

## **Drought Situations and Management in Vietnam**

**Background:** In Vietnam, drought is one of the most frequent natural disasters, only after flood and storm, and has been becoming more severe due to the impact of climate change. According to the collected statistics, during the past 50 years, droughts have taken place in 40 years in different extents and locations across Vietnam. Drought has had many impacts on the local agriculture and livelihood. In order to deal with the drought issues during the past years, the Vietnamese government has put a lot of efforts to develop drought management measures. However, the drought situation is still very complex.

### **Vulnerability assessment:**

*Drought events in Vietnam in terms of timing, cause and the extent of damage can vary across different regions of Vietnam. Some typical examples of drought problems in Vietnam are:*

- (i) In the northern mountainous area and the Red River delta

In this area, the raining season ends in September or October; droughts often occur when there is a shortage of rainfall, and low water level in reservoirs, mainly during winter-spring crop season. For example, the drought from the end of 1998 until April, 1999 had affected about 86,140 ha of rice paddy (severe drought in 17,077 ha), 10,930 ha of vegetables and others; during the drought from January to February 2004, the water level of the Red river was the lowest in 40 years, the flood retention capacity of reservoirs were below the designed level, the local communities have to mobilize all possible resources to cope with this drought.

For the last 10 years, the water resources in Red river downstream have decreased substantially; the water level of Red river from December to May have been much lower than the average of previous years of about 0.5 to 1.1 meter, therefore not being able to supply enough water for irrigation especially for the Winter-Spring rice season. However, since there are additional water sources from hydropower reservoirs, the drought problems in this area have been mitigated significantly.

- (ii) In the Central coastal lands area

Droughts occur most frequently in this area, during both winter-spring and summer-autumn crop seasons. The droughts strike when there is a shortage in rainfall and water retention capacity of reservoirs, combining with hot and sunny weather. For instance, in 1998, due to the decrease in rainfall during the dry season (only about 30-70% of the annual average) and prolonged heatwave, many rivers, streams, small and medium sized reservoirs had dried up. This prolonged drought since the beginning of the year until August across the Central region affected 253,988 ha of Spring-Winter rice paddies

(30,739ha destroyed), 359,821 ha of Summer-Autumn rice paddies (68,590 ha destroyed); 153,072 ha of seasonal rice paddies (22,689 ha destroyed); 236,413 ha of fruit plants were affected, including 50,917 ha was destroyed. Moreover, the salt water intrusion had become more serious and wildfires occurred in many places, around 3.1 million people had to deal with domestic water shortage. In 2003, the drought in the North of Central region had affected 22,350 ha of Summer-Autumn rice paddies (8,980 ha was destroyed); around 5,000 ha of vegetables and other crops were destroyed

During the Winter-Spring crop season of 2005, there had been a shortage of rainfall and prolonged heat wave in the Central Coastal Southern provinces. This led to the substantial decline in water flow on river systems and reservoirs' water level, water shortage and drought situation were very severe. As the result, 30,000 ha of farm lands in Khanh Hoa, Ninh Thuan and Binh Thuan had been unable to be cultivated, about one million people had not had enough water for their domestic use, industrial and livestock production.

(iii) In the Central Highland area and South East region

Droughts in this area occur in all cultivation seasons, more frequently in Winter-Spring crop season. Since the many farm lands do not rely on irrigation work systems, the drought situation is mainly affected by the weather conditions. For instance, the drought from February until April 2012 had affected 14,380 ha of crops, of which 6,767 ha were severely damaged; from May to August 2002, droughts continued to take place in the Central Highlands area destroyed 6,200 ha of Summer-Autumn rice paddies, 4,460 ha of seasonal rice paddies; 28,210 ha of vegetables, 1,360 ha of fruit and industrial plants. In 2005, the drought in the Central Highlands area occurred at the same time with the drought in the South East central region. This drought had damaged 11,000 ha of crops.

(iv) In the Mekong River delta (the South West area)

The water shortage and drought situation occur in all cropping seasons in the South West area, more often lead to salt water intrusion. These problems had significantly affected agricultural production and people's livelihood. For example, droughts since the end of 1998 to April 1999 had affected 4,420 ha of farm lands; from February to April 2012 droughts had affected 50,000 ha of rice paddies, of which 13,000 ha were severely damage.

**The causes of droughts:**

Meteorological conditions, hydrology, forest management, water resources management and the quality of meteorological and hydrological forecast are objective and subjective factors that lead to the drought problem in Vietnam.

***(i) Objective factors:***

Being located in the South East Asia region, having the typical tropical and tropical monsoon climate, Vietnam has very diverse rainfall patterns and significantly large volume of rainfall, forming many large rainy regions. Rainfall distribution are seasonal, the rainy season is from April to October, having 80-90% of the annual rainfall, while the dry season is from November to March, having 10-20% of the annual rainfall.

As the weather condition described above, even though the average rainfall is quite high, the rainfall distribution is not even, in various places and times water shortage and droughts still occur. In recent years, due to the impact of climate change, the average temperature has increased, leading to greater evaporation volume, especially during dry season; the rainfall distribution has become more extreme, the rainfall is mainly focused during the rainy season with very high intensity while substantially reduced during the dry season.

The second objective factor is the natural flow and the flow distribution of streams and river systems. Vietnam has 2,360 rivers with a length of 10 km or above. Among thirteen largest river basins with the area of more than 10,000 km<sup>2</sup> such as the Red river (Đa, Thao, Lo), Thai Binh River, Ma River, Ca River, Đong Nai River, Mekong River, etc, there are 10 international river basin (only 3/13 rivers originate from Viet Nam and having the downstream in neighbouring countries, 7 rivers originate from neighbouring countries and flowing to Vietnam). This means that Vietnam is subjected to not only many international constraints but also various complex water sharing issues, especially when countries of upstream region have increasingly exploited their water resources and constructed more large reservoirs to store water, leading to reduction in water flow to the downstream region.

***(ii) Subjective factors:***

First of all, it is due to the ineffective forest management and protection. Before 1945, the forested area of Vietnam is 43%, however, in 1995 this area decreased to only 29% and after "The new 5 million hectares of forest program" and improvement of watershed conservation policies being carried out, the forest coverage now can reach nearly 40%. Moreover, the distribution of forested areas are not even across different regions, the quality of these forests are not good enough for effectively regulate the flow between dry season and rainy season, leading to less water flow during the dry season.

Secondly, the over exploitation and development of irrigation systems, hydropower systems and other water resources mining projects have led to the depletion of water resources, both surface and under ground water. The coordination between relevant sectors in water use and multi-purpose water service is not efficient enough, for example, the issue

of regulating the flow from hydropower reservoirs to the downstream during dry season is still very prevalent.

Thirdly, the quality of meteorological and hydrological forecasts are not good enough, resulting in ineffective planning and timing for crop production, and passive reservoir water storage planning, putting a lot of pressure on irrigation water supply, especially during the period of water resources shortage.

### **Droughts management measures which have been implementing in Vietnam**

a) Strengthening reservoir construction, maintenance and upgrading. Currently, hydropower reservoirs and irrigation reservoirs can store around 10% of the total ground water volume in Vietnam. Therefore, it is necessary to construct more water storage facilities. During few decades ago, the Vietnamese Government has invested in construction of various major reservoirs such as Cua Dat, Ta Trach, Krong Buk Ha, etc. Besides, "the Program to ensuredam/reservoir safety" has been developed and implemented since 2003 in order to ensure major reservoirs' safety and maximize their designed capacity. Currently, the main achievement of this program is that basically the repair of large reservoirs with the capacity of 10 million m<sup>3</sup> and above have been completed while the repair for small reservoirs are still under implementation.

b) Increasing the ensued measure of irrigationsystems. The designed ensued measure existing irrigation systems is 75% (a 75-years return periods). In order to meet the demands of production and people's livelihood, the ensued measure of the exsiting facilities has been improved to 85% (a 85-years return periods). The maintenance and upgrading of the irrigation systems have to ensure this objective.

c) Managing and increasing the coverage of protected forest areas and the forest watersheds. In 1995, the forest coverage of Vietnam was only around 28.2%, decreased by 5 million ha in comparision with the coverage before 1945. "The 5 million hectares of forests Program" has been developed in order to manage and conserve effectively the remaining forest, while reforest 5 million hectares to increase the forest coverage, protect and regulate the water resources .

d) Improving the efficiency of the Irrigation works systems. According to the current assessment, irrigation works used in agricultural production only can reach 60-65% of their designed capacity. To overcome this challenge, the Ministry of Agriculture and Rural Development has developed "a scheme on improving management and utilization efficiency of the existing irrigation systems", one of its main objectives is to effectively use the irrigation systems, ensure saving water, improve the management modernization, prevent degradation and actively adapt to climate change.

e) Regulating water sources in the catchment area. In reality, water supply for agriculture production and manage drought is under the responsibilities of MARD and Vietnam Electricity Corporation by their coordination in regulating the water from hydropower reservoir to supply to the downstream regions. For example, for the last 10 years, there have been additional supply of water for Winter-Spring rice cultivation in the Red river delta, supplying enough water sources for crop production. Nevertheless, reservoirs in the central coastal lands area also have been regulating in order to supply enough water for the lowlands during the dry season.

f) Crop restructuring. to respond to the water shortage issue, especially in central coastal lands and central highlands areas. Rice has been replaced by other plants which use less water. This restructuring has been under close management of the Ministry of Agriculture and Rural development and actively implemented at the local level.

g) Improving the implementation of water-saving measures. In order to save water, the "Canal Upgrading Program" have been implementing in order to enhance the effectiveness of the irrigation system. In particular, since the system has been standardized stabilized, the water loss has decreased by 20-25 %, the canal water level is high enough for gravity irrigation; therefore, shorten the irrigation time. The irrigation management has become more active and the cost of regular maintenance for the new system is only about 60 % of the cost for the previous soil canal system.

On the other hand, innovative technologies and methods of rice cultivation have been done pilot research on and implemented step by step in many different regions. The innovative methods may apply for 1,000,000 ha paddy rice in 2020 and has proven to be able to decreased 20-25% of irrigation water, 70-90% of rice varieties, 20-25% of fertilizes, 50-70% of pesticides, 20-25% of greenhouse gas emissions and increased 9-15% of rice yield.

h) Dredging upstream of inrrigation intake and canal system, installing mobile pumping stations to utilize the water resources are some frequently used measures at the local level. In principles, the implementing costs for these measures are covered by the annual irrigation fee incomes of local irrigation management organisations. Droughts and natural disasters can take place in various regions in Vietnam due to both objective and subjective factors. They can bring significant impacts on agricultural production and people's livelihood. Even though, droughts can be forecasted and relatively slow-paced, drought management measures are not simple and there is a need for long-term measures besides the immediate responses. To deal with droughts, the long-term forecast can play a very important role and support the agriculture production planning such as effective and proactive crop restructuring, rescheduling cropping season, adjusting water supply and

storage planning. To improve the drought forecast and warning system, the quality of meteorological and hydrological forecasts needs to be strengthened in the future.

## **LIST OF REFERENCE**

1. Reports on drought situation of the Directorate of Water Resources;
2. Provincial report on drought situation from 1995 until 2013;
3. The Decree no 143/2003/NĐ-CP dated 28/11/2003 of the Government to specify the Provisions for Implementation of the Irrigation works Exploitation and Protection Ordinance.
4. National Technical standards for Irrigation work, mainly related to construction design (QCVN 04 - 05 : 2012/BNNPTNT);
5. Thematic report: Study and analysis on the drought situation and drought management policies and institutions at the central and local levels in Vietnam – under the Project: Scientific research on drought management and desertization to develop the integrated and strategic solutions and management system; Case study on the Red River Delta and the South Central region (code : KC.08.23/06-10)