

Livelihood Vulnerability

Subjects: Social Work

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Livelihood vulnerability can be a function of both physiological and social factors [9]. Physiological vulnerability is the extent to which communities are exposed to physical effects such as sea-level rise and an increase in sea temperature, and/or atmospheric temperature. Such exposure to climate change increases rural livelihood vulnerability and reduces households' ability to cope with climate risks, shocks, and stress. Rural households often have limited assets and thus adaptive capacity. The social vulnerability can include factors such as relative inequality, culture, the degree of urbanisation, and the rate of economic growth.

Keywords: livelihood vulnerability ; agricultural dependency ; climate change

1. Introduction

Vulnerability assessments have become a core means of understanding development challenges and climate change influence in many contexts. Such assessments can encompass the numerous methods utilized to systematically consider interactions between humans and their environmental surroundings, including physical and social aspects [1]. Approaches to vulnerability assessment include historical narrative, comparative analysis, statistical analysis, indicator-based methods, and agent-based modelling. Recently, the indicator-based method has been widely used to assess vulnerability to climate change and climate-induced disasters [2][3]. Almost all the approaches use indicators to characterize and quantify the different dimensions of vulnerability, with the common practice being to combine the diverse indicators into a single composite index [1][4].

The indicator approach has been used at different scales and domains to quantify system dynamics [2][5][6][7]. The Sustainable Livelihood Approach (SLA) (**Figure 1**) has been used to understand household livelihoods and to plan community development programs. This approach considers five types of household's assets i.e., natural, social, financial, physical, and human, and uses multiple indicators to assess exposure level to natural disasters and climate change. Households' economic characteristics affect households' adaptive capacity, and the characteristics of health, food and water resources determine the household's sensitivity to climate change impacts [8]. A major work in livelihood vulnerability assessment is that of [1], who developed two approaches.

They firstly expressed Likelihood Vulnerability Index (LVI) as a composite index, comprising eight major components:

- Socio-Demographic Profile
- Livelihood Strategies
- Social Networks and Finance
- Health
- Food
- Water
- Housing and Productive Land
- Natural Disaster and Climate Variability

The second approach was based on the vulnerability definition of the Intergovernmental Panel on Climate Change (IPCC), whereby they decomposed the eight major components into three contributing factors to vulnerability: based on exposure, sensitivity, and adaptive capacity. The LVI approaches consist of variables indicating the level of exposure, sensitivity, and adaptive capacity to climate-induced disasters (for example, droughts and floods, landslide, etc.) and climate change. The LVI indicates a way to understand how vulnerability varies across time and space and to identify the main factors contributing to vulnerability, highlight strategies reducing the vulnerable level, and also evaluate how efficient these strategies are in different social and ecological environments [4]. In the past decade, the LVI has become a means of assessing farmers' vulnerability to climate change and disasters around the world [9][4][10][11][12][13].

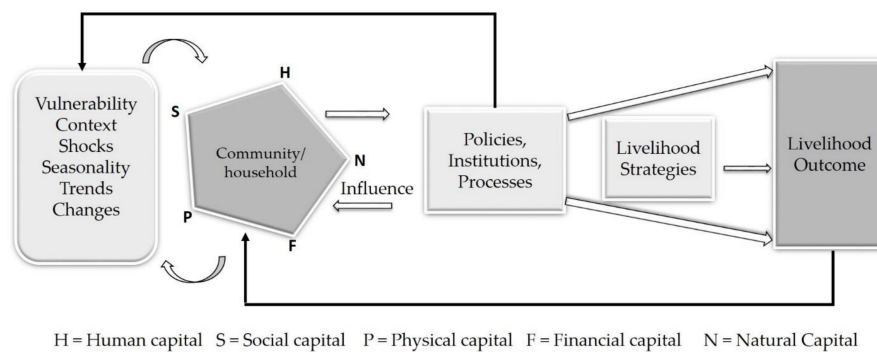


Figure 1. The asset pentagon lies

at the core of sustainable livelihood approach, within the vulnerability context [14].

2. Assessing Livelihood Vulnerability of Minority Ethnic Groups to Climate Change: A Case Study from the Northwest Mountainous Regions (NMR) of Vietnam

Climate variability and climate events have been increasing in frequency and intensity in the NMR of Vietnam, which affects both livelihoods and production activities of various ethnic minority groups, and those who have lower levels of education and income, small-scale farming as the main livelihood and poor housing systems are likely to be especially affected. The overall indices revealed differences based on ethnicity/location, with Hmong and Dao being the most vulnerable groups. This shows the potential of the two methods to identify what might be critical factors in more or less vulnerability and adaptive capacity. We conclude that an analysis of the sub-components of LVI are critical to formulating highly targeted responses, especially where program resources are very limited.

Our findings identified education levels, diversity of income sources, agricultural training, and organizational membership as the most important factors influencing the households' adaptive capacity. The diversity of income among all groups is relatively low, with high dependence on agriculture, so there is a high exposure to climatic effects. We observed that while all four ethnic groups had relatively low education levels and high dependence ratios, Hmong and Dao were especially vulnerable on these sub-components. These then are likely constraints on people's ability to receive and understand information and policies from the local government. Becoming a member of a social or professional organization or network provides more opportunities to get information on agricultural practices/activities/natural hazards and also to strengthen the connections among communities. Access to health services and water resources could also be important, with deficits in these areas further increasing vulnerability to climate variability, change, and events. Housing location and construction also contribute to household vulnerability, especially concerning extreme weather events.

In order to reduce the vulnerable level of ethnic groups to climate change, we provide the following recommendations which may be of interest to researchers working in other remote rural areas in other regions:

- In national and local adaptation planning, priority should be given to support the poorer communities (in our studies case, the Hmong and Dao ethnic communities) that are more vulnerable and have a low capacity to cope with climate change.
- It is essential to enhance literacy, especially amongst disadvantaged groups (Hmong and Dao ethnic groups in the current work). This solution is important because this would increase the effectiveness of training and education programs, especially with understanding threats to livelihood, including climate change, and better enable the transfer of technology.
- Governments could strengthen extension, through targeted programs and appropriately designed visual aids and materials. These will help in the adaptation of farm systems and disaster preparedness.
- Local governments could facilitate income diversification strategies, supported by training and concessional loans.
- The government could upgrade road infrastructure to link remote communities to larger towns and centres and water systems and treatment.

Finally, we reiterate that the subjective selection and weighting sub-components for major components in the LVI models, and its influence on the vulnerability of households or communes, can be a limitation of LVI methods [9][11][15]. This research suggests that effective identification of the sub-components could improve the precision of assessment of the vulnerability of livelihoods to climate change at the local or regional level. To achieve that goal, researchers need to have

a deep understanding of local situations including the natural resources, livelihoods assets, social-economic aspects, and climate conditions. The results of LVI-IPCC models recommend that researchers should use caution in case the scores of LVI are negative or counterintuitive (the adaptive capacity results are greater than the exposure results). Increasing sensitivity might reduce the overall level of vulnerability. Therefore, in this case, in applying the LVI-IPCC model, caution should be taken in suggesting the adaptation options to climate change.

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