The Impact of HIV/AID on Community-based Resource Management: A Case Study of an Indigenous Irrigation System in Northern Thailand[1]

By

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Introduction

The first case of HIV/AIDS in Thailand was reported in September 1984. Since then, the progressive numbers of AIDS cases as well as people with HIV were reported throughout the following years. In less than a decade, the HIV/AIDS epidemic has become the nation's highest priority public health problem with wide ranging medical, social, and economic consequences.[3] Heterosexual transmission accounts for such rapid expansion (Napaporn et al. 1992; Brown and Xenos 1994). According to the Ministry of Public Health's Epidemiology Division, from 1984 to 1999, there were 178,499 cumulative AIDS cases, with 32,935 cumulative deaths (Division of Epidemiology 1999). However, such reported figure didn't cover all infected cases. This under-reporting of AIDS cases remains problematic. Based on the Thai National AIDS Programme's estimation, by the year 2005, 1.8 million people in Thailand would have been infected with HIV, and more than 800,000 would have died of AIDS (NESDB Working Group on HIV/AIDS Projection 1994).

In case of Northern Thailand, the region has been severely affected by an explosive expansion of HIV/AIDS and consistently shown the highest rate of HIV infection. Statistically speaking, about 40 per cent of reported AIDS cases in Thailand are in the Northern region, particularly in six provinces namely, Chiang Mai Chiang Rai, Lamphun,

Lampang, Phayao, and Mae Hong Son (Sopon 1996). There are numbers of reasons why the epidemic is more advanced in the region. The most important one is that Northern Thailand is a reservoir of commercial sex workers which greatly enhances the possibility of HIV transmission. This livelihood strategy among Northern Thai women is occurred in response to the lack of education and poverty in the region. Prostitution is seen as a source of high income for family welfare (Muecke 1989). At the same time, Thai men have greater freedom in their sexual activities and few societal limitations for them to visit sex workers. A survey of partner relations conducted in Thailand by Werasit (1992) found that close to 80 per cent of the men who had non-marital sexual encounters reported paying for sex. This sexual behavior pattern has created an active and well-attended commercial sex industry which, in turn, fuels the rapid growth of the epidemic. Another study conducted in Northern Thailand estimated a dramatically high 3 to 8 per cent chance of a sex worker transmitting HIV to her client in a single unprotected sexual act (Mastro et al. 1994).

HIV/AIDS in Northern Thailand managed to gain a foothold in high-risk groups such as gay men and injecting drug users before expanded to commercial sex workers. From commercial sex workers, HIV/AIDS has spread rapidly into the general population (CDC 1996). The problem has been getting serious since

1992 onwards, with far reaching impact on the region. As the rate of HIV infection peaks in the 20-45 age group (about 88 per cent of AIDS patients), loss of productive labor has been increasingly evident.[6] Such loss will aggravate the problem of labor shortage which currently exists in the region.[5] However, little is documented and understood about the effects of HIV/AIDS epidemic in the context of Thailand and Northern region in particular. Thus, this paper aims to provide some information on the effects of HIV/AIDS on community-based resource management by focusing on an indigenous irrigation community, locally called muang fai, in Sanpatong District, Chiang Mai province in Northern Thailand. The area has been severely affected since 1992 and still has the highest death rate and infection in the region. As a result, the indigenous irrigation, which requires intensive labor utilization for effective operation and maintenance, will inevitably be affected. The paper will discuss both the impacts and responses of the indigenous irrigation community to AIDS epidemic. This type of information will fill the gap in our knowledge and provide strategic response to HIV/AIDS.

Northern Regional Profile

Northern Thailand comprises seventeen provinces and covers an area of approximately 169,600 square kilometers on which 12.12 million people live. For development purposes, the area is further divided into two sub-regions:--the Upper and Lower North (see Table 1.).

Agriculture is still a leading sector despite declines in its share of the Gross Regional Product (GRP) due to the increased diversification in regional economic structure (NDC 1999). Usually, agriculture contributes about 20 per cent of GRP, but sixty per cent of the labor force still depend on the agricultural sector for their livelihood (NSO 1999). Rice continues to be the main crop although various crops, particularly fruit trees are now being cultivated in response to the foreign market demand. Only in this region, however, do indigenous irrigation systems play a dominant role in agricultural production. According to 1993 figures, the irrigated area covered by these indigenous irrigation systems totaled 3.3 million rai[4] in the whole region. In contrast, the seven government-managed irrigation systems in the region comprised an irrigated area of only about 800,000 rai (Royal Irrigation Department or RID 1994).

Table 1. Number of Population in Northern Thailand (1999)

Unit : Person

Region	Total Population	Male	Female
Upper North	6,280,804	3,135,843	3,144,961
Chiang Mai	1,587,465	787,608	799,857
Lamphun	407,085	200,173	206,912
Lampang	806,762	401,836	404,926
Mae Hong Son	232,483	120,453	112,030
Tak	484,678	246,517	238,161
Chiang Rai	1,265,091	632,753	632,338
Phayao	515,128	255,888	259,240
Phrae	492,607	243,111	249,496
Nan	489,505	247,504	242,001
Lower North	5,844,135	2,894,658	2,949,477
Phitsanulok	868,138	431,101	437,037
Uttaradit	485,025	240,897	244,128
Sukhothai	627,585	306,912	320,673
Phichit	598,406	293,923	304,483
Kampaeng Phet	765,876	381,002	384,874
Phetchabun	1,040,731	521,846	518,885
Nakhon Sawan	1,126,311	555,107	571,204
Uthai Thani	332,063	163,870	168,193
Total	12,124,939	6,030,501	6,094,438

Source: Department of Local Administration, Ministry of Interior.

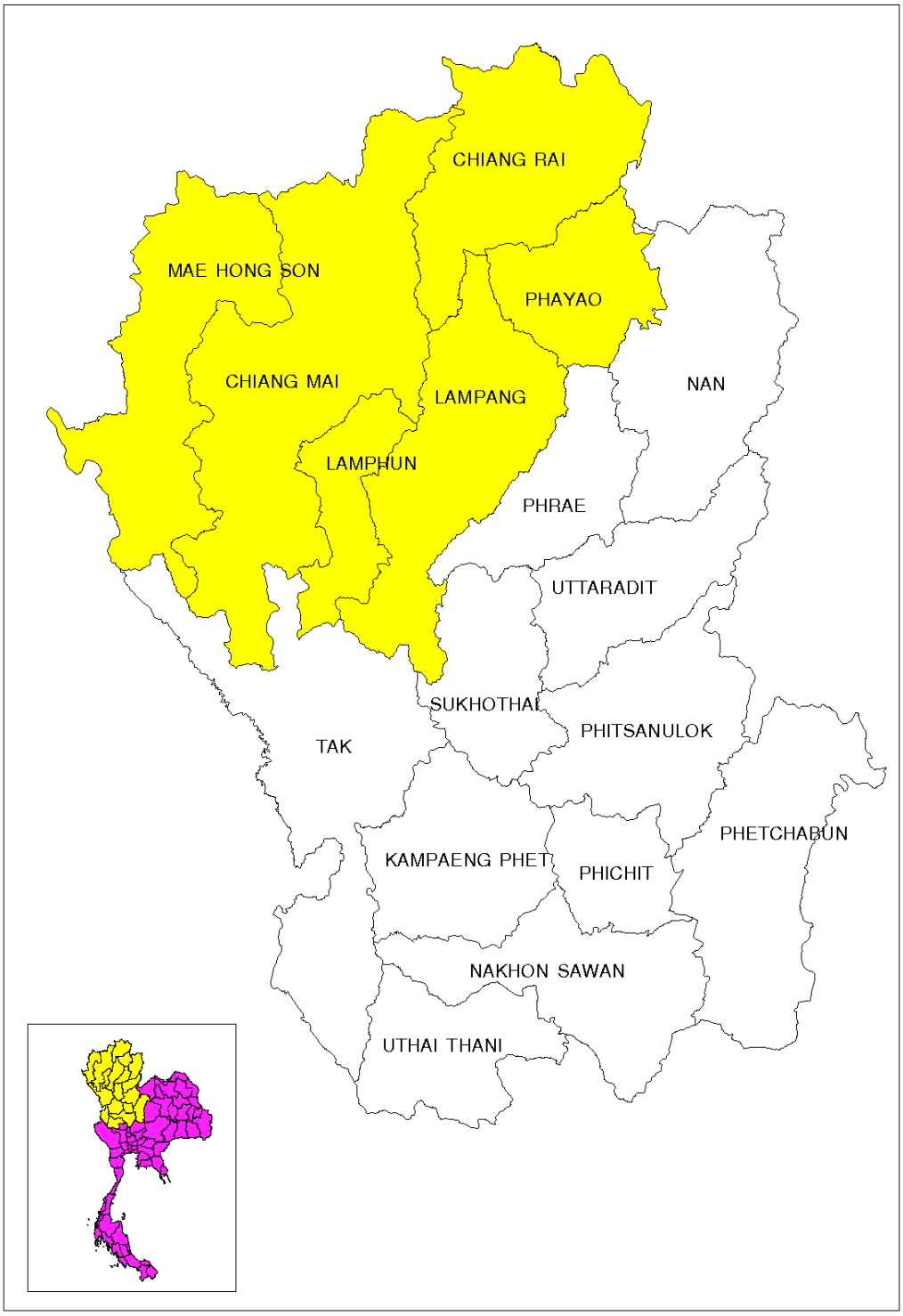
HIV/AIDS in Northern Thailand

The pattern of HIV/AIDS transmission in Northern Thailand follows the same pattern of the country. High risk groups, such gay men and I.V. drug users, played a major role in the early stages of the epidemic. HIV infection exploded among I.V. drug users, rising from almost nil to 60 per cent in a single year (CDC 1996). At nearly the same time, the second wave of infection spread among sex workers and then to their clients and later to their wives and children, the third and fourth waves. Undoubtedly, the widespread sexual behavior

among Thai men helps to fuel the rapid expansion of HIV into the general population.[7] In 1989, the Ministry of Public Health initiated an HIV sentinel surveillance system in 14 cities over the country. The first round of testing revealed that nearly half (44 per cent) of brothel-based sex workers in the northern province of Chiang Mai were infected with HIV. Subsequent rounds of sentinel surveillance showed steadily rising infection rates among men attending STD clinics, reaching more than 8 per cent by mid-1992. As these men brought the infection home to their wives, increasing numbers of pregnant women began to test positive for HIV. HIV thus spread rapidly between sex workers and their clients. The result has raised an awareness of the seriousness of AIDS in Northern region (World Bank 2000).

The severity of AIDS in Northern Thailand has concentrated in six provinces in the Upper North subregion namely, Chiang Mai, Chiang Rai, Lamphun, Lampang, Phayao, and Mae Hong Son (see Figure 1. and Table 2.).

Figure 1. Map of Northern Thailand and Six Provinces Seriously Affected by HIV/AIDS



Since 1992, the HIV/ AIDS has spread to the village level and become the main public health and social problems in the region. Clearly, the epidemic was not limited to a few isolated "risk groups" as previously thought. The numbers of HIV-infected people increased rapidly and peaked between 1995-1996.

Through AIDS campaigns and prevention programs, the government has succeeded in controlling new HIV infection in the region. The numbers of infected cases decreased from 13,026 cases in 1996 to 9,036 cases in 1999, especially in six provinces under the jurisdiction of Northern AIDS Coordination Center (NACC). However, considering the proportion of HIV infection, the figure hasn't changed much. About 40 per cent of adults infection still persist in the region. Thus, the AIDS crisis is far from over and still needed government attention and collaborative efforts for effective control of the epidemic. Especially, under the recent regional socio-economic transition, such as the migration of illegal migrant workers from neighboring countries and risk behavior among the youth, HIV/AIDS prevention have become even more difficult (Sopon 1999).

Table 2 Numbers of Reported AIDS Cases in Northern Thailand, 1984-1999[8]

Unit : Person

Region	1984-1995	1996	1997	1998	1999	Cumulative Cases
Upper North	25,236	10,802	11,087	9,534	7,234	63,893
Chiang Mai	9,072	3,322	3,007	2,183	1,532	19,116
Lamphun	2,069	966	915	793	618	5,361
Lampang	2,488	1,112	1,264	1,090	955	6,909
Mae Hong Son	549	219	166	117	69	1,120
Tak	271	149	234	164	108	926
Chiang Rai	6,288	2,455	2,793	3,048	2,253	16,837
Phayao	3,072	1,673	1,775	1,370	1,080	8,970
Phrae	825	478	513	367	357	2,540
Nan	602	428	420	402	262	2,114
Lower North	3,059	2,224	2,626	2,454	1,829	12,192
Phitsanulok	392	278	333	322	285	1,610
Uttaradit	184	115	114	108	11	532
Sukhothai	474	300	376	375	306	1,831
Phichit	266	238	225	333	188	1,250
Kampaeng Phet	588	336	550	234	199	1,907
Phetchabun	434	413	397	495	321	2,060
Nakhon Sawan	615	439	541	497	439	2,531
Uthai Thani	106	105	90	90	80	471
Total	28,295	13,026	13,713	11,988	9,063	76,085
Whole Country	59,913	32,332	34,332	29,605	22,267	178,499
Northern/Country(%)	47.2	40.2	40.0	40.5	40.7	42.6

Source: Adapted from Epidemiology Division.

The Policy Response [9]

Information about the progressive growing epidemic eventually made HIV/AIDS a top priority public health problem among national and provincial leaders and the general public. In 1987, the Cabinet approved the launching of AIDS Prevention and Control Program in Thailand (1988-

1991), as developed and proposed by the Ministry of Public Health. In the following year, the Ministry of Public Health, with financial and technical assistance from the World Health Organization (WHO), formulated a Short Term Program with initial funding of US$ 500,000. This plan served as an immediate response to HIV/AIDS.

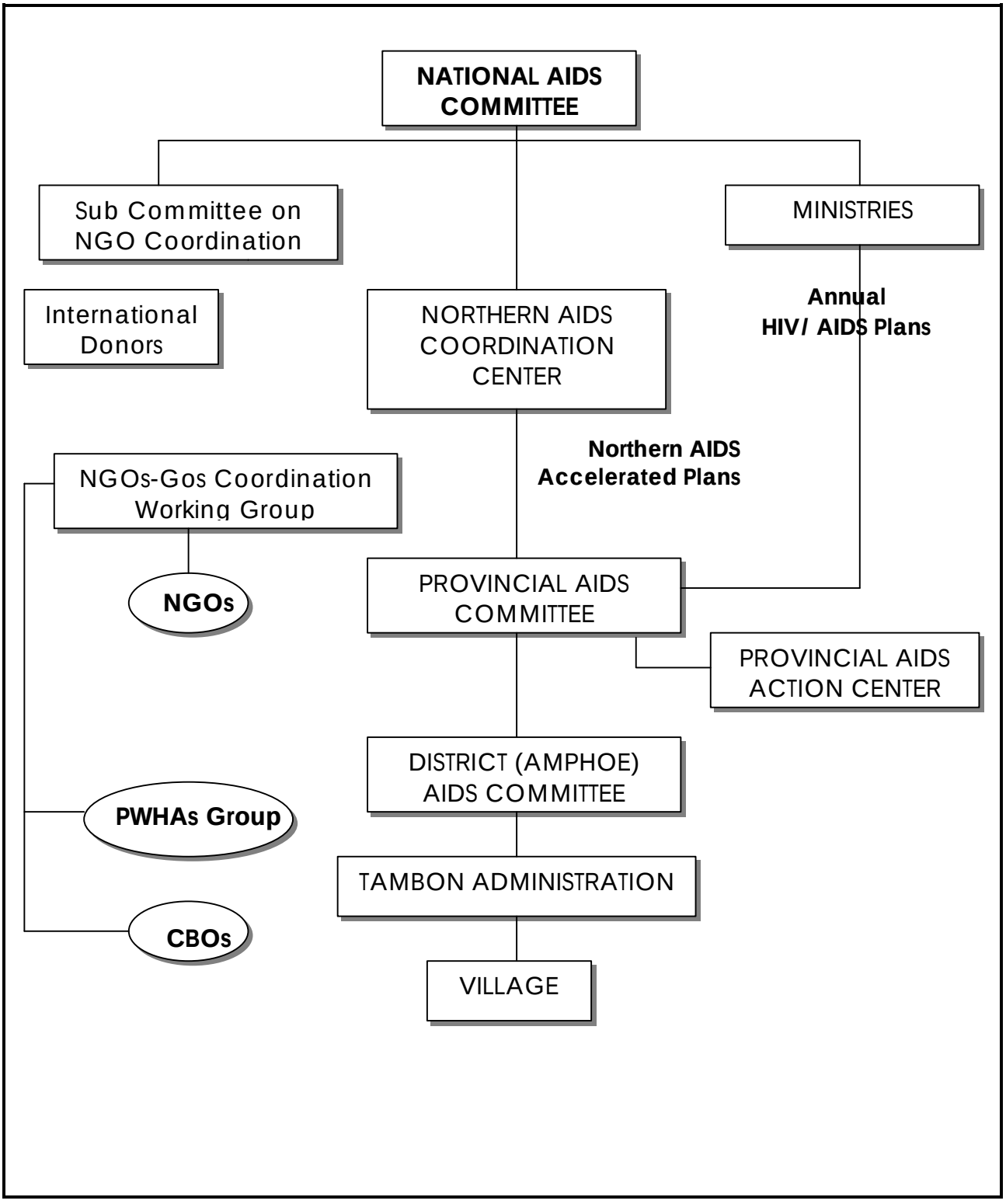
In 1989, the Thailand's Medium Term Program for the prevention and control of AIDS was formulated and implemented by the Ministry of Public Health. It was a three year plan, with detailed workplans developed annually. It included activities in program management, health education, counseling, training, surveillance, monitoring, medical and social care, laboratory and blood safety initiatives.

For better coordination among various agencies, the National AIDS Committee (NAC) was first established in 1985. Originally, it was chaired by the Director-General, Department of Communicable Disease Control, then the Permanent Secretary of Public Health and later by the Minister of Public Health. The NAC has adjusted its membership to reflect the growing health and social dimensions of the expanding HIV/AIDS epidemic. Today, in order to more effectively meet the challenges of the epidemic and to secure the direct political commitment of the highest national authority, the NAC is chaired by the Prime Minister.

To carry out the AIDS prevention activities, the Ministry of Public Health coordinated its national AIDS program through an Executive Board, composed of six technical subcommittees. The AIDS Division, originally called the Center for Prevention and Control of AIDS, was established in 1987 under the Department of Communicable Disease Control. In addition to serving as the Secretariat to the Executive Committee and its six subcommittees, the AIDS Division also serves as the Secretariat to the NAC. It assigned tasks include planning, monitoring, and evaluating AIDS prevention and control activities.

At the provincial level, under the chairmanship of the Governor, a Provincial AIDS Committee is directly responsible for the planning, coordination, and monitoring of the provincial HIV/AIDS program. Various agencies in the province are responsible for implementation of the activities. A similar organization is applied to activities at the District level (see Figure 2.)

Figure 2. Organization Structure of HIV/ AIDS Program in Thailand



For the planning of HIV/AIDS prevention, in 1992, the National Economic and Social Development Board (NESDB), the highest planning body in Thailand, was assigned to formulate the First Five Year Plan for National HIV/AIDS Prevention and Control (1992-1996). The Plan served as a framework for detailed workplan and budget allocation among the concerned agencies. Such involvement helps to move HIV/AIDS prevention into the national agenda. To date, it is in the period of the Second Five Year Plan for National HIV/AIDS Prevention and Control (1997-2001).

In case of Northern Thailand, the response to the epidemic is quite unique and different from other parts of Thailand. This occurred as a response to the rapid expansion of HIV/AIDS. In response to such crisis, the government established the Northern AIDS Coordination Center (NACC) in 1994. This Center is a special unit under the NAC. It is chaired by the Deputy Minister of Public Health. In addition to serving as the coordinating body, NACC was able to allocate its budget directly to GOs, NGOs, and local community groups for HIV/AIDS prevention activities.[10] Its activities covered six provinces, with highest rate of HIV infection in Northern Thailand(see also the Figure 1). NACC serves as a model for HIV/AIDS prevention in other parts of the country. The other organization, which also played a significant role in AIDS prevention, was the Northern AIDS Prevention and Care

Center (NAPAC). It was established in 1993, with funding support from the Australian Government. These two umbrella organizations coordinately played a significant role in coordinating the activities of government agencies and NGOs and to encourage a positive community response.[11]

Under the NACC and NAPAC's support, national and international NGOs operating in many sectors shifted their priorities to include an emphasis on HIV prevention and care. Moreover, a number of local community groups grew up focusing specifically on problems related to the epidemic. The most important one was the emergence of People Living with HIV (PWH) groups in the early 1990s. Today there are about 200 active PWH groups scattered around the heavily HIV-infected provinces across the region (AIDSNet: Personal Communication). This new type of organization can provide the grass root support to people who live with HIV. The organization's activities include health care, counseling, vocational training, home visits, and community education. Aside from these activities, PWH can create the supporting environment to those infected. This type of peer-based service is appropriate under limited government financial resources.

With close collaboration among GOs, NGOs, and community groups, Thailand is now well known for its effective program to control of HIV/AIDS. This society-wide response has substantially reduced the incidence of HIV and has

mobilized a wide rang of resources to care for those affected by the epidemic. Despite the success in stabilizing the new infection, HIV/AIDS continues to spread and the crisis is far from over. The government thus cannot relax its guard against HIV/AIDS based on the reduction of new HIV infection. In addition, current information on trends in sexual risk taking behavior have yielded conflicting results. The condom use between noncommercial sexual partners and indirect sex workers remains low– about 12 to 20 per cent range, and these can be the new sources of HIV expansion (World Bank 1999). Thus, it is necessary for the government to sustain the previous successful prevention efforts and to expand its activity to cover care and treatment and impact mitigation in response to the epidemic at the turn of the millennium(Westley 1999).

HIV/AIDS Impact: The Hidden Problem

Up to now, both the actual and potential impacts of HIV/AIDS on people and society in Thailand has largely been analyzed in terms of medical and clinical issues: the cost of testing for HIV infection, of clinical care for AIDS patients, of protecting the blood supply, of sterilization practices and of publicizing health information about AIDS (Sukhontha et al. 1992; Viraivan 1995; Chaiyot et al. 1995). Little attention has been given to analyzing the socio-economic impact of HIV/AIDS on wider society. Most studies, including the

government development activities, have mainly focused on HIV/AIDS prevention despite the fact that HIV/AIDS in Thailand has expanded for more than a decade. In fact, the epidemic is now threatening various aspects of Thai society ranging from rising mortality to food security (World Bank 1999).

To date, there is growing awareness on the effects of HIV/AIDS. Meechai et al. (1993) pioneered in this direction by assessing the direct and indirect costs at macro-level for the health system and economy. Varachai et al. (1995) analyzed the effects of AIDS death on number and structure of the national population. The results showed that effect of AIDS death on the size of national population is not significant. Thus, the study pointed out that it is not necessary to change the current population control policy. However, the macro-level studies can provide only a part of the picture needed to explain the HIV/AIDS impact, and must be supplemented by the analysis of AIDS impact at the local level. For example, van Griensven et al. (1998) found that death rates of men 25-29 in Chiang Rai and Phayao provinces has increased almost tenfold due to AIDS. In addition, these early studies mainly used secondary data from documents, articles, and research reports while studies of the effects of HIV/AIDS at the level of individual, family, and community are few and far between.

In case of Northern Thailand, limited data is available on the socio-economic effects of HIV/AIDS despite its particularly high infection rates.[12] At present, the impact of HIV/AIDS is now already evident which affect the individual, the family, and the community in various ways.[13] Foremost among the impacts of growing HIV-related illnesses and deaths will be the loss of productive labor resources. It is only in recent years that attention has focused more on the problem of the loss of productive labor and fear of labor shortages as a result of AIDS whether this be in agriculture or wage labor (Bangkok Post 1996).

Sopon (1996) and Sopon and Apichart (1997) did their pilot study on the impact of HIV/AIDS on local communities in Sanpatong District, Chiang Mai province. The findings indicated that HIV/AIDS caused a major reduction of productive labor resources in the community. The death rate in those communities between 1996-1999 increased from 16 persons per year to 31 persons per year. Such increase was attributed to AIDS. The studies also provided information on the responses of local people to the epidemic. A similar study conducted by Sumalee et al. (1997) also provided the information on the economic impact of AIDS on local families and communities in five districts of Chiang Mai province. About 96 per cent of those infected were males. And the average cost of treatment and transportation for treatment per infected patient who had died was about 26,387 baht.[14]

Moreover, the household had to pay 38,440 baht for funeral cost. The study found that there were no existing mechanisms to mitigate both individuals and households affected by the AIDS epidemic.

Wassana and Sasipen (1999) investigated the household resources allocation in response to AIDS-related illnesses. The findings showed that household income reduced as the infected person became ill, at the same time expenditures increased. This led to a decrease saving. Family members would also resolve by reducing consumption and finding additional income through additional time spent on job. Sukhontha and Watts' study (2000) of household impact of AIDS in Phayao, also provide an understanding of various coping mechanisms among the infected households, including the role of Buddhist Monk in caring for HIV/AIDS patients. Recently, the study of HIV's impact has focused on children and older persons. In villages throughout Northern Thailand, grandparents well past retirement age are now struggling to support their grandchildren whose parents have died of AIDS but who are not infected themselves (Knodel and van Landingham 2000).

Despite the growing literature on HIV/AIDS impact, various aspects of HIV/AIDS impact have not yet been fully analyzed. Like Northern region, agriculture is still a major contribution to the growth of the region and provides full or

part-time employment for more than half of the region's labor force. Attention rarely focuses on the impact of HIV/AIDS on agriculture and farming system and therefore on rural livelihood.[15] Moreover, the government has not yet given its program priority beyond the prevention activities. HIV/AIDS' impact is still be a hidden agenda in the fight against AIDS to date. Thus, under the widespread of the AIDS's impact, it has become necessary to address and understand more of its impact and place greater emphasis on impact mitigation in confronting the future of HIV/AIDS epidemic.

The Setting

Socio-economic Profile of Sanpatong District

Sanpatong is one of 22 districts of Chiang Mai province. The area is located about 30 km. South of Chiang Mai city. The district is further divided into 11 sub-districts. As of 1999, the district contains a total population of 79,843, (38,762 males and 41,081 females). This population comprises 25,869 households, with 70 per cent being farm households. These households reside in 117 villages, the smallest administrative unit.

The main economic activity in the district, like Northern Thailand in general, is agriculture. Agriculture in this area, before the government's involvement in promoting the intensification of the commercial production of rice and cash

crops, was devoted only to wet-season rice cultivation for household consumption (Anan 1984). Because of the uneven distribution of rainfall during the cropping season farmers were compelled to construct irrigation systems (see Figure 3). Fukui (1986) indicates that planting rice in Sanpatong would have been impossible without irrigation.

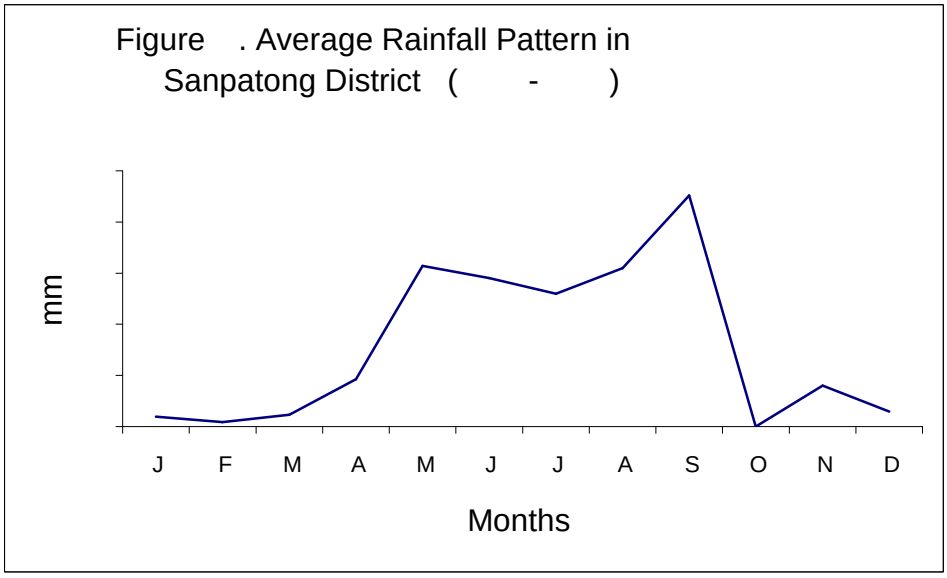


Figure . Average Rainfall Pattern in Sanpatong District (-)

Source: RID (1990).

To date, the common cropping pattern in the area is the wet-season rice followed by non-glutinous rice and several cash crops during the dry season(see Figure 4). Some upper areas, farmers now turn to longan fruit orchard which has become popular during the last decade because of its increased international market demand and labor shortages. The area has been reported as the most intensively-cropped area in Northern Thailand (Wanpen et al. 1980).

Figure 4 Cropping Pattern Calendar in Sanpatong

Crop / Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet-season Rice												
Dry-season Rice												
Soybean												
Onion												
Groundnut												
Chili												
Garlic												
Tobacco												
Potato												
Longan												
Irrigation Maintenance												

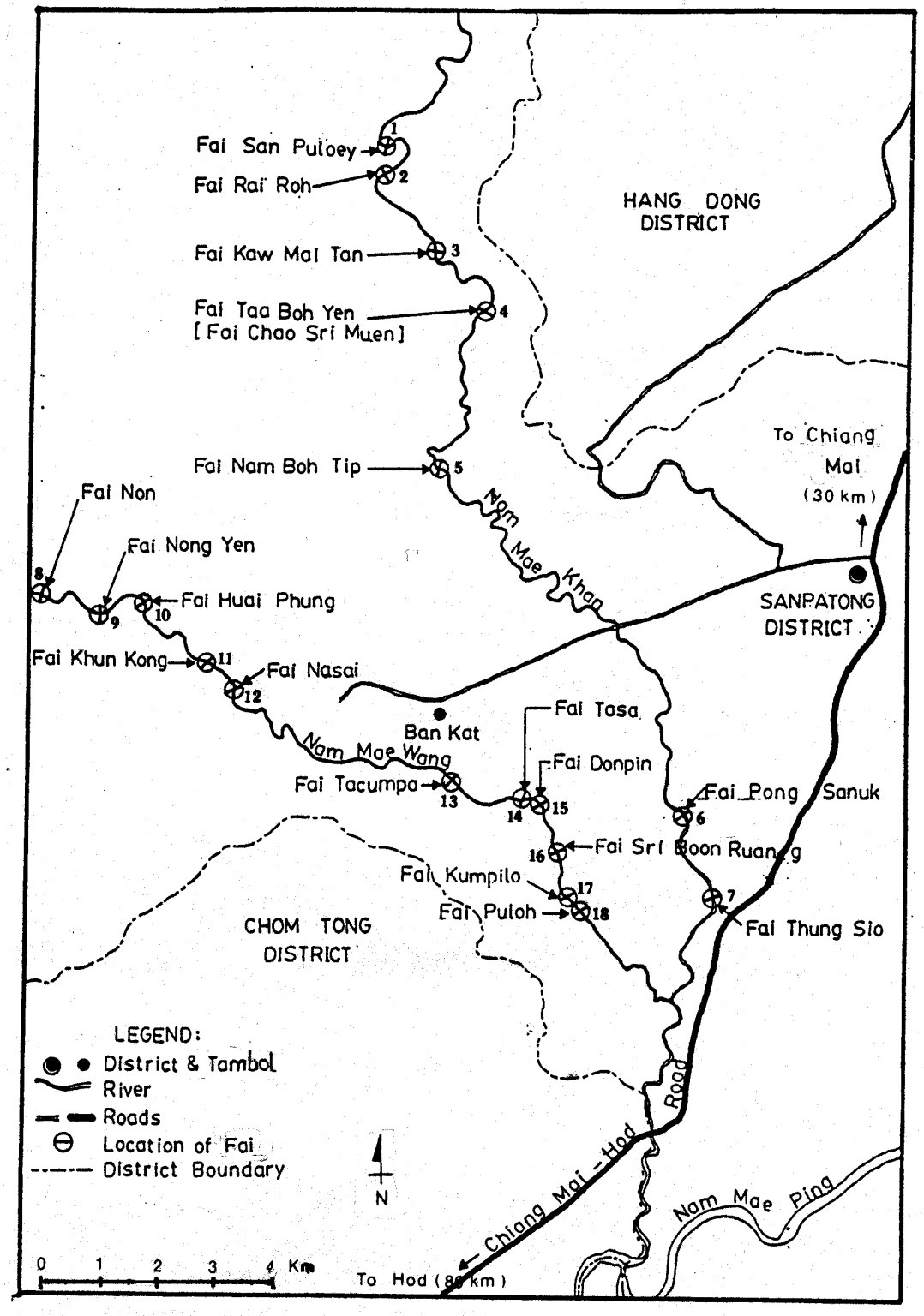
Indigenous Irrigation Systems in Sanpatong District

Indigenous irrigation system, locally called muang fai, is characterized by a weir built across the river to raise the water level so that the water can enter the main canal and convey it to the fields through gravity. These irrigation systems are communally managed and serve the agricultural water needs of Sanpatong district. They not only provide water during the

rainy season, but also make dry-season cultivation possible. It is a unique type of irrigation system, according to Tanabe (1994), as it cannot be observed in other parts of the country.

There are two major rivers---Mae Khan and Mae Wang---serving agriculture in the Sanpatong district. A long the course of these two rivers, farmers have collectively built 18 irrigation systems: 7 systems in Mae Khan and 11 systems in Mae Wang (see Figure 5). These systems have been constructed, operated, and maintained by the farmers for more than 100 years (Fukui 1986). The coverage of the systems varied from 300 rai to more than 10,000 rai. Only one muang fai system serves the land in one administrative village. The others irrigate areas in three or more adjoining villages. At present, almost all irrigation systems have been rehabilitated from temporary structure into permanent concrete structures through the government assistance (see Table 3).

Figure 5. Indigenous Irrigation Systems in Sanpatong District



Each muang fai system has its own organization. Its organizational structure is usually composed of irrigation headman, and one assistant in each village served by the system. The irrigation leader is elected by the water users in a general meeting. Originally, the members of the irrigation organization participated in the election without intervention from the outside. However, after the People's Irrigation Law of 1939 was passed, the election of the irrigation leader has to be witnessed by a representative from the district office. The results of the election are reported to the district office for formal announcement. The leader shall assume his post as long as he wishes to, or he is not replaced for being ineffective. Once elected, the leader appoints one or more assistants as well as a laam (messenger), whose duty is to inform members of the meetings, maintenance activities, or other decisions of the leader. However, at present, many systems no longer had the laam as they had been replaced by the use of loud-speaker. The assistant usually takes over the tasks of the messenger.

The membership of the irrigation organization consists of all water users in the system. Members are required to contribute labor and materials for irrigation activities in exchange for access to water. They are also required to pay water fee, or nam loh, based on the size of their irrigated area. Payment can be paid in cash or in produce, particularly rice.

Farmers whose crops failed are exempted from paying the water fee.

The water fee collected from the members are paid to the organization officials as remuneration. The irrigation officials are also entitled to a water exemption, or nam yok. That is, they are relieved from providing labor and materials for irrigation activities, and are only expected to supervise the work. All in all, the irrigation organization is responsible for all activities concerning the irrigation system. Moreover, each organization manages the system independently from other organizations. However, under the intensive cropping, the conflict between the irrigation systems along the Wang River usually occurs during the dry-season crop cultivation. For conflicts between irrigation systems, the district office serves as a ground where problems are discussed and solutions made.

Table 3 The Irrigation Systems in Sanpatong District

Name of the system	Irrigated area (rai)	No. of village served	Year of rehabilitation
Mae Khan River:			
Fai San Puloey	1,500	7	1991
Fai Rai Roh	989	8	1991
Fai Kaw Mai Tan	3,500	30	1991
Fai Taa Boh Yen	2,976	13	1990
Fai Nam Boh Tip	2,530	6	1986
Fai Pong Sanuk	3,200	10	1976
Fai Thung Sio	1,515	6	1990
Mae Wang River:			
Fai Non	500	1	1986
Fai Nong Yen	20,800	18	1977
Fai Huai Phung	1,500	5	1988
Fai Khun Kong	6,600	11	1983
Fai Nasai	1,550	9	1983
Fai Tacumpa	1,460	6	1988
Fai Tasa	650	6	1981
Fai Donpin	1,470	7	1970
Fai Sri Boon Ruang	650	3	1982
Fai Kumpilo	450	5	----
Fai Puloh	319	3	1983

Source: 1999 Inventory.

HIV/AIDS in Sanpatong District: No Coffins, No Tears

Like Northern Thailand, before 1992, people in Sanpatong paid little attention to HIV/AIDS epidemic. They mainly said “they are not afraid of AIDS, but afraid of losing chance of having sexual relation.” This phase was so common in the conversation. Due to its economic prosperity, the area had relative high prevalence of commercial sex workers thus thriving sex industry ranging from cafes to brothels. This sex industry usually catered to local demand. At that time, the rate of condom use was lower than 20 per cent, when males

visited sex workers (Sanpatong Health Worker: Personal Communication 2000).

HIV/AIDS epidemic affected the area at full swing from 1992 onwards. The severity of AIDS infection had been evident at the village level. Many people died and their neighbors discriminated against the infected families. Fear spread widely among local villagers. In response to the crisis, the District AIDS Committee, led by the District Head, launched a district-wide campaign program on HIV/AIDS. The activities included raising awareness on HIV/AIDS, increasing the rate of condom use, blooding test before marriage, and setting the village fund for affected families. Through this program, villagers in Sanpatong had become aware of AIDS. The rate of condom use was increasing. The rate of condom use was reached 80 per cent. In addition, many brothels were closed due to no visitors. However, the important success of the campaign was the reduction of discrimination against those infected families. Many AIDS-infected persons organized into AIDS patient association in order to help themselves.

Although Sanpatong is successful in controlling new HIV/AIDS infection, the area still has the highest incidence of reported AIDS cases in Chiang Mai. This is due to the past spread of AIDS. According to the statistics of Chiang Mai Provincial Health Center, there were 1,108 full-blown AIDS

cases and 863 symptomatic HIV in 1999. The cumulative rate per 100,000 was 160, the highest among districts in Chiang Mai province. However, the rate of new infection per 100,000 declined from 160 in 1997 to 145 in 1999. The highest case rates per 1000 were seen in the 30 to 39-year age group for men and in the 25 to 29-year age group for women. About 54 per cent of AIDS patients were wage laborers.

Although the situation is now improving, with the reduction of new HIV infection, there is no room for complacency. The rapid widespread of AIDS has created a severe impact and become increasingly evident in the area. The loss of productive labor associated with HIV/AIDS is now threatening the viability of local communities and sustainability of rural agricultural production. On average, about 20 persons in each village of Sanpatong had already died of AID since 1992 (Sanpatong Health Worker: Personal Communication 2000).

The Impact of HIV/AIDS on Indigenous Irrigation

An Overview of Fai Tacumpa Irrigation System

The Fai Tacumpa irrigation system was purposively selected from among the indigenous irrigation systems in the area for intensive study. The system was founded around 1870, when a group of farmers from six villages led by influential local leaders decide to construct the weir and the

main canal. The six villages were Ban Sankantha, Ban Klang, Ban Rai Luang, Ban Ku, Ban Sarapee, and Ban Tao Hai. The residents of these villages were considered the first to possess the water rights. The villagers who participated in the construction obtained new land, around 5 rai per person; while the leaders received a larger share, around 25 rai each. The construction was completed in around eight months. Informants reported that the original area served by Fai Tacumpa was about 1,000 rai (160 ha).

At present, the Fai Tacumpa weir was rehabilitated into concrete structure by RID. The new weir is 31 m in length and 1.90 m in height. It provided water during the wet and dry season to an area of 1,460 rai in six villages.

Like other muang fai systems, Fai Tacumpa was originally built to serve only wet-season rice cultivation. However, a big change in the cropping pattern occurred in the 1960s when the government introduced new farming technologies which made possible double and triple cropping. At present, farmers planted wet-season rice, followed by cash crops and then by dry-season rice.

For wet-season rice, farmers planted glutinous rice for household consumption. In cases, where farmers were able to pro duce more than their household needs, they divided their land to plant non-glutinous rice for sale in the market. Farmers used the improved rice varieties such as nieo

sanpatong, and kao kor kho (RD rice varieties). These non-photosensitive rice varieties gave higher yield than the traditional ones. Of the improved rice varieties, the nieo sanpatong and RD 10 are popular among the farmers in the area. The average yield was about 65-70 tang[16] per rai. However, unlike the traditional ones, the new improved rice varieties require fertilizer application and weed control. Also they are sensitive to diseases.

After harvesting wet-season rice, farmers started to plant cash crops from mid-November and continue to April. The selection of the type of crop to be planted was mainly based on the previous year market's price. The most popular cash crops in the area were garlic, onion, and soybean. The average yield for garlic was around 500 kg per rai; onion was around 500 kg per rai; and soybean was around 400 kg per rai.

Longan was another crop which had become popular in the last 7 years owing to its increased demand in the international market and local labor shortage. As longan required less care and water, farmers have converted part of their farms into longan fruit gardens. Farmers were able to harvest longan in 5 year's time after planting.

Dry-season rice cultivation was practiced to a limited extent because of water shortage. Thus, the area was devoted to dry-season rice whenever water was available. About 10 per cent of the irrigated area were able to cultivate dry-season rice.

However, this figure varied from year to year. Usually, the planting of dry-season rice began around May and farmers could harvest their crop from the end of July until the second week of August. The average yield was about 90 tang per rai.

The Impact of HIV/AIDS on Cropping Pattern

In a comparison between a study conducted in 1990 and the present study in the Fai Tacumpa irrigation system, marked changes were observed in the cropping pattern. In the past, various types of cash crops were grown during the second cropping season which started since 1960s. Since cash crops were produced mainly for market, such practice aimed to minimize the risk of the fluctuation in the market price. Aside from cash-crop cultivation, farmers who had access to water planted dry-season rice as their third crop. Under the intensification and diversification of cropping, farmers had started using power tiller for land preparation since 1975. Each stage of the new farming operation had to be accomplished on schedule. Because the family labor could not adequately respond to the new cropping schedule, wage labor had become dominant.

Under the HIV/AIDS impact, such intensive and diversified cropping had been changed. Due to the insufficient labor, there was a general shift away from crops that are labor demanding, like rice and chili, to those that are least labor intensive most frequently soybean and onion. Generally,

farmers remarked that at present, a narrower range of crop is grown in the area.[17]

The direct impact of HIV/AIDS on cropping pattern in Fai Tacumpa was a reduction in wet-rice area. A vast tract of rice-cultivated area in the system had been converted to longan fruit garden, particularly in the upper fields. At the time of the study, the Fai Tacumpa irrigation's records showed that the area devoted to rice cultivation decreased from 2,062 rai in 1990 to 1,460 rai in 2000. HIV/AIDS accounted for 50 per cent (or 301 rai) of rice land conversion. Such conversion occurred due to the loss of productive male household members to cultivate rice and maintain the irrigation canal. This can be interpreted as a coping mechanism, as longan cultivation requires less care and water. As the HIV/AIDS impact progresses, there will be an increase transition from a rice-based farming system to a longan-based system. Thus, such transition, in the long term, will threaten the food security among farm households.

The Impact of HIV/AIDS on Irrigation Organization

Like other muang fai systems, Fai Tacumpa had its own organization responsible in operating and maintaining the system. The irrigation organization executed all irrigation activities, both routine and emergency. Some organizational aspects had changed since the system was affected by HIV/AIDS epidemic. HIV/AIDS caused a dramatic reduction

in the number of water users. A clear example was Ban Sankantha where 50 water users died of AIDS. In addition, as sections of the irrigated area of Fai Tacumpa were converted to longan orchard, which no longer needed water, the organization excluded those sections from the organization record. These caused a dramatic decrease in the number of water users of Fai Tacumpa from 417 to 300. This had resulted in there now being insufficient labor for system maintenance.

In response to the shortage of labor for system's activities and difficulty of mobilizing farmers for system's activities under the new cropping pattern, the irrigation organization modified its compensation scheme. In the past, the irrigation leader and his assistants were paid only in the form of fixed water exemption– 30 rai for the irrigation leader and 15 rai for the assistant. This rate was determined by all farmers. If the irrigation officials tilled smaller farms, they could sell their water exemption share to other farmers. Those who bought the water shares didn't have to participate in irrigation activities. To cope with the situation, the organization had started to collect from water users a certain amount of money as water fee which was then given to the irrigation leader and his assistants as their remuneration. After the implementation of water fee collection, the water exemption practice had been modified. The water exemption, which was previously given to the irrigation leader and his assistants

regardless of the size of their farms, was given based on the irrigation officials' cultivated area within the system. Because of this change, the selling of water exemption shares was no longer practiced. Moreover, the water exemption share was also given to village headman and commune leader who served as the irrigation committee. And also, it was given based on the size of cultivated area within the system. The irrigation leader reasoned that if former water exemption share scheme were in use, there would not be enough labor to carry out the system's activities. At the time of the study, water users paid 20 baht per rai of cultivated area for both wet and dry-season cultivation. The irrigation leader took half of the water fee for his own compensation; the other half was divided equally among his assistants. However, he was responsible for the expense of the annual ritual activity associated with Fai Tacumpa. The irrigation leader paid about 500 baht for buying materials for the offering, including a chicken, rice, food, cigarettes, liquor, flowers, and sweets and presenting these offerings to the weir's spirit.

The Impact of HIV/AIDS on Irrigation Management

HIV/AIDS had created major changes in the Fai Tacumpa irrigation system. Loss of productive members made the irrigation organization difficult to carry out the maintenance activities. The chief maintenance activity at present is canal cleaning of both main and lateral canals. At

the main canal level, the activity was done once a year in June before the cultivation of the wet-season rice. Before the HIV/AIDS impact, the organization divided the main canal into six specific sections. The water users in the six villages were responsible for each section. Farmers removed the silt and cleaned brush and grass along the main canal banks at their respective portions. The assistant oversaw the work at his own section, while the irrigation leader moved from place to place to supervise and double-check the job. Owing to the major reduction of the number of productive water users caused by HIV/AIDS, the irrigation organization had to hire a bulldozer in main canal cleaning since 1997. By using machine, the maintenance work lasted for three years. The organization paid 70,000 baht for the maintenance work. This was the additional cost added to the irrigation organization, which caused by the HIV/AIDS epidemic. In fact, the main canal cleaning was the responsibility of all water users in exchange for water right. All water users had to pay 50 baht per rai of cultivated area for main canal cleaning. This special contribution, in many cases, caused dissatisfaction among water users. However, the irrigation leader pointed out that using hired machine in main canal cleaning was only option available to the organization to cope with rapid reduction on the numbers of water users caused by HIV/AIDS.

Maintenance work at the lateral canal was under the supervision of the assistant served by each canal. Before the

HIV/AIDS impact, the lateral canals were cleaned twice a year. Due to the shortage of labor, the lateral canal maintenance was now done once a year. Since productive male labor had become less available, the obligation for lateral canal maintenance had been double. At the time of the study, farmers who tilled one rai of irrigated area were responsible for maintaining 4 m on both sides of the lateral canal. In addition, the organization allowed women and old persons to participate in the lateral canal cleaning. The irrigation leader assessed that women and old persons failed to clear the canals thoroughly. However, the irrigation leader pointed out that it was better than the canals left uncleaned. Moreover, in some sublateral canals, the maintenance work was not carried out due to insufficient labor to accomplish the task. As farmers engaged in both on-farm and off-farm activities, labor mobilization for system maintenance had become difficult. In response, the irrigation organization has now emphasized on cash mobilization. Usually, the cash contribution from each member depended on the type of work and was based on the size of his irrigated area. However, the involvement of farmers in wage work in the urban areas, particularly in Chiang Mai city possibly led to HIV/AIDS infection.

Due to the shortage of resources for the operation and maintenance of the system, the irrigation organization has increasingly relied on outside resources for system activities. Since Fai Tacumpa irrigation organization is not recognized by

the law as a legitimate organization, it cannot directly seek government funds for its system work. To mobilize the government resources, the irrigation organization developed informal linkage with village headman and commune leader by inviting these leaders to be the irrigation committee. To some extent, this connection helped facilitate the mobilization of government resources. However, under the country's New Constitution and the decentralization policy, the central government has to allocate the fiscal budget directly to the Tambon Administrative Organization (TAO) for development. This new local organization will receive about 35 per cent of the total national budget in 2006. In view of this situation, the Tacumpa irrigation organization had started to submit its request to TAO for the development fund for the maintenance of the system. But the TAO hadn't yet allocated fund to the irrigation organization.

Conclusion and Recommendations

In less than a decade, Northern Thailand has been severely affected by HIV/AIDS epidemic. The widespread sexual behavior is accounted for such rapid HIV/AIDS expansion. Rising mortality and morbidity as a result of AIDS have become evident at the village level since 1992. In response, the government has implemented a comprehensive AIDS prevention program by involving NGOs, private sector, and local community groups, in fighting against AIDS.

Through this strong response and multi-sectoral cooperation, the government has been successful in reducing HIV transmission. Despite the success at lowering the new HIV infections, the crisis is far from over and its impacts are increasingly severe.

The impact of AIDS manifests itself in various ways ranging from rising mortality to food security. To date, little attention has been paid to its social and economic impacts. The government has mainly focused on prevention activities. Thus, under the widespread of AIDS in the past, impact mitigation will be of great importance in confronting the future of HIV/AIDS epidemic. At the same time, it is essential for government to find ways in sustaining the previous successful prevention effort under limited government budget if future generations are to be spared the threat of HIV/AIDS (Time 2000; World Bank 2000).

This paper documents the impact of HIV/AIDS on an indigenous irrigation system in Sanpatong district, Chiang Mai province. The area has been severely affected by the epidemic since 1992 and still has the high incidence of HIV infection. As a matter of fact, HIV/AIDS has led to several changes in the Fai Tacumpa irrigation system. It weakened and disrupted the smooth operation of the irrigation organization. AIDS-related deaths caused the shortage of productive labor that forced affected-farm households to shift from rice to least labor

intensive crops, such as soybean and longan, in which the food security is now being threatened. Family members of affected families are often unable to manage their farms effectively due to the loss of managerial skills and relevant experience. As the irrigated area was converted to longan cultivation due to the labor constraint at the household level, labor resources became less available for irrigation activities. Thus, the irrigation organization has faced the difficulty in carrying out the system's activities. In response, the irrigation organization has modified its management mechanisms to cope with the changing situation.

At present, the Fai Tacumpa irrigation organization now relied more on cash mobilization for system maintenance. It also reduced the frequency of the maintenance activities. Women and old persons were allowed to participate in lateral canal maintenance. In some lateral canals with few water users, the maintenance work was not carried out. This results in productivity declines.

Due to the dramatic decrease in the number of water users, the irrigation organization has increasingly relied on external resources for the operation and maintenance of the system. The organization now places greater importance on tapping government resources for system rehabilitation and maintenance. Without legal standing, the irrigation organization is unable to develop formal linkage with

government agencies for resource mobilization though some form of informal linkage was developed for external mobilization of resources. With the shortage of resources, the organizational viability is now being threatened.

Given the impact of HIV/AIDS on the indigenous irrigation organization, the government can help by providing technical assistance and resources to these existing organizations. Labor-saving technologies for agricultural production and water management need to be developed and introduced into the area to alleviate the labor constraint. In addition, the government can also help to strengthen these existing community-based organizations by providing legal recognition thereby giving them more autonomy. As Gibbs and Bromley (1988:27) have pointed out " successful irrigation organizations require legal status." Such legal framework will enable these existing locally-based resource management organizations to obtain legally enforceable recognition of their identity and rights within the society and be able to call upon the state as the last resort (Korten 1986; Wade 1988).

Under the New Constitution and the decentralization policy, the Tambon Administrative Organizations (the former commune council) were granted full autonomy in

implementing their development activities. At the end of 2006, the central government has to allocate 35 per cent of its annual budget to this local government. Thus, it is fortunate for incorporating the indigenous irrigation organization into this local government structure by appointing the irrigation leader to be a member of the Tambon Administrative Organization. This will allow the irrigation organization to gain access to the government funds and programs available for development in the area. However, it depends on the sincerity and commitment of the government in promoting the involvement of local people in their own resource management and development. As Korten (1986) points out, few countries in Asia have given much attention to this task. If the government moves in this direction, it will enable these century-long organizations to continue to exist and to cope with the impact of HIV/AIDS epidemic.

Endnotes

1. This paper was written while I was a visiting fellow of Overseas Development Group, University of East Anglia. I am grateful to Professor Tony Barnett for his guidance, and invaluable insights which helped shape my view on HIV/AIDS epidemic. I also would like to thank the Overseas Development Group for financing all expenses associated with this fellow. I also appreciate the assistance and hospitality of all ODG's staff.
2. I am a development planner at the National Economic and Social Development Board, Northern Development Center, Faculty of Social Sciences, Chiang Mai University, Chiang Mai, Thailand, 50200. Views expressed here are of my own and do not necessarily reflect the policies of any organization with which I am connected.
3. Subsequent reconstruction of the history of the epidemic has shown that the early case-based monitoring system failed to document the spread of the epidemic. While the official record reported only 200 AIDS cases in 1990, in fact more than 100,000 Thais became infected at that time (Westley 1999).
4. In some villages in Chiang Rai province, all young men (20-45 age group) died of AIDS (Chiang Rai Health Worker: Personal Communication). This type of information can only obtained from local government staff, local NGO, and villagers. The government statistics doesn't report this information because the unit of data collection is different. Thus, the government statistics reports only the total numbers of death. My recent field visit in Lamphun, the province nearby Chiang Mai, found that in some villages there are two or three families where all family members died of AIDS.
5. Under the successful Family Planning Program, Northern Thailand has the lowest fertility level in the country. Such rapid fertility decline seriously affects the population age structure and creates the labor shortage in the region (Tieng 1998; Sopon 1993; Pearson 1996).
6. The Thai unit area of measurement equals 0.6 hectare.
7. Under the decrease of government's promotion on HIV/AIDS prevention and current economic crisis, the sex industry in Chiang Mai is mushrooming again (Wantana: Personal communication).
8. In Thailand, the reported AIDS case is usually obtained only from hospitals. Thus, it is likely that the current statistics may not reveal the true level of infection due to under-reporting of AIDS cases. It is estimated that about 30 per cent of AIDS cases are not reported (Chiang Mai Provincial Health Office: Personal Communication).

9. The material in this section draws heavily on several excellent reviews of AIDS policy in Thailand, by AIDS Division 1994; and Wiput et. al. 1998.
10. This is the first time in Thai administration history that the government allocates the budget directly to NGOs.
11. In 1997, NAPAC has changed its name to AIDS Network Development Foundation (AIDSNet), with support from the European Union. AIDSNet has assumed many of NAPAC's functions.
12. Northern Development Center of NESDB is now requesting assistance from Japan International Cooperation Agency (JICA) for studying the socio-economic impact of HIV/AIDS in Northern Thailand.
13. Barnett and Whiteside (2000) indicate that an HIV/AIDS epidemic is a 'long wave' event. By the time the significant numbers of people begin to fall ill and to die, the epidemic will already be far advanced.
14. Thai currency, equivalent to US$ 0.02 (as of 2001).
15. Studies on the socio-economic impact of HIV/AIDS on agriculture have mainly been conducted in African countries since the area has been hardest hit by the epidemic (see Barnett and Haslwimmer 1993; Bellin-Sesay et al. 1995; and Kwaramba 1997). For the excellent collection of papers on HIV/AIDS impact on smallholder agriculture in eastern and Southern Africa see Mutangadura et al. 1999.
16. Tang, a unit of volume measurement equivalent to 20 litres.
17. Labor shortage in the study area occurs from four factors: fertility decline, labor migration, rural income diversification, and HIV/AIDS. However, HIV/AIDS impact is accelerating such labor constraint.

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