



# Vulnerability to climate change: Adaptation Strategies and Layers of Resilience



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## Mainstreaming Grassroots Adaptation and Building Climate Resilient Agriculture in SAT Viet Nam

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### Background

Viet Nam has a population of more than 86 million people, and an inland surface of 33,115,000 ha. Forest and agricultural lands, cover 44.7% and 28.4%, respectively. The agricultural sector, including crops, livestock, fisheries and aquaculture accounts for more than 20% of the national GDP, 65% of employment and 30% of export value. The agricultural sector has a considerable influence on the national economic growth, poverty eradication and malnutrition elimination (GSO 2010).

Agriculture is considered to be the sector most affected by climate change, especially in crop and animal production and livelihoods of farmers in the semi-arid tropical regions (SAT). On an average, it was estimated that the damages for the agricultural sector is about 1% GDP. The agriculture sector lost about 800 billion VND (USD 40 million) annually due to typhoons, floods and extreme climate events. According to the most optimistic scenario (B1) of climate change and sea level rise, rice production in Viet Nam will probably reduce by 8.4% in 2030 and 15.3% in 2050, if there is no action taken to minimize the impacts. This will severely influence the national food security and sustainable development of the country.

Under the aegis of the project “Vulnerability to Climate Change: Adaptation Strategies and Layers of Resilience” funded by the Asian Development Bank (ADB), and coordinated by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and conducted by the Institute of Agriculture & Environment (IAE), the grassroots level responses were captured to understand the adaptation measures against climate extremes being practised by farmers across semi-arid regions of Viet Nam.

### How equipped is the Viet Nam government against climate change?

The government of Viet Nam is well aware of climate changes, and has initiated steps to mitigate these effects, especially in the agricultural sector, and these are as follows:

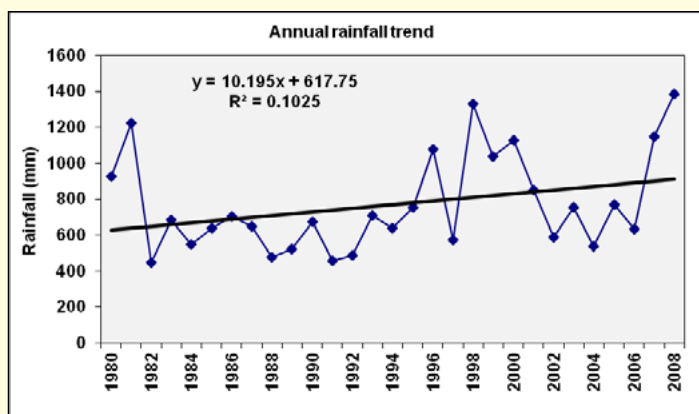
- ◆ Viet Nam Prime Minister has approved the decision (Decision 158/2008/QĐ-TTg) of the National Target Program to respond to climate change on 2 December 2008;
- ◆ Ministry of Natural Resources and Environment (MONRE) issued National Scenario of Climate Change and Sea Level Rise (NSCCSLR) in 2009; and supported the provinces to issue an action plan to respond and adapt to climate change;
- ◆ Minister of Agriculture and Rural Development approved the Action Plan Framework for Adaptation to Climate Change in the Agriculture and Rural Development Sector during the period 2008-2020 on 5 September 2008 (Decision No. 2730 /QĐ-BNN-KHCN);
- ◆ Minister of Agriculture and Rural Development signed a Decision of action plan Framework for Adaptation to Climate Change in the Agriculture and Rural Development Sector Period 2011-2015 on 23 March 2011 (Decision No. 543 /QĐ-BNN-KHCN), which was developed to:
  - Provide safety for the people in the cities and regions, especially in Mekong River Delta, Red River Delta and central coastal line
  - Promote low greenhouse gas emission, sustainable agriculture, forestry and aquaculture production

- Ensure food security, protect the rice cultivation area of 3.8 million ha, including 3.2 million ha of double or triple rice cultivation
- Ensure safety of dikes, people and infrastructure to avoid loss and reduce risks from disaster
- Stabilize agricultural growth rate of 20%, reduce poverty by 20% and reduce greenhouse gas emission by 20% over a 10-year period.

## Trends in climate in SAT Viet Nam

Annual average rainfall at Phan Rang station is 764 mm with a wide range from 449 mm to 1384 mm. Annual rainfall showed an increasing trend of 10%, but there is no significant change in the seasonal rainfall. Monthly rainfall can be classified into three periods ie, 1) A very dry period with no significant rainfall from January to April with a monthly rainfall ranging from 5 to 21 mm/month; 2) The mid-period, which occurs from May to August with a monthly rainfall ranging from 52 to 84 mm/month; 3) The heavy rainfall period, which occurs from September to December (140mm/month) with the highest rainfall occurring in November and diminishing in December. This period receives a higher rainfall when compared with the previous periods and the trend shows an increasing level of rainfall in this region.

Regarding temperatures, there was a positive trend in the annual maximum temperature in autumn and winter, and a negative trend in summer and spring, but this was insignificant during the period 1994-2008. Regarding the minimum temperature, it showed a positive trend for all annual minimum temperatures, in spring, summer, autumn and winter seasons, but was not significant during 1994-2008 (Figure 1).



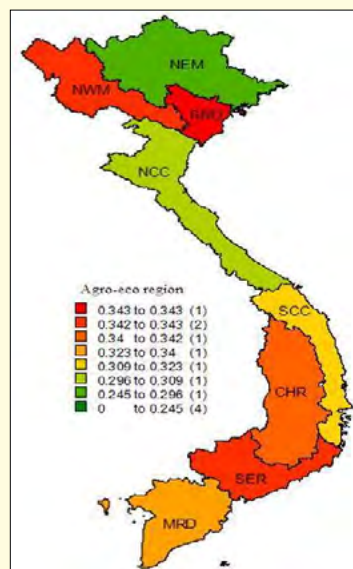
Source: ICRISAT (a).

Figure 1. Annual rainfall and trends of rainfall at Phan Rang station, Ninh Thuan province.

## SAT Viet Nam – A vulnerable hub to climate change threat

Thirteen variables (indicators) represented in three groups (exposure; sensitivity and adaptive capacity) were computed for Viet Nam's vulnerability to climate change. Some variables are indicative of vulnerability in case of variation in temperature and rainfall, but are poor with regard to a sea level rise. The absolute value of vulnerability is highly dependent on the available set of input data and it may change over time (Figure 2).

Climate change vulnerability was constructed for 8 agro-ecological zones of the country using a list of relevant indicators. The indicators were selected based on the availability of data on agricultural activity, food security and farmers' income.



Source: ICRISAT (c).

Figure 2. Climate change vulnerability of different Agro-eco regions of Viet Nam.

## Adaptive capacities of SAT farmers

Several promising adaptation activities are being carried out to reduce the impact of climate change, and to reconstruct the shore and river dikes: introduce drought, submergence and salt-tolerant varieties; shift crop calendar; and shift rice crop to upland crop with less water demand.

Various mitigation techniques and measures have also been introduced to deal with climate

change, such as saving irrigation water; managing soil carbon; reducing burning of crop residues; using biogas and treating animal waste.

## Farmers' perception and their coping mechanisms

For several decades, farmers have been dwelling upon the various factors that bring about changes in climate. They perceived that the annual rainfall was increasing, but the number of rainy days was decreasing. Rainy season usually arrives late and is highly erratic. Farmers confirmed that sometimes it was difficult for them to predict the arrival of rains. Temperature was perceived

Table 1. Farmers' capacity to respond to climate shocks.	
Response evaluation	%
Fair response	0.00
Medium response	31.39
Weak response	68.61

Source: ICRISAT (b).

to have slightly increased in comparison to the previous years, especially in summer.

For several decades, farmers have continuously adjusted and responded to climate change. Farmers perceived that land had degraded due to erosion and overexploitation. Their common property resources, especially lakes, water reservoirs and wells had become drier than before.

Government investment has supported the farmers in developing agricultural production by introducing new varieties, irrigation systems and other infrastructure. The farmers confirmed that government programs are helping them in adopting adaptive strategies in response to climate change, but due to lack of resources, the programs are not fully implemented.

In general, farmers in the study villages have been cultivating drought tolerant crops such as grape, apple and tobacco in place of high water demanding crops such as rice. Some of the villagers have come up with good solutions for water conservation (14.83% in Son Hai village). 13.4% of them are ready to give up agriculture and earn money by indulging in non-agricultural activities (Figure 3).

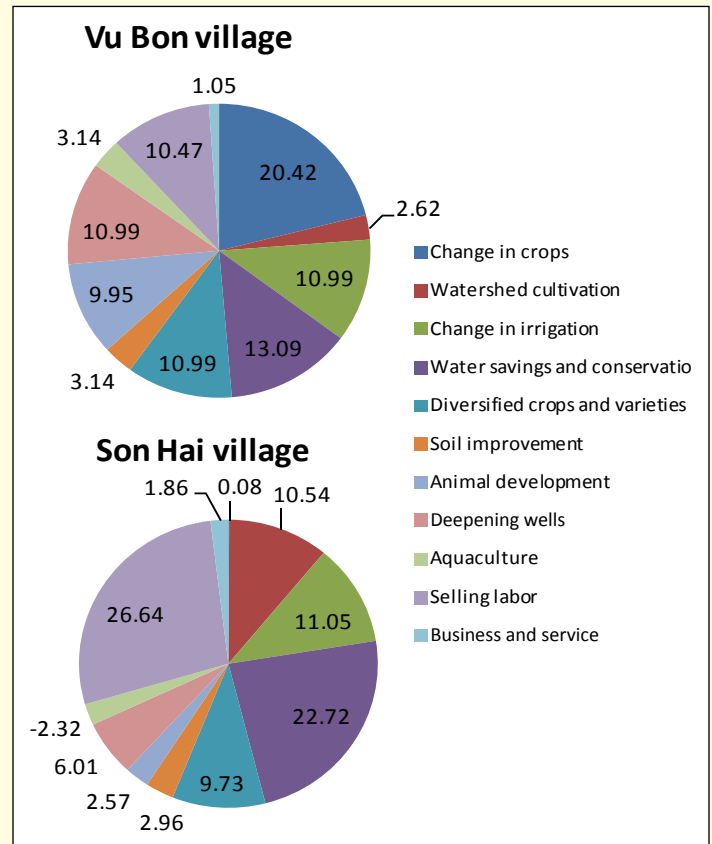
### How far are the farmers from efficient adaptation?

Based on several group discussions, the farmers are facing some difficulties/constraints. The farmers classified them into different categories and listed what constraints they were facing. There were 12 issues mentioned by farmers, including capital; water sources; seeds; animal feeds (grasses, food); technological services; agricultural land; skills in responding to floods and drought; exhausted fish resources; environmental pollution; input price; human care services; and agricultural product storage (rice, fish) (Table 1).

### Government programs on the ground

There are policies introduced by the government to help farmers to improve agriculture. However, a few government programs such as agricultural extension and science and technological research have not been

addressed in response to climate change. Although the government has incorporated climate change into its national program, still it is limited. Hence, the governmental program needs to integrate climate changes



Source: ICRISAT (b).

Figure 3. Adaptive strategies selected by farmers to respond to climate shocks.

### Constraints faced by the farmers

#### Small farmers

- Lack of water resources
- Lack of capital
- Lack of improved seeds and feed for animals
- Lack of market for the produce

#### Intensive farmers

- Lack of capital, water, market information and storage infrastructure

#### Local officers

- Capacity to respond to climate shocks
- Degraded environment
- Exhausted natural resources
- Lack of capital resources
- Lack of adapted seed and feed for animals

#### Women's group

- Lack of healthcare services
- Lack of capital resources
- Lack of water resources
- Limited technological services and agricultural extension coverage.



## Policy Recommendations

- ◆ To build national scenarios and action plans to respond to climate change/climate shocks for semi-arid tropical regions of Viet Nam;
- ◆ To build strong micro level database network with respect to climate and other common property resources;
- ◆ Need for an effective communication strategy to ensure percolation of information to local authorities, farmers and other stakeholders at micro level so as to improve the awareness on changes in climate, its impacts and the response behavior;
- ◆ Build the capacity of farmers and local authorities to respond effectively to climate change impacts;
- ◆ Support research and development of new technological innovations, such as salt-tolerant crops, drought resistant crops as well as efficient management and soil conservation practices;
- ◆ Invest in infrastructure development, such as irrigation systems, water reservoirs, etc, to improve alternate irrigational resources for the farmers;
- ◆ Implement equitable risk based agricultural loan policy to support farmers in developing climate proof farming;
- ◆ Improve public services such as health care and markets, to help farmers improve their living conditions.

especially in the SAT regions, considering the insights and needs of different strata of poor farmers at the micro level.

## Need to build grassroots resilience capacity – Policy environment

Climate change is a reality and will have a serious impact on Viet Nam's economy. Also, agricultural production will be the most affected.

Farmers account for a high proportion among the people and most of them are poor, especially in the SAT region. The government needs to support farmers by implementing active policies to protect them from serious impacts of climate change, by conducting regular trainings and farmer awareness programs.

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