

Resilient Livelihoods: Increasing the Ability of Communities to Prevent, Mitigate, and Cope with Extreme Weather Events

FINAL REPORT

ACKNOWLEDGEMENTS

This report is written by a team including Dr. Tran Dai Nghia (Team Leader), Dr. Phung Duc Tung, Dr. Nguyen Viet Cuong, Do Thu Trang, Do Xuan Hanh and Nguyen Ba Minh. The valuable contributions of the following researchers and officers are acknowledged: Dr. Le Dang Trung, Nguyen Hoang Thao, Phung Thi Thanh Thu, Nguyen Hong Thuy, Dang The Vinh, and Le Hai Chau.

The whole study could not be completed without tremendous and continual support from the team of the Global Facility for Disaster Reduction and Recovery (GFDRR) at the World Bank Office in Hanoi. Their priceless inputs and feedback from the beginning of the study are greatly appreciated.

The team of authors would also like to express their sincere gratitude to NMPRP-II Central Project Office in Hanoi, especially Ms Nguyen Thi Minh Nghia, Mr Dang Dinh Ngoc along with TAPI team for sending their timely feedback on each stage of developing the final report as well as their valuable support for the team to conduct necessary surveys and field study in 12 districts and 12 communes within the project areas. Special thanks also go to district staffs and District Project Units in 12 districts: *Lac Son and Tan Lac (Hoa Binh province), Moc Chau and Thuan Chau (Son La province), Muong Ang and Muong Cha (Dien Bien province), Tram Tau and Mu Cang Chai (Yen Bai province), Van Ban and Bat Xat (Lao Cai province), and Sin Ho and Phong Tho (Lai Chau province)*. The authors would like to express great appreciation towards staffs and villagers in 12 communes where the field study was undertaken: *Quy Hoa, Phu Cuong, Xuan Nha, Long He, Ngoi Cay, Hua Ngai, Ban Mu, Lao Chai, Chieng Ken, Tong Sanh, Sa De Phin and Dao San*. This assignment would have not been accomplished without their dedication and enthusiasm.

The preparation of the report involved consultation with Vietnamese researchers and practitioners from various institutions. We are grateful for their contributions throughout the whole process of completing the study.

EXECUTIVE SUMMARY

The Second Northern Mountain Poverty Reduction Project (NMPRP-II) covers 2,366 villages with 230 communes in 27 districts within 6 provinces: Lao Cai, Lai Chau, Dien Bien, Son La, Yen Bai and Hoa Binh. The project targets the most remote and inaccessible communes in the Northern Mountain region of Vietnam where ethnic minorities accounts for a great proportion of the region's total population. As major livelihoods in the region are heavily reliant on climate and natural resources, any changes in the weather patterns are likely to affect productivity, households' income and therefore, undermine their development progress. The objective of this study is to support the subcomponent 3.5 of NMPRP-II –*Safeguarding assets of communities and households* – in analyzing the communes' vulnerability and developing livelihood-resilience models for these communes.

The 6 project provinces are situated in the North-western region of Vietnam and are characterized by high variation in terms of topography, climate and biodiversity. With an altitude of around 800 meters from sea level, mountainous areas usually face limited accessibility and economic development. There are two distinct seasons in the region. The dry season, characterized by cold climate, starts from October to March, while the rainy season lasts from April to October. During the past years, the Northern Mountain region has been experiencing more serious impacts of climate change reflected through rising temperatures, changing rainfall patterns as well as an increase in the frequency and intensity of extreme weather events.

The Northern Mountain region remains the poorest region of Vietnam with the poverty rate estimated at 29.4% in 2011; the poverty rate in this region is the highest in the country and almost three times higher than the national average. Provinces of Lai Chau and Dien Bien show the highest poverty rates of more than 50%. Ethnic minority groups account for a significant proportion of the population in these six provinces. For a large number of project communes, more than 90% of the inhabitants belong to minority groups. Ethnic minority groups in these mountainous areas are substantially poorer and more disadvantaged than their majority counterparts due to limited access to education, health care, market access and lower living conditions. The highest poverty rate of 81.4% and 68.7% are recorded for H'Mong and Dao groups. These 2 groups are also the most disadvantaged groups in terms of non-income indicators.

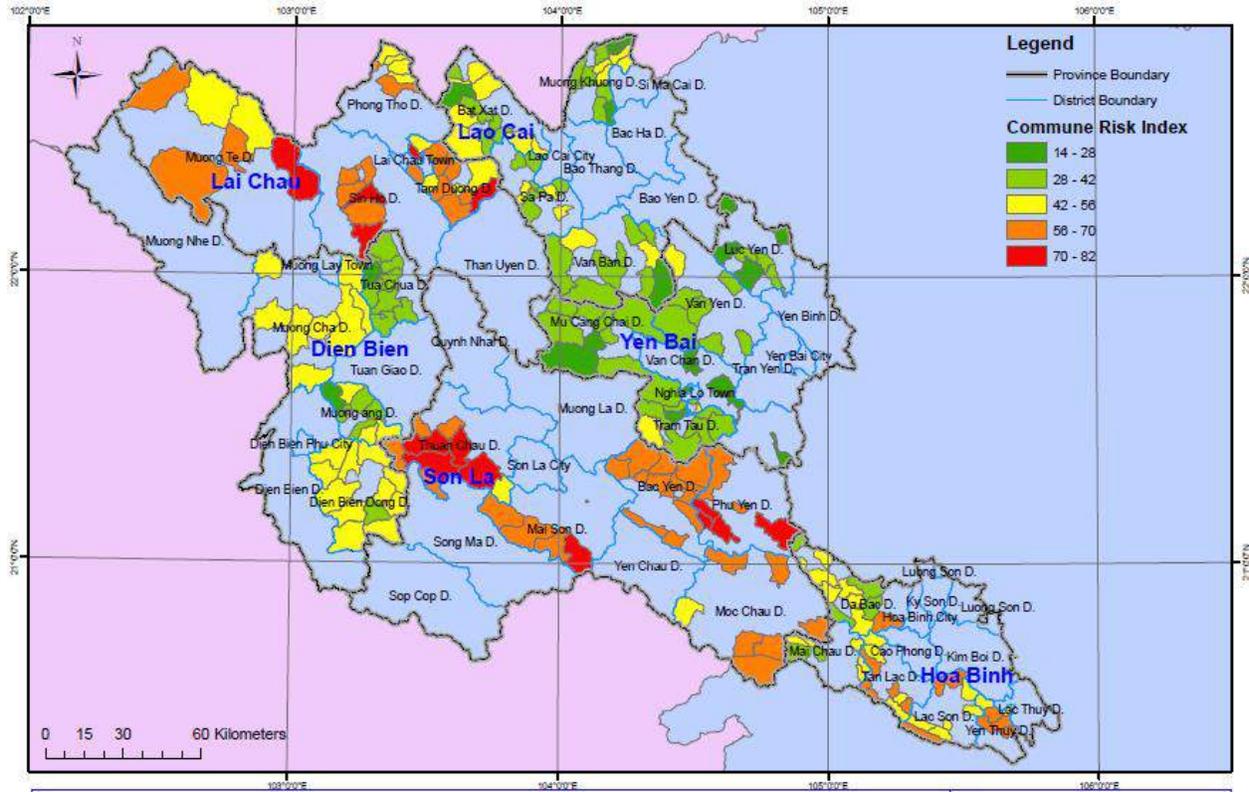
With regard to the main livelihood activities, the income structure of households falling under NMPRP-II is not as diversified as the national income structure; in the project area, **agricultural production is the key income source for beneficial households.** Most agricultural production activities are operated through a 'family farming system' whereby production is mainly based on either family labor or animal labor with limited use of modern farming equipment; traditional farming is still a common practice. Rice and maize remain the most common crops for targeted households. Regarding husbandry, cattle and pig are major livestock in the project areas. However, the scale of livestock farming varies among beneficial households.

Risk Assessment

In a context where impacts of climate change on local communities are increasingly evident, there is still a lack of intensive research on the vulnerability of the area to climate and extreme weather events.. A thorough assessment of natural disaster risks in the localities is, therefore, vital to facilitate efforts in improving the resilience and adaptability of poor households in the project areas. This research has employed both quantitative and qualitative analysis. As part of the risk assessment, **the Aggregate Risk Index has been developed as a composite index comprising of three separate components: the Hazard Potential Index, Hazard Exposure Index and Coping Capacity Index.** An area with high score on Hazard Potential Index indicates that it is more likely to witness the occurrence of a certain extreme weather event. The index of Hazard Exposure measures the extent an area can be affected by the disasters. Meanwhile, the Coping Capacity Index reflects the response potential of an area's population.

Key findings reveal that **storm, flood, drought and prolonged or extreme cold are the most common extreme weather events that have threatened public infrastructure, household properties and agricultural production.** With regard to storm, Hoa Binh has the highest probability of being hit by a storm within a year while Dien Bien, Lao Cai and Lai Chau are the provinces with lower probability of storm. The probability of floods is small in Northern mountainous region. Hoa Binh and Lai Chau are provinces with the highest frequency of floods, while Lao Cai and Son La tend to have lower flood frequency. Drought is more likely to happen than flood but less likely than storm. Communes in Son La have the highest probability of drought, followed by communes in Hoa Binh. Lai Chau and Lao Cai have communes with the lowest probability of drought. Yen Bai, Lao Cai, Hoa Binh and Dien Bien are the provinces with high frequency of extreme colds, while Son La and Lai Chau have lower frequency. Overall, the Aggregate Risk Index measures vulnerability level to extreme weather events: the higher score indicates higher level of vulnerability. **Son La and Lai Chau are estimated with the highest level of vulnerability whereas the lowest levels of vulnerability are recorded for Yen Bai and Lao Cai.**

Figure 1: Map of the aggregate risk index of communes



The risk assessment also includes analysis of the vulnerability of the project areas based on findings from the customized surveys and field study. Among the most common extreme weather events, **extreme and prolonged cold is seen as the most damaging event for rice, other food crops, and husbandry activities** since extreme and prolong cold directly affects productivity of main crops and usually causes deathly diseases in animals. **Landslide** caused by heavy rain, flood and flash flood **results in severe damages to local infrastructure, especially traffic roads and irrigation systems** located near high mountains, hills or rivers, ponds and streams.

With regard to the institutional capacity, the field study reveals that **most local officers have a good understanding of the weather pattern** in their locality and **appropriate mitigation measures** to extreme weather events. However, **their forecasting capacity remains relatively weak**. The capacity to proactively mobilize multiple resources in the locality is still missing. On identifying knowledge gaps of local staffs as well as their training needs for natural disaster management and resilient livelihoods, a training program has been developed whereby a number of training topics have been proposed. Accordingly, **5 areas that should be prioritized include: climate change and its impacts, natural disaster risk management, resilient livelihoods, resilient infrastructure, and resilient non-agricultural activities**. Trainees will be selected from DPMUs' related program officers and facilitators, extension staffs, officials from DARD and Division of Infrastructure Economics at the district level.

Review of international and local good practices and development of adaptive models

The study has examined various practices of sustainable production activities with an emphasis on both international and domestic agricultural livelihoods. **Good practices are selected on various criteria with strong emphasis on their adaptability to similar extreme weather events in the project areas, scalability on small farm households, sustainability and long-term efficiency.** Most measures for coping with impacts of climate change in these selected cases have already existed. Adaptation measures are based on available international measures with deep integration of local communities' experience and knowledge. Some key characteristics of these case studies are summarized in Table 1. By the end of 2012, a number of livelihood sub-projects including sechium, potato, artichoke, pig, and non-farm activities had been introduced in the project area. These sub-projects create positive impacts on the local environment as well as change outdated farming practices and improve farming land quality in piloted areas.

The findings from desk review, screen surveys and field study allow us to select the following 6 existing models (see Table 2) that can be upgraded to highly adaptive models:

- Model 1: Building cowshed, and raising buffalos and cows indoors. The model mainly focus on improvement of livestock barn so that it can keep warmth during the winter and allow ventilation during hot summer as well as ensuring food supply for livestock.
- Model 2: Growing rice on terraces with Son Tra/Mong apple (*Docynia*). This model aims to sustain and protect the forest area (watershed), prevent cutting the forests and reclaiming forests for agricultural production by intercrop Son Tra (*Docynia*) with natural forests.
- Model 3: Raising local pigs which have proved their high adaptability to harsh weather conditions in mountainous areas. Building pigs' stall using local available materials (bricks, woods, bamboo) and attention in taking care of the pigs are emphasized.
- Model 4: Growing corn on sloping land. This type of SALT cultivation model has been scientifically proven as an sustainable agricultural practice that requires low off farm inputs and has an ability of mitigating natural and disaster risks.
- Model 5: Raising local mountain goats. Models are based on simple techniques to improve goats' barns and recommendations on maintaining a reasonable flock size.
- Model 6: Building ponds and water reserves to transplant spring crop rice. This model follows the system of zabo which is zero risk and an effective way of harvesting water for paddy rice irrigation.

Overall, these 6 adaptive models are relevant to geographical, cultural and weather conditions of project areas. They are environment-friendly and cost-effective which allows the implementation

on poor households with limited financial resources. All of the proposed models require simple practices and only a moderate level of local knowledge's adjustment. The use of locally available resources is highly highlighted. The review is expected to provide important inputs for the project to introduce relevant activities in developing livelihood-resilience models in project communes as well as enables policy makers to make better and more inclusive decisions about future adaptation strategies.