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“Strengthening Capacities to Enhance Coordinated and Integrated Disaster Risk Reduction Actions and Adaptation to Climate Change in Agriculture in the Northern Mountain Regions of Viet Nam”



Baseline Survey of Lao Cai Province

Lao Cai, 2012

1. Introduction

A detailed study was conducted in each of the 6 selected districts of the 3 provinces (Bao Thang and Bat Xat districts of Lao Cai, Ha Hoa and Doan Hung of Phu Tho, and Van Yen and Yen Binh of Yen Bai province) to deepen the understanding about local vulnerabilities, natural resource endowments, institutional setting in order to address climate risks and on locally available natural disaster prevention/preparedness strategies, and their existing strengths and demands. The findings show that communities depend largely on external suppliers for rice seeds, and thus often face problems caused by poor seed quality, untimely seed supply, especially when extra volumes are required for restoring production after natural disasters. In term of disasters, the target locations face problems of storms, floods, flash floods, whirlwind, drought, landslide, forest fire and failure of water reservoir. Up to the present, in order to mitigate risks and exposure to natural disasters, the local authorities are actively implementing the national policies as expressed in the “National Strategy for natural disaster prevention, response and mitigation to 2020”, including:

- Integrating into local socio- economic development plans the issues of disaster risk reduction (DRR) and management (DRM);
- Giving priorities to disaster preparedness, study of impacts of the global climate change, storm surge and other extreme climate phenomena in order to define and take appropriate response actions in time.
- Considering traditional experiences and lessons learnt from other regions/nations and previous activities, combining them with modern knowledge and technologies for effective DRM.
- Flowing the principles of:
 - the “four-on-the-spot” (commands, man-power, materials and logistics),
 - proactive prevention,
 - timely response, and
 - quick and effective recovery

However, in fact, there are still great limitations in DRM, and the most important are as below:

- Disaster prevention, response and mitigation activities are still passive and mainly focus on addressing their impacts and effects;
- Response to disasters is slow;
- Production systems are inappropriate in terms of preparedness to disaster risk reduction;
- Infrastructure is poor and in various locations are vulnerable to disasters;
- Forecast and warning systems do not meet the requirements, particularly with regards to disasters like flash floods, landslides, whirlwinds, etc.;
- emergency relief, damage recovery and rehabilitation are limited, sometimes are disconcerted and lack of coordination;
- Search and rescue activities are limited.

The main reasons for this include poor awareness, lack of appropriate long term development plans, poor management of natural resources and other activities, lack of supportive policies encouraging farming communities to be more proactive etc.

In partnerships with local DARD, relevant officers and staff, based on the survey findings, 6 communes were selected as target for further activities, including:

1. Dai Phac commune of Van Yen district, Yen Bai province
2. Yen Binh commune of Yen Binh district, Yen Bai province
3. Son Hai commune of Bao Thang district, Lao Cai province
4. Muong Vi commune of Bat Xat district, Lao Cai province
5. Minh Hac commune of Ha Hoa district, Phu Tho province
6. Chan Mong commune of Doan Hung district, Phu Tho province

Survey Aspects:

- Situation of agricultural land use;
- Main features of climate conditions;
- Situation of disasters;
- Disaster risk reduction (DRR) measures, practices;
- Policies for prevention (preparedness) disaster risks and DRR.
- Bat Xat district, Lao Cai province;

2. General Assessment

Vietnam is located in the tropical monsoon area, one of the five storm-prone areas of the Asia Pacific region. Therefore the country often faces natural disasters of various types. Viet Nam is prone to natural disasters, with typhoons, storms, floods, droughts, mudslides, forest fires and salt-water intrusion presenting recurring risks, especially for children, women, and the elderly. The poorest people in society are the most vulnerable to natural disasters. More than one million people require emergency relief each year. Climate change models predict that that Viet Nam is one worst affected countries globally, because of sea level rise and because natural disasters such as typhoons, floods and droughts are expected to intensify and occur more frequently.

In recent years, disasters have continually occurred all over the country, causing vast losses in human life, property, socio-economic and cultural infrastructure as well as environmental degradation. In the last decade, natural disasters such as typhoons, floods and droughts have caused significant losses. According to available data, about 8,000 people were missing or killed, and asset damage is equivalent to 1.5% of GDP. Natural disasters in Vietnam have been increasingly severe in terms of magnitude, frequency and volatility. More than 80% of Vietnam' population are living at risk of direct impacts of natural disasters

So, the effective planning, preparedness and public investment are needed to minimise the adverse impacts of natural disasters and adapt to the reality of climate change.

2.1. The Northern mountainous region

has the most complicated geological structure compared with other regions in the country. One third of the northern mountains consist of rocks with a thin weathered layer, which is infertile and poorly water-absorption, resulting in strong surface flow of the rain water. Mountains and hills occupy 80% of the region' land area. The forest coverage in this region is lowest in the country. The northern mountains and highlands still have much bare land and hills that cannot keep the rain water, contributing to formation of severe flash floods.

At present, mountainous regions are facing a lot of difficulties due to more and unpredictable natural calamities, longer droughts and the biggest limitation are low and unstable crop yields, under-utilization of flat lands, hunger, poverty and inappropriate exploitation of natural resources in consequence of all above stated.

Regarding 3 selected provinces (Phu Tho, Yen Bai and Lao Cai), all of them are located along the Red river. Though different in agro-climatic and socio-economic conditions, they are facing the same kinds of natural hazards like: Storms, whirlwinds, flash floods, landslides, drought, forest fires, etc. (table 1).

Table 1. Common disasters in Northern mountainous region and their vulnerability level¹

Types of hazards	Geographycal region	
	<i>Northwest mountain region</i>	<i>Northeast mountain region</i>
Storms	+	+++
Flood	++++	++++
Flash flood	++++	++++
Whirlwind	++++	++++
Drought	+++	+++
Inundation	-	-

¹ Adapted from MARD

Landslide	+++	++
Forest fire	++++	++++
Earth quake	+++	+++
Failure of water reservoir	+++	+++

In order to mitigate risk and exposure to natural disasters as indicated above, the local authorities are actively implementing the national policies expressed in “National Strategy for natural disaster prevention, response and mitigation to 2020”, including the following musts:

- Be integrated into socio- economic development master planning and plans of every region, sector, and nation-wide.
- Give priority to disaster preparedness, study of impacts of the global climate change, storm surge and other extreme climate phenomena for appropriate response actions.
- Consider traditional experience, learnt lessons, combining them with modern knowledge and technologies.
- Include the principles:
 - Of the “four-on-the-spot” (commands, man-power, materials and logistics),
 - Proactive prevention,
 - Timely response,
 - And quick and effective recovery.

In recent years, Vietnam has made considerable efforts in improving physical and technical infrastructures for disaster preparedness. The leadership and coordination in response to natural disasters from central to local levels have made substantial progress. However, with regards to the consequences of natural disasters and the socio-economic development goals in the near future, the following limitations need to be addressed:

- Disaster prevention, response and mitigation activities are still passive and mainly focus on addressing the consequences;
- Response to disasters is slow;
- Production systems are inappropriate in terms of preparedness to disaster risk reduction;
- Infrastructure is poor in in vulnerable to disaster places;
- Forecast and warning systems do not meet the requirements, particularly with regards to disasters like flash floods, landslides, whirlwinds, etc;
- Emergency relief, damage recovery and rehabilitation are limited, sometimes disconcerted and lack of coordination;
- Search and rescue activities are limited.

The above weaknesses are due to the following reasons:

+ Awareness:

- Inadequate awareness of natural disasters and sustainable development, especially in terms of living in harmony with the nature;
- Dependent and inactive attitude like waiting for support rather than self-preparedness to disaster risk prevention and reduction;
- Disseminating, training and raising community awareness of disaster prevention,

response and mitigation are infrequent and unsystematic; training programs of natural disaster preparedness have not been included in school curriculum.

+ *Planning:*

- Lack of synchronous planning and short of coordination among ministries, sectors and localities. Lack of due attention to the integration of natural disaster prevention, response and mitigation into local and sector's socio-economic development programs;
- Construction planning is lacking due attention to safety and flood and storm avoidance, particularly in industrial zones, tourism areas, mountainous areas, residential areas and transportation roads;
- Development planning has not been linked with environment and landscape protection and preservation. For example, upstream protective forests have been destroyed for agriculture, mining, etc.

+ *Policy and mechanism:*

- Lack of penalties for failure to obey legal regulations, and the orders of relevant authorities;
- Overlaps of functions and duties due to lack of clear responsibility assignment;
- Lack of policies to encourage disaster-related insurance purchases;
- Lack of policies to encourage individuals and organizations volunteering and participating in search, rescue and response activities;
- Lack of timely adjustment in policies on mobilization of resources for disaster prevention and mitigation.

+ *Investment:*

- Investment in natural disaster prevention, response and mitigation has not been synchronous and not met the requirements of the given situation of disaster;
- Investment in the maintenance, management and utilization of existing structures is not correspondent to the new construction investment;
- Financial allocation to some critical, approved projects such as reservoirs, dyke systems, etc. is slow and does not meet current requirements.

+ *Direction and management:*

- The directions and orders in response to natural disasters have not yet been seriously executed; the implementation is slow; dependence on leaders still exists;
- The inspection and direction of four "on-the-spot" principles are not determinedly;
- There have been wrong directions of economic development without linking with natural disaster prevention, response and mitigation;
- The lax management and protection of watershed forests, coastal and riverside protective forests have led to the degradation of forest coverage in some areas, restraining the effectiveness of flood, storm and drought control and causing unexpected dangers;
- The lax management of sand exploitation on rives and other activities on river banks have resulted in harmful impacts on flood discharge and caused erosion;
- The quality control in some particular structures was insufficient, hence, damaged structures even in case of low intensity disaster. Some structures have even hindered flood discharge or made flood more serious.
- Management of implementing progress and operation of disbursement's procedures are

still slow, especially ODA;

- The management and utilization of resources for disaster recovery are sometimes lax, lack of transparency or for inappropriate purposes;
- Lack of equipments and facilities for early warning and forecasting, risk prone mapping, unprofessional operations, not bringing the combined strengths of all forces and communities into full play.

Regarding DRR in agricultural production:

Our National Strategies oriented to enhance farmers to produce enough food for them, improving their food security status. Once food security is achieved, local people will have more ability to cope with disasters. Emergency supply is important, but may result in producing “dependency from external aids” that needs to be addressed and overcome with by empowering farmers’ capacity (both mental and physical capacities) for disaster preparedness and mitigation, especially important is to achieve seed security.

Our survey findings indicate that there are good practices which can be re-developed and applied DRR in agriculture:

- Older farmers have good knowledge and skills in production of conventional rice seeds. Before, particularly during 1960-1980, most communities were self-sufficient in rice seeds: each agricultural cooperative established a rice seed production group comprising most experienced and skillful farmers, trained them in relevant techniques and provided them with appropriate land areas and necessary supplies to produce rice seeds for the whole cooperative. This is a useful lesson and great advantage for the project to build community-based rice seed production and supply systems for overcoming the above mentioned problems of seed supply towards disaster risk management. Recorded traditional knowledge is of high values for developing advanced technology for rice seed production at household level.
- Different newly improved pure-line rice varieties are adaptable to the local growth conditions, and some local rice varieties are with good/specialty quality; and their production brings higher income to farmers. However, supports from both scientists and local authorities are necessary for communities to propagate and develop/restore these valuable rice varieties, because seed companies often consider them "rare" varieties, and hence do not trade their seeds.

To this end, we propose the following activities in the communes of the project intervention:

- Establishment of farmers' groups specialized on quality rice seed production, storage and distribution;
- Establishment of systems for sustainable production through participatory on-farm demonstration and farmers field schools on integrated rice crop management technologies; through improving capacity of local institutions including research and training ones, extension staff and farmers in rice crop management;
- Improving systems for supporting community seed production and storage, ensuring supply of quality seeds for sowing and seeds reserved for emergency cases;
- Improving agricultural production systems in such a way that enhances the local preparedness, their resilience against the impacts of extremes climate change with proactive participation of the most vulnerable groups.

3. Brief description of Lao Cai province

3.1. Geographical location

Lao Cai is located in Northwest of Vietnam. The total natural area of the province is of 8,057.08 km², bordering with:

- Yunnan province of China in the North;
- Yen Bai Province in the South;
- Ha Giang province in the East;
- Son La and Lai Chau provinces in the West.

3.2. Topography

The province can be divided into two regions:

- Highland region: The average altitude of the region is more than 700 m. This region is formed by two large mountain ranges: Hoang Lien Son and Elephant mountains. On the right side of the Red river is Hoang Lien Son mountain range with the country' highest pick Phan Xi Phang (3,143 m asl); then Ta Giang Phinh pick (3,090 m asl); Pu Luong (2,938 m asl), etc... The dissection of the province topography is large and deep with very steep slopes. The regions is the homeland of some ethnic minority groups like H'mong, Dao; Ha Nhi; Phu La; Khang La; La Chi, etc.

- Lowland regions: The region consists mainly from valleys along rivers, large streams. Beside the Red river valleys is the Muong Than valley which is the 3 largest in the Northwest of Vietnam. The region is the homeland of some ethnic groups like Tay, Thai, Nung, Giay, Lu, Bo Y, Muong, etc. These groups are more advanced than those living in the highland region.

3.3. Climate

There are 4 distinct seasons: Spring, Summer, Autumn and Winter. In recent years, there is a transformation to two seasons: rainy and dry seasons. The dry season lasts from October to March (5 months). The rainy season lasts from April to September (7 months).

The average temperature is about 18.4^oC and not fluctuating so much. The hottest month is June with the average temperature of 25^oC; The coldest month is January with the average temperature of 11^oC. The relative air humidity is not changing so much, about 86%. The annual rainfall is 1,500 mm to 2,000 mm, concentrating in May to September. The month with the highest rainfall is August with 350 mm rainfall; January has least rainfall (about 20 mm). In general the climatic conditions in Bao Thang are quite favorable for agricultural production.

Nonetheless, Lao Cai has very complicated weather conditions (7 types and 12 sub-types). Due to some overlaps, there are 10 sub-types and 43 circles of climate. In terms of economic activities, there are 3 circles of climate and two distinct seasons. The dry season is from October to March, and the rainy season is from April to September.

The average temperature in the highland region is from 15^oC to 20^oC; the rainfall is from 1,800 mm to 2,000 mm per year.

The average temperature in the lowland region is from 23^oC to 32^oC; the rainfall is from 1,400 mm to 1,700 mm per year.

The complicated climate conditions in Lao Cai is favorable for development of a diversity of fauna and flora in the province.

b. Situation of agricultural production and DRR in Bat Xat district of Lao Cai province

Table 4. Agricultural land use in Bat Xat district

Land use	Area as of March 2010 (ha)
Total natural area	106,189.00
Agricultural land	8,193.06
Forestry land	46,391,.8
Special use land	2,549.87
Living land	291.75
Unused land	46,508.42

Bat Xat is located in Northwest of Lao Cai province, bordering with Yunnan province in the North, with Phong Tho district of Lai Chau province in the West, with Sapa district in the South and with Lao Cai city in the East. Bat Xat has 98.8 km of border with China. In the West of the district are high mountains.

The soils in Bat Xat are quite fertile with medium to rich nutrition contents, hence are favorable for many crops like rice, maize, soybean, fruit trees, flowers and other high cash value crops.

Climatic conditions: Bat Xat has hot and humid tropical climate. In the highland, the climate has sub-tropical and temperate characters. The annual average temperature is 22.8⁰C, that of the hottest month is 32.5⁰C, and that of the coldest month is 15⁰C; the average sunny hours is 1,400 hours per year.

The annual average rainfall is from 2,400 to 3,000 mm, mainly concentrating to the period from May to October.

3.4. Climate change impacts in agricultural production

In recent years, the climate change has become very complicated. In the rainy season, there are lots of tropical low atmosphere events causing heavy rains, flash floods, land slides and damages to people' lives, property, agricultural production and bad consequences. In 2004, a land slide in Sủng Hoảng Village of Phin Ngan commune killed 23 people, 04 houses were totally destroyed. In 2006, a flash flood in Tả Lé village of Trung Leng Ho commune destroyed 1 house and 64 households had to evacuate from the land slide prone areas.

In 2008, 56 ha of rice, 168.5 ha of maize were destroyed; 23.98 ha of other crops were buried in mud, sands and stones.

In 2009, from April to September, heavy rains occurred in many communes like: A Lu, Ngai Thau, Sang Ma Sao, Den Sang, Trung Lung Ho, Pa Cheo, Ban Vuoc, Ban Xeo, Ban Qua, Den Thang, Trinh Tuong, Muong Vu, Phin Ngan, Coc San... On June 5, 2009, the localized shower occurred and caused local inundation in Coc San, Quang Kim, Ban Qua, ... and severe damages.

In contrast, from September to March, the rains stop that constraint agricultural production in winter. In addition, the drought is also the reason causing forest fires. In 2009, there were 36 forest fires destroying 7.6 ha of forests.

In 2009, land slides damaged 6 houses; there were 4 land slide prone sites, 143 households in Quang Kim, Pa Cheo, Tong Sanh, Den Thang had to evacuate from land slide prone areas.

In early 2010, 56 ha of spring rice were suffered from drought, of which 18.2 ha had to be planted with other crops; in many fields, rice cannot grow up. On 1-crop-season lands, soybean also cannot develop after sowing because of the lack of water.

According to recent observation, the trends of natural hazards are as followed:

- + Inundation: Due to flood in the Red river (Suffering communes: Nam Chac, Trinh Tuong, Coc My, Ban Vuoc, Ban Qua and Quang Kim);
- + Flash floods: Often occur along most of the district streams like Ta, Cau, Muong Hum, Pieng Lao, Trung Chải, Ban Xeo, Quang Kim and Ngoi San.
- + Land slides: often occur along the roads from Lao Cai to Sapa, to Ban Xeo, Ban Vuoc, Coc San, Tong Xanh, Pa Cheo, A Lu communes.
- + Whirlwinds often occur in Pa Cheo, Muong Vi, Ban Xeo, Ban Vuoc, Trinh Tuong, Phin Ngan, Sang Ma Sao.

3.5. Disaster risk prevention and mitigation measures

As the district is highly prone to disaster risk, the district authorities set high priority on defining and mapping the areas the highly prone to flash floods, landslides, geological hazards; making residential planning with special emphasis on evacuation of population out of dangerous areas, making land use planning, restructuring cropping patterns to avoid damages by natural disasters; also managing mineral exploitation to prevent harmful impacts on the environment and landslide risks, properly planting and exploiting forests.

Other measures applied are building structures to prevent landslides and flash floods; expanding flood discharge openings of sluices and bridges on traffic roads to ensure flood drain ability; building reservoir system for both flood and drought control.

When in floods and storms, rapidly organizing search and rescue of people and properties under danger and fast recovering after disasters, especially agricultural production.

c. Situation of agricultural production and DRR in Bao Thang district of Lao Cai province

Bao Thang is a lowland district of Lao Cai province. The district natural area is 68,246.6 ha, of which agricultural lands occupy 10,983.6 ha; forestry lands occupy 31,440.7ha; special use lands - 5,164.7 ha; residential lands - 629.3 ha; water surface for aquaculture - 616.4 ha; other lands occupy 19,411.9 ha.

The district population in 2009 was 100,901 people, the population density was 148 people/km² with 23,749 households and 17 ethnic minority groups. The Kinh people occupy 70.68%. There were 29.32% of population living in urban areas. Agricultural production engages 38,769 laboring people (or 82.7% of labor force; non-agricultural activities engage only 8,089 laboring people or 17.3%). Urbanization trend is increasing.

Bao Thang has a good transportation systems including land roads, railways and water ways. There are 44 km of the road number 70 running throughout the district.

3.6. Hydrology

The Red river flows through Bao Thang district with 43 km long. There is no water falls, or rapid flows, so it is quite favorable to use water transport.

- + On the right side of the Red river, there are 3 big streams that bring water to the river:
 - Bo stream (running through Gia Phu commune);
 - Trat stream (running through Xuan Giao, Son Hai, and Tang Loong township);
 - Nhu stream (running along the borders of 3 districts: Van Ban, Bao Yen and Bao Thang. Two communes in Bao Thang, namely Phu Nhuan and Son Hai are engaged with the Nhu stream.
 - There are other smaller streams, creeks like Muong Bat, Ma Ngan, Nhuan and Doi Co, etc.
- + On the left of the Red river, there are many tribute streams that are smaller and shorter than those on the right, namely:

- Van Hoa (in the borders between Van Hoa commune, Lao Cai city and Thai Nien commune);
- Lang Giang stream (Than Nien commune);
- Cai Muc stream (Lang Muc and Thai Nien communes);
- Luot, Quan, Do, Lang, Cau My streams (Thai Nien);
- Lu stream (running through Lu Town);
- Tri stream (running through Lu Town);
- Cai Nho stream (Tri Quang commune);
- There are many other streams in the district.

3.7. Natural hazards

Since 2005:

- Red river floods (usually, there are 1 or 2 big floods exceeding the alarm grade 2);
- Land slides (occur every year, killing people, collapsing houses, blocking up transport, damaging crops and infrastructures);
- Floods in streams: occur after every 50 mm/day rain. When the rain intensity is higher 100 mm/day, the flash floods are unavoidable, and at least 1 to 3 times/year;
- Whirlwinds: whirlwinds at small scales (destroying about 10 houses) occur every year in several villages or communes with the frequency of 1 to 3 or 4 times/year);
- Drought is also often at less than 10 ha;
- Hails: heavy hails are not common, so the damage is neglectable.

Damages caused by natural hazards

The biggest damages are caused by the floods in the Red river:

- In 2002, 7 communes along the Red river were inundated due to water blocking from streams.
- The most severe damages, caused by the Kammuri Storm that occurred in 2008: The heavy rains (up to 500 mm/day) caused strong flash floods and land slides in many communes of the district. In only less than 1 week, another flood occurred at about the alarm grade 3, causing inundation at very large scale. The total loss was estimated to reach 100 billion VND.

Measures for disaster risk prevention and reduction

The year 2008 was the most damageous to agriculture in the district: more than 600 ha of rice were destroyed, of which the harvest on 25% was totally failed. Among others, the following measures are considered effective:

- Seed security for crops (not yet implemented);
- Soil protection and improvement (little has been done);
- Seed preservation (still at small scale);
- Early warning (not being able at district level);
- Re-greening of barren lands and hills (program for 5 mil. ha of new forest planting).

Policies of the district:

- Non-structural measures: these include forest rehabilitation, communication systems renovation, forecast, warning, community awareness raising, step-by-step consolidation of organizational mechanism for flood, storm control and

search and rescue;

- Structural measures: Improve the flood discharge capacity for river channels through removal of obstructions on the river plain and river bed; dredging channels and completing flood divergence projects.

In term of good practices, except those directly related to DRR as mentioned above, there are agricultural practices of values for mitigating effects of disasters and/or for recovery of crop production after disasters. Most noteworthy are the use of pureline rice varieties which are with good adaptability to local growth conditions, and the farmers experience in producing quality seeds of these varieties:

- Older farmers have good knowledge and skills in production of conventional rice seeds. Before, particularly during 1960-1980, most communities were self-sufficient in rice seeds: each agricultural cooperative established a rice seed production group comprising most experienced and skillful farmers, trained them in relevant techniques and provided them with appropriate land areas and necessary supplies to produce rice seeds for the whole cooperative. This is a useful lesson and great advantage for the project to build community-based rice seed production and supply systems for overcoming the above mentioned problems of seed supply towards disaster risk management. Recorded traditional knowledge is of high values for developing advanced technology for rice seed production at household level.
- Different newly improved pure-line rice varieties (TL6, HT1, BT 13, HD 18, SH 14, T10, N46) are adaptable to the local growth conditions. Most of these varieties are with short growth condition, good quality and yield. Some local rice varieties, especially Seng Cu variety, are with good/specialty quality. The production of these pureline varieties brings higher income to farmers, and thus their development is of high desire. However, supports from both scientists and local authorities are necessary for communities to propagate and develop/restore these valuable rice varieties, because seed companies often consider them "rare" varieties, and hence do not trade their seeds.