Drought conditions and management strategies in Lao PDR.

Dr. Mayphou MAHACHALEUN

Deputy of Climate and Agro-Meteorological Division, Department of Meteorology and Hydrology (DMH), MoNRE, Souphanouvong Avenue, Ban Akard, Sikhottabong District, P. O. Box: 2903, Vientiane Capital, Lao PDR, Email: mayphou66@yahoo.com.

Mr. Chanseng PHONGPACHITH

Senior Expert, Agriculture and Policy Research Center, Ministry of Agriculture and Forestry, NAFRI, 7170, Vientiane, Lao PDR.

1. Background

The Lao People's Democratic Republic is located in the Central of Southeast Asia. Sharing border with China to the North, Myanmar to the North West, Thailand to the West, Cambodia to the South and Vietnam to the East. From the geographic location, the width of some 40 km to 50 km in the Central province is vulnerable to Tropical depression and Typhoon originating in the Pacific Ocean or the South China Sea.

Droughts are known to have the most far-reaching impacts of all natural disasters. They affect nations around the world with dramatic impacts on food security, social stability, environmental and the economy's at large. While the impact of droughts can be significantly reduced by risk-based drought management policies and practices, most countries currently have in place only emergency and recovery strategies that regulate disaster response after droughts have taken their tool. Such reactive responses, however, often prove to be ineffective.

The main hazards in Lao PDR are flood and drought both is dependent on the amount of rainfall. If there is less than 2.000 mm rainfall in the year, drought sensitive areas will be affected. More than 200 mm in 2 days certainly leads to floods along the Mekong plain. In recent years natural disasters resulting from climate abnormalities have occurred more frequently especially droughts and floods. For the period spanning from 2003 to 2013 the Lao PDR has already experienced 2 years (2003 and 2007) with the devastating droughts (*Tab.1)*

No	Year	Types of Damage	Damage Cost US$	Place of Damage
1	2003	Drought	16.500.000	Northern and Central
2	2007	Drought and Flood	997.969	Central

(WMO, UNCCD, FAO, CBD and UNW-DPC)

2. Drought monitoring and early warning system.

The Plan reflects the disaster risk reduction initiatives since creation of the National Disaster Management Committee in 1999 in line with the paradigm shift in disaster management from conventional response and relief to a more comprehensive risk reduction culture.

Although droughts have affected mankind for centuries, the World Meteorological Organization (WMO), The Food and Agriculture Organization of(1) the United Nation (FAO), United Nation Convention to Combat Desertification (UNCCD) in cooperation with UN-Water Decade Programme on Capacity Development (UNW-DPC) have initiated the Joint Development initiative on Nation Drought Management Policies. The initiative was launched by an international kick-off workshop during the high-level Meeting on Nation Drought Policy (HMNDP) held in March 2013, in Geneva Switzerland.

Effective drought early warning system (DEWS) is an integral part of efforts worldwide to improve drought preparedness. Most households vulnerable to drought live in the provinces of Khammouane, Savannakhet, Vientiane, Saravanh, Champasack and Sayaboury (WFP, 2006).

2.1. Temperature monitoring.

Temperature is continuously increasing; the rain does not come properly, which Results in a number of adverse impacts to the economic system, environment and the Livelihoods of people of all ethnic groups. Thus, climate change poses as a great Challenge for the Lao PDR to tackle and adapt to climate change conditions and minimize the emission of those greenhouse gases:

- Mean Minimum temperature is 13.5° C - 17.5° C (December – January).
- Mean maximum temperature is 35.5° C - 39.5° C (March – April).
- Annual average temperature is 26.5° C - 27.5° C.
- Absolute maximum temperature is 40.1° C at station Sayaboury on 11/4/2005.
- Absolute maximum temperature is 40.5° C at station Vientiane on 7/5/2003 and 1/4/2007.
- Absolute maximum temperature is 41.0° C at station Khammuouane (Thakek) on 24/4/2007.
- Absolute maximum temperature is 42.0° C at station Savannakhet on 23/4/ 2007.
- Absolute maximum temperature is 39.6° C at station Saravanh on 31/3/2007.
- Absolute maximum temperature is 40.0° C at station Champasack (Pakse) on 15/4/ 2010.

2.2. Water sector.

Lao PDR’s climate can be divided in two distinct seasons: a dry season from mid-October to April and a rainy season dominated by the south-west monsoon which brings high rainfall, high humidity, and high temperature between May and mid-October (2). Temperatures during March-May period can reach high into the 30s°C, while at higher elevations and during the dry season's cooler months of December and January, temperatures can drop as low as 15°C and below. The average annual rainfall ranges between 1,300-3,000mm (Figure 1)

- Study, design, and build multi-use reservoirs in drought-prone areas;

- Improve systems for the sustainable use of drinking water and sanitation, with community participation in flood- and drought-prone areas;
- Survey underground water sources in drought-prone areas;
- Mapping of flood-prone areas;
- Raising awareness of water resource management;
- Improve knowledge and skills of engineers who design and build water and sanitation systems;
- Establish an early warning system for flood-prone areas and improve and expand meteorology and hydrological networks and weather monitoring systems.

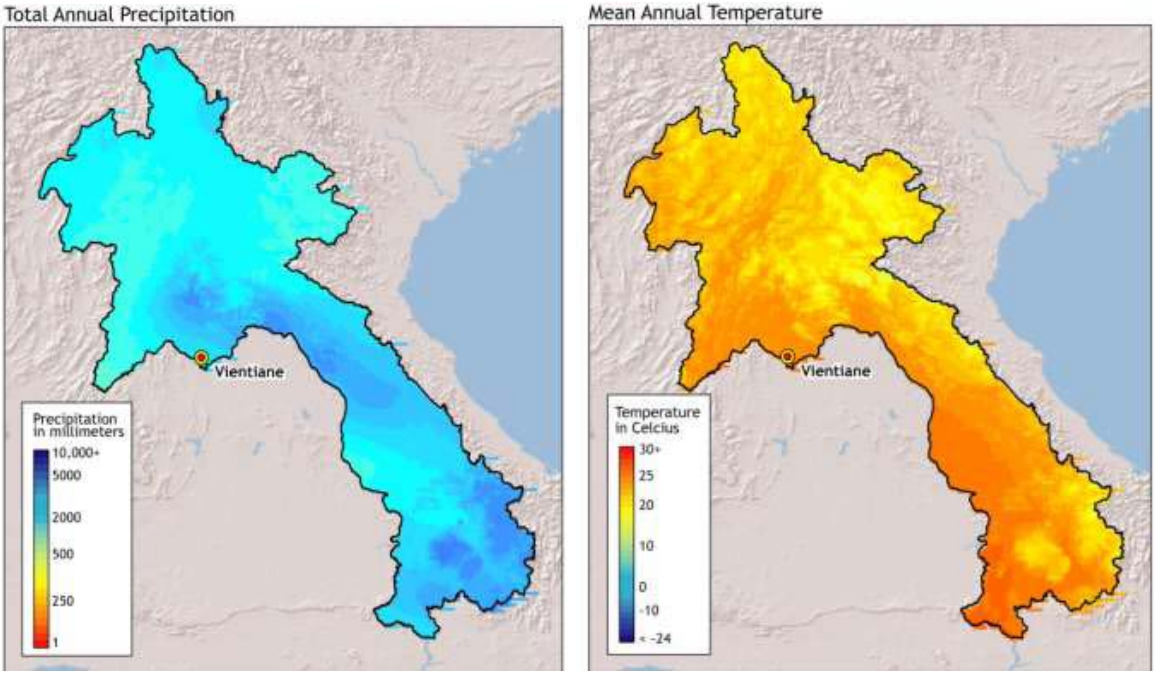


Figure 1: Mean annual precipitation and temperature across Lao PDR

3. Vulnerability assessment.

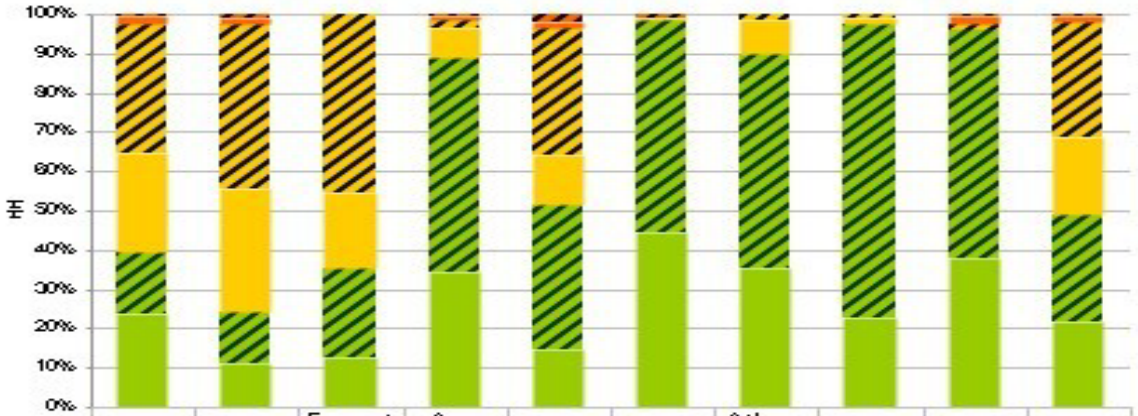
The implications of these low water levels are serious for the people of Lao PDR. Severe drought will have an impact on agriculture, food security, access to clean water and river transport, and will affect the economic development of people already facing serious poverty. National Centre for Environmental Health and Water Supply in Laos has started advising people to counter the effects of drought by reducing water consumption. The MRC is undertaking more detailed assessments of the low flow conditions and is working with its member countries to closely monitor the situation as well as integrating drought management considerations into its climate change adaptation initiative. The government will spend more on irrigation stations in Vientiane if the water level in the Mekong continues to fall.

The government has spent about 1.4 billion kip (5) on installing the pumps on boats and making channels to bring water to the stations. Irrigation projects on other rivers such as the Nam Ngum are not affected because they have enough water. Only the irrigation systems on the

Mekong have a problem with low water levels. The Vientiane water supplier, Nampapa Nakhoneluang, will start pumping water on boats in two days' time.

A Household's vulnerability to drought is proportional to the livelihood exposure and the household's resilience. According to the CFSVA, farmers, farmers/gatherers and farmers/fishers/hunters are the livelihoods at greatest risk to drought since they depend on rain-fed agriculture. The most vulnerable households are farmers and (agricultural) unskilled laborers. 12 % of agro-pastoralists are also considered vulnerable to drought.

A severe drought would hardly affect the other livelihood groups(3). The CFSVA estimated that 46 percent of the rural population (around 188,000 households) is vulnerable to drought. Most of these households are located in the lowlands, especially in the Southern regions and in the provinces of Xayabury and Luangprabang. This is in addition to the 2 percent who are already chronically food insecure.



	Farmers	Farmers / gatherers	Farmers / fishers / hunters	Agro-pastoralists	Unskilled	Skilled and salaried	Artisans with agriculture	Petty traders	Others	Total
Chronically FI Drought prone	2	1	0	0	1	0	0	0	0	4
Chronically FI No drought	5	2	0	1	1	0	0	0	1	9
Vulnerable Drought prone	79	59	42	2	12	0	0	0	0	195
Vulnerable No drought	60	44	18	5	5	0	1	0	0	133
Not vulnerable Drought prone	38	18	21	38	14	14	7	12	18	180
Not vulnerable No drought	57	16	12	24	5	12	5	4	12	145

Figure: Drought - Vulnerable Households and Households at Risk, by Livelihood Group (in percentage in graph, in thousands of HH in table)

4. Emergency relief and drought response.

(WMO, UNCCD, FAO, CBD and UNW-DPC)

Recent droughts have been followed by emergency interventions supported by the FAO(4), Special programme for food security (SPFS) and South-South Cooperation was implemented in Lao PDR with a total budget of US$2 900 279.. Improving food safety and its management in Cambodia, Lao PDR and Viet Nam, GCP/RAS/207/NZE, US$ 1 149 520, funded by New Zealand Enhancing food safety by strengthening food inspection systems in ASEAN countries, GCP/RAS/222/JPN, US$1 270 073, funded by Japan. Support to the FAO programme on capacity building in food safety in selected ASEAN countries, GCP/RAS/223/JPN, US$849 843, funded by Japan. Support to the EC programme on linking information and decision-making to improve food security for selected greater Mekong sub regional countries, GCP/RAS/247/EC, US$2 557 545, funded by the European Union. As detailed in the Development food-for-work with nine partners including six international NGOs during 2005 for the implementation of Development food-for-work schemes. In 2005, new partnerships were formed with Christian Reformed World Relief Committee (CRWRC) in Xiengkhuang Province and with Adventist Development Relief Agency (ADRA) in Luangnamtha.

5. Practices to alleviate drought impacts.

Comprehensive multi-hazard risk, vulnerability, and capacity assessments at all levels. Management and dissemination of knowledge on risk. Effective early warning systems for threats including famine, drought, reverie floods, flash flood, earthquake and severe storms, etc... Communication and awareness rising about hazard threats. The drought hazard assessment has been carried out using SPI (Standard Precipitation Index)(3). SPI was chosen for this study because of its simplicity and based only on precipitation data. The SPI has many advantages over other drought indices, such as the Palmer approach, which requires more variables. The SPI is calculated from monthly precipitation record by first fitting in the gamma probability distribution function and then transforming into a normal distribution in such a way that the mean SPI is set to zero (McKee, 1993; Edwards, 1997). Drought was relatively more frequent in first and third 5-year period of analysis while there was lull in between. Probability of occurrence of drought of any category is found to be highest (27%) at Phalan in dry season where as it is found to be highest (25-27%) at Phiengluang in other three durations, however it is to be noted that both the stations contains only about one decade of data.

6. The need for knowledge and skills on drought management.

Although, the Lao People’s Democratic Republic is a landlocked country, it is also a land linked with the other countries of the Southeast Asia effecting by the Tropical disturbances: Monsoons and Typhoons. Lao PDR has been incessantly damaged by natural disasters that floods and droughts are the two mains hazards, Due to the limited availability of data, only climatologically data from 2003 to 2013 was considered for the drought assessment. Moderate drought frequently occurs in all the durations but severe and extreme droughts are less common; except for severe drought in the dry season which has occurred many times. Advances in climate knowledge and prediction capacity on the seasonal time-scale can contribute to adaptive management and resilience within the hydro-climatic system for livelihood security (WMO, 2005). Therefore, study on drought hazards especially drought monitoring and assessment are essential for implementing mitigation and adaptive measures to reduce drought impact in Lao PDR. However drought impacts in the Lao PDR (UNEP & Ministry of Natural Resources and

(WMO, UNCCD, FAO, CBD and UNW-DPC)

Environment, UNDP, FAO and JICA), often on external assistance from donor organizations, result in increased vulnerability to drought events in a changing climate.

References

1. **AGRICULTURAL DROUGHT INDICES PROCEEDINGS OF AN EXPERT MEETING. 2-4 JUNE 2010, MURCIA, SPAIN, page 13 – 21.**
2. **DEVELOPING A NATIONAL RISK PROFILE OF LAO PDR, page 82 of 97.**
3. **WFP LAO PDR COUNTRY STRATEGY 2011 – 2015, page 13 – 18.**
4. **CLIMATE RISK ADAPTATION COUNTRY PROFILE, APRIL 2011, page 4 – 9.**
5. **DROUGHT MEKONG RIVER, VIENTIANE 2010, Eng.**