has brought effective changes in improving income for households and contributing to poverty alleviation. Some regions are specialized to grow perennial trees such as coffee, tea, pepper and sugarcane. The majority of these products not accounting sugarcane are mainly produced for export. Due to the lack of market information, the price is depends on the export market and it fluctuates. During the past years, there has been a large quantities of exports, but unstable and did not concentrate on potential clients, the appearance of the product is poor and no brand name; therefore, the competitiveness in the international market is not strong.

5. Products from Animal Husbandry

Animal husbandry is regarded as the economic spearhead for the uplands. Together with the economic growth and the establishment of the expansion of new urban sectors, the domestic needs of food-stuff (e.g. meat, egg and milk) have continuously increased along with the demand for export, thus creating a new opportunity for the market in the mountainous areas. Based on the dominance on both physical conditions and markets, in recent years, some zones changed to famous husbandry specialization such as buffaloes in Tuyen Quang and Bac Can; cows for meat in Dong Van, Meo Vac, dairy cows in Ba Vi, goats in Ninh Binh; and bees in Dak Lak. It is estimated that annually there are about 10,000 buffaloes transferred from Tuyen Quang to the Red River Delta, Ho Chi Minh City, and even exported to Thailand. Cows are sold at 1 to 6 million VND per cow in the markets in Meo Vac and Dong Van towns every week. In 2002, 2000 tons of honey was exported by the Tay Nguyen Honey Processing Joint Venture Company in Dak Lak.

6. Food and Food Stuff Products

Traditional crops in the uplands are comprised of rice, bean, maize and canna. These crops are mainly local varieties. They can be intercropped with fruit or forest trees in the first three years, but their productivities are very low. In some places, this group of products is primarily produced for subsistence of upland people. However, in the past few years, due to the development of the market for husbandry products and the increase in needs of cattle feed, some areas have shifted the production structure toward the specialization in material crop cultivation and goods-oriented products such as maize, bean and canna. For example, maize in Son La is mainly cultivated in the upland fields, alluvia plain and other fields in spring; maize in Son La is consumed in several markets throughout the nation such as Ha Tay, Thanh Hoa, Nam Dinh, Vinh, and so on.

SOME CONSTRAINS IN THE DEVELOPMENT OF AGROFORESTRY SYSTEMS IN VIETNAM

Many researchers prove that the expansion and development of agro-forestry systems in the rural, particularly in the uplands or the remote areas is the essential condition for the stable economic development as well as natural resource conservation. However, actually this system has not been developed nationwide. It is believed that the causes behind this fact are as follows:

1. The Policy

Currently there is a deficiency in comprehensive and specific policies to encourage the development of agro-forestry systems. There are many problems with these policies because they are integrated into other policies such as the land policy, the forest development policy, the rural development policy, and the poverty alleviation program.

Vietnam's land policy has not been entirely suitable for stimulating agroforestry practice. Several years ago, upland farmers only had rights to manage agricultural land, not forest land. In recent years, farmers have been allocated some forest lands. However, these lands were allocated in scattered plots, far from agricultural land, making it very difficult to build self-contained agroforestry models on a household scale.

The land policy in Vietnam was irrelevant to the development of agro-forestry. Upland farmers were formerly given the right to manage agricultural land but forest land. In recent years the right to control forest land has just been given. However, due to the fact that the paddy field is allocated to households dispersedly and the forest land is not adjacent to agricultural land, it is difficult to build agro-forestry systems in household size.

2. The Market

Vietnam has a total of 8,213 markets, of which 1,611 markets are located in upland regions, and only 227 of these markets are located in the Tay Bac region¹. If we divide that number by the total number of communes in Tay Bac, we can see that the market network in the upland is sparse. It means that marketing upland agroforest products faces many problems

Many areas in the uplands hardly have any markets. The farmers who sold bamboo shoots, mushrooms, pigs or buffaloes does not mean that their products appear in the markets. That is actually a mode of self-sufficient production; local people only sell those things when they need money for treatment, clothing, books for their children, weddings, and funerals. Although the market is in some areas, the market is unstable. Farmers have not received any help on product consumption.

The market is not only buying or selling even those are the main and recognizable activities, but also requiring the understanding of consumer behavior (which products they need) and marketing sectors in order to get the best benefits. The marketing is comprised of many activities such as planning, a pricing, promoting trade, delivering products and services to the consumer. In a point of view of economics, whatever types of market still answer three questions related to goods including what, how and to whom. All of these problems remain unanswered in Vietnam.

CONCLUSIONS

The development of sustainable agriculture and forestry in the uplands not only plays a significant role in improving the living standard for upland farmers, but also make a grate contribution to the socio-economic development of the nation. Of the sustainable agriculture and forestry development forms, agro-forestry needs to be paid more attention not only to the agro-forestry model development but also to the market for agroforestry products.