

DeRISK SE Asia INFO NOTE SERIES

Applying participatory climate risk and livelihoods mapping to define users' demand for climate services

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KEY MESSAGES

- Participatory climate risk and livelihoods mapping provides specific information that is required to deliver more salient climate services (CS) for farmers within the context of farm decision-making.
- Each major cropping and livelihood system has different CS requirements in terms of their temporal and spatial scale.
- The identification of relevant actors to tailor CS and building partnerships at the local level is crucial to better define mandate, roles, and types of support that each actor can provide.
- It is important to consider the anticipated future changes in peoples' livelihoods and zones since these have important implications for designing CS-related programs and integrating the CS agenda into the national or provincial climate change adaptation planning.

Introduction

Understanding the demand for climate information services (CIS) at the livelihood level is essential in the production, translation, and dissemination of tailored agro-advisories for intended users. Key drivers for the demand for CIS are price, income, vulnerability to climate variability, beliefs and religion, complementary services, gender, type of crops, and farm size (Ouedraogo, 2022). The project, "Applying seasonal climate forecasting and innovative insurance solutions to climate risk management in the agriculture sector in Southeast Asia", also known as "DeRISK SE Asia", aims to strengthen the resilience of agricultural value chains in SE Asia, including Cambodia, against the physical and economic impacts associated with natural disasters exacerbated by climate change disasters.

The project aims to enhance the understanding of smallholder farmers and agribusinesses engaged in rice, cassava and other priority and

high value crops on better management of climate risks by determining the adaptation options through improved quantification of risks to fine-tune management strategies, targeted climate forecasts to respond to management needs, co-exploration and co-development of decision support tools, and the development of risk transfer mechanisms (i.e., index insurance). Central to this is the combination of local knowledge with global scientific knowledge to develop customized and locally relevant products and services.

Mapping the priority livelihood and cropping systems and determining the main climate risks and the local coping and adaptation strategies of farmers are critical in designing a reliable and responsive climate service. In 2019, DeRISK SE Asia collaborated with the World Food Programme (WFP) in Cambodia to conceptualize and develop a series of climate risk workshops using the 2013 livelihood maps from the Consolidated Livelihoods Exercise for Analyzing Resilience (CLEAR). The 2013 CLEAR exercise aimed to understand how



Various representatives from the relevant sectors actively participated in the participatory climate risk and livelihoods mapping exercise in Phnom Penh, Cambodia. *Photo: IIRR*

specific livelihoods (micro-livelihood zones) are affected by natural resource management and weather and climate impacts, to better inform program planning and development and identify key livelihood risks.

This Info Note provides an overview of the process, result and implication of the participatory risk and livelihood mapping in 2019, including:

- The process on how the project defined the priority livelihoods and cropping systems using the 2013 WFP-CLEAR livelihood map;
- The key changes that occurred in the livelihood zones between 2013 and 2019, based on the results of the participatory livelihood mapping; and
- Key recommendations based on the findings to better define the demand for climate services for major cropping systems in each livelihood zone in consultation with national stakeholders.

Climate services for agriculture

Agriculture is one of the major livelihoods in Cambodia, contributing 27% to GDP with fishing contributing 12% (World Bank, 2019). It employs 90% of the population of Cambodia, with 80% growing crops for subsistence and 20% for commercial purposes (USAID, 2019). Cambodia is one of the countries highly exposed to climate risks, particularly floods (UNISDR, 2015). These are expected to increase due to seasonal changes in weather patterns and variability in monsoon rains driven by climate change (CFE-DM, 2017). Climate risks have the potential to negatively impact livelihoods, food security, and nutrition resulting to decreased agricultural productivity, more frequent occurrence of natural disasters and higher variations of seasonal rains.

Cambodia is divided into four main agroecosystems: i) mountainous/upland, ii) Tonle Sap, iii) Mekong Delta, iv) and coastal areas. A huge territory of Cambodia is covered by the Mekong River and Tonle Sap basins. This makes annual flooding events during the wet season alone result in an estimated loss between 100 and 170 million USD each year (ADPC and UNDRR, 2019).

The detrimental impact of climate change and weather extremes (e.g., heat waves, droughts, heavy rainfall) on agriculture and smallholder livelihoods is increasing. Planning and decision-making for agriculture continue to become more challenging, especially in a climate-sensitive environment. Access to science-based information can help manage adverse impacts on livelihoods through making informed decisions with less regret. However, most smallholder farmers do not have access to actionable agro-advisories based on actual seasonal forecasts. They rely on their own farming experiences and traditional knowledge. However, these may no longer work to predict the climatic conditions of the coming season.

Some farmers may also obtain climate information, such as rainfall and temperature, and natural disaster warnings from television or radio as well as a social media, such as Facebook. Agro-advisory services may be supplied by a variety of entities, including the government, NGOs, and the business sector, but these are often inadequate as they are not developed based on climate information tailored to their conditions. Forecasts and projections have been produced in a vacuum and disseminated with minimal consideration of the diversity of farmer needs, thus meaning that the information is not always useful for the farmers who need it. (Vincent et al, 2020).

In this context, CS can only be designed effectively if there is a concrete understanding of the demand for climate services by different type of users. Hence, it is critical to define the livelihoods and timing of priority cropping systems, as well as farmers' climate-influenced decisions. The World Meteorological Organization (WMO) defines 'climate services' as a decision-aid derived from climate information that assists individuals and organizations in society to make improved ex-ante decisions. This requires iterative engagement to produce a timely advisory that end-users can comprehend and will guide their decision-making to enable early action or preparedness. Most importantly, CS must respond to the needs of their target users.

Smallholder farmers, extension officers, and agricultural departments require regular and timely access to accurate climate information that is relevant to their needs, in a language and format that is understandable and useful to carry out the agro-advisories or recommendations to adapt and minimize the risks of potential loss and damages caused by climate change and variability.

Depending on the type of CS and agro-advisory, relevant government institutions, such as the Ministry of Agriculture, Forestry, and Fisheries (MAFF), primarily the General Directorate of Agriculture (GDA), along with other stakeholders, such as the Ministry of Water Resources and Meteorology (MoWRAM), Ministry of Environment (MoE), the private sector, and other non-governmental organizations (NGOs) should be involved and complement each other.

Updating existing WFP-CLEAR livelihood map through climate risk workshops

As part of a national assessment on the demand for CS, participatory workshops were conducted across the country to validate and map people's livelihoods and climate risks and identify current and available farming practices of local communities to cope with climate variability.

Between August and December 2019, DeRISK SE Asia organized five climate risk workshops with a total of 205 stakeholders from 22 provinces representing Tonle Sap, Low land, Mekong Delta, Mountainous/Upland, and Coastal Areas. GDA, WFP, Regional Integrated Multi-hazard Early Warning Systems (RIMES), Provincial Departments of Agriculture, Forestry and Fisheries (PDAFF), Water Resources and Meteorology (PDOWRAM), Provincial Departments of Environment (PDoE), Provincial Committee of Disaster Management

(PCDM), statistics and planning, provincial halls, research institutions and universities, and district agricultural offices were among those present and provided technical input during the workshops.

Three different types of maps were prepared for each livelihood as part of the methodology: the administrative boundary map, Google Earth satellite image map, and the 2013 WFP-CLEAR livelihood map (Figure 1a). An administrative map with district boundaries was printed and used in the regional workshops as an overlay for Google Earth satellite image and the WFP-CLEAR livelihood map. Supplementary information and official documents that participants brought to aid in the participatory mapping and validation process included the agricultural census, local land cover maps, crop calendars, and production data. Participants examined and decided on the zones that needed to be revised based on the crops and cropping patterns. Making use of their perceptions and local knowledge, they either updated or drew new commune-level limits or livelihood zones (agricultural areas, forests, plantations, etc.) directly on the WFP-CLEAR livelihood map and Google Earth Image. Based on the validated livelihood maps, the participants were asked to identify the main cropping system for each livelihood.

In this context, it is important to remind that 'livelihood' comprises the capabilities and assets (including both material and social resources) for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (DFID, 1999). A livelihood zone on the map illustrates an area in which residents primarily have similar livelihood resources and income-generating activities. Meanwhile, the 'cropping system' is described as a sub-system of a farming system, comprising practices used for crop cultivation (monoculture, rotational, intercropping, etc.) and the interrelationship between crops and environment (crop calendar, rainfall, temperature). The term "cropping system" refers to the crops and crop sequences and the management techniques used on a particular field over a period of years.

The project identified four criteria to prioritize the cropping systems within livelihoods based on the following: i) food security; ii) economic value; iii) cultivation area; and iv) the number of farming households. In some cases, other sub-criteria may

be used for evaluation (e.g., nutrition may become the main indicator if food availability or security is no longer a main concern in a particular livelihood zone).

For prioritized cropping systems within each livelihood zone, exercises followed on: i) developing crop calendars and determining farm management practices; ii) recalling risk events, ranking the major risks; iii) defining the responses to manage the risks identified; and iv) identifying climate information and institutional support network for each risk management response.

After the series of participatory workshops in the major agroecological zones, data were processed and analyzed, and the validated maps digitalized in close coordination with WFP in Cambodia.

Key findings and policy recommendations

The participatory risk and livelihood mapping identified some key changes in livelihood zones over time (Figure 1b). In summary, the major shifts from the WFP-CLEAR exercise in 2013 are as follows:

- The northern area of Cambodia has seen significant change. There are now two new

sources of income: farming vegetables and the tourism industry.

- A significant portion of Preah Vihear’s forested land in the north of the country has been converted to agricultural use (cash crop).
- Approximately half of the land in the northern part of Svay Rieng has been converted from wet lowland paddy to vegetable production.
- The area around Tonle Sap Lake used to be for fishing, but now much of the land is used for agriculture (dry lowland and wet lowland paddy).
- There has been an expansion of industrial crops in Koh Kong in the west of the country.
- Wet lowland paddy in the districts of Oddar Meanchey in the north of the country is being converted to cash crops.

POLICY RECOMMENDATIONS

These observed changes in livelihood zones have important policy implications. Key recommendations to be considered by government agencies, NGOs, the private sector, and development partners and donors are:

- To develop effective agroclimatic advisories, it is important to **explore the key farming decisions made by the farmers to cope with**

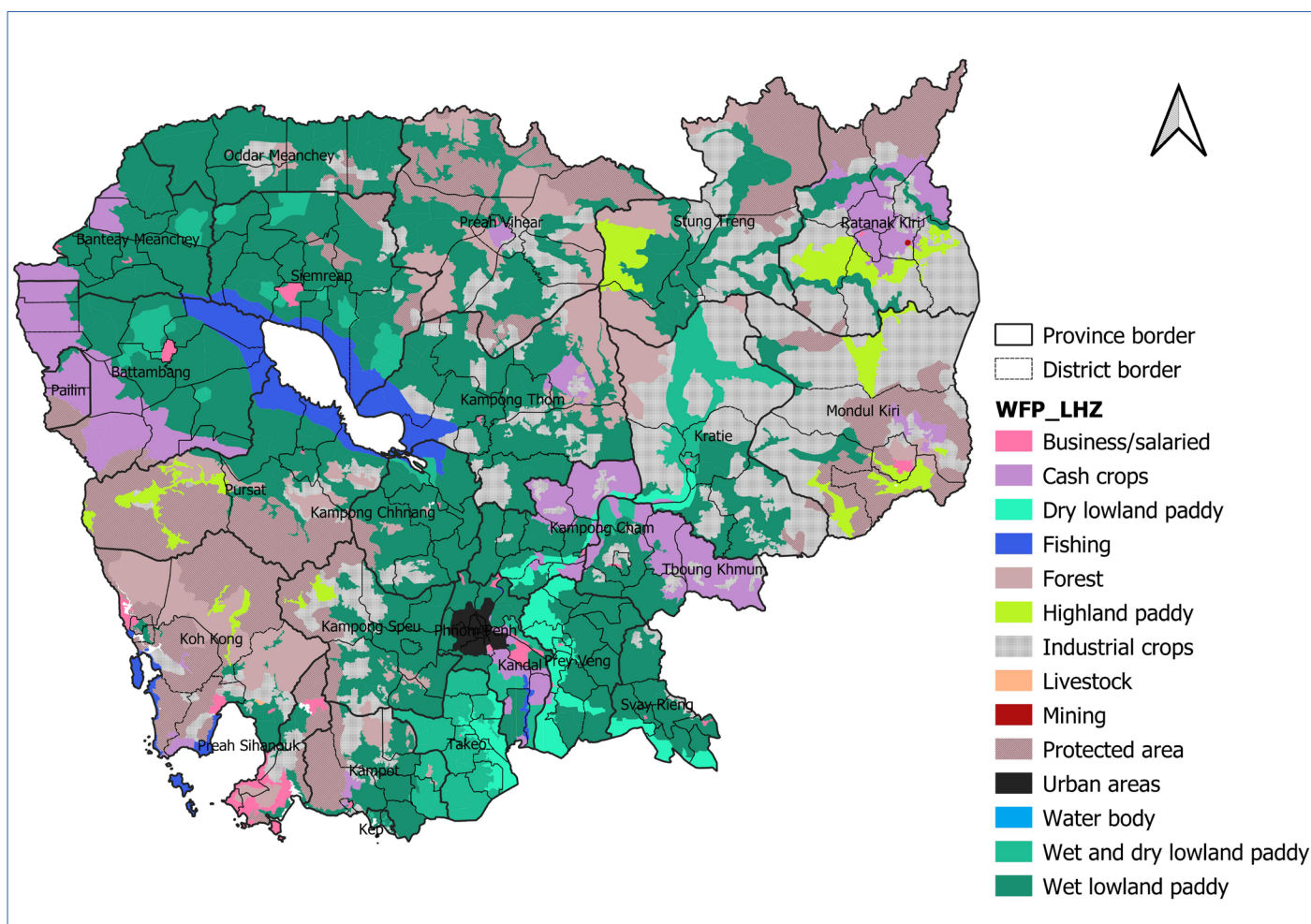


Figure 1a. WFP-CLEAR livelihood map (2013)

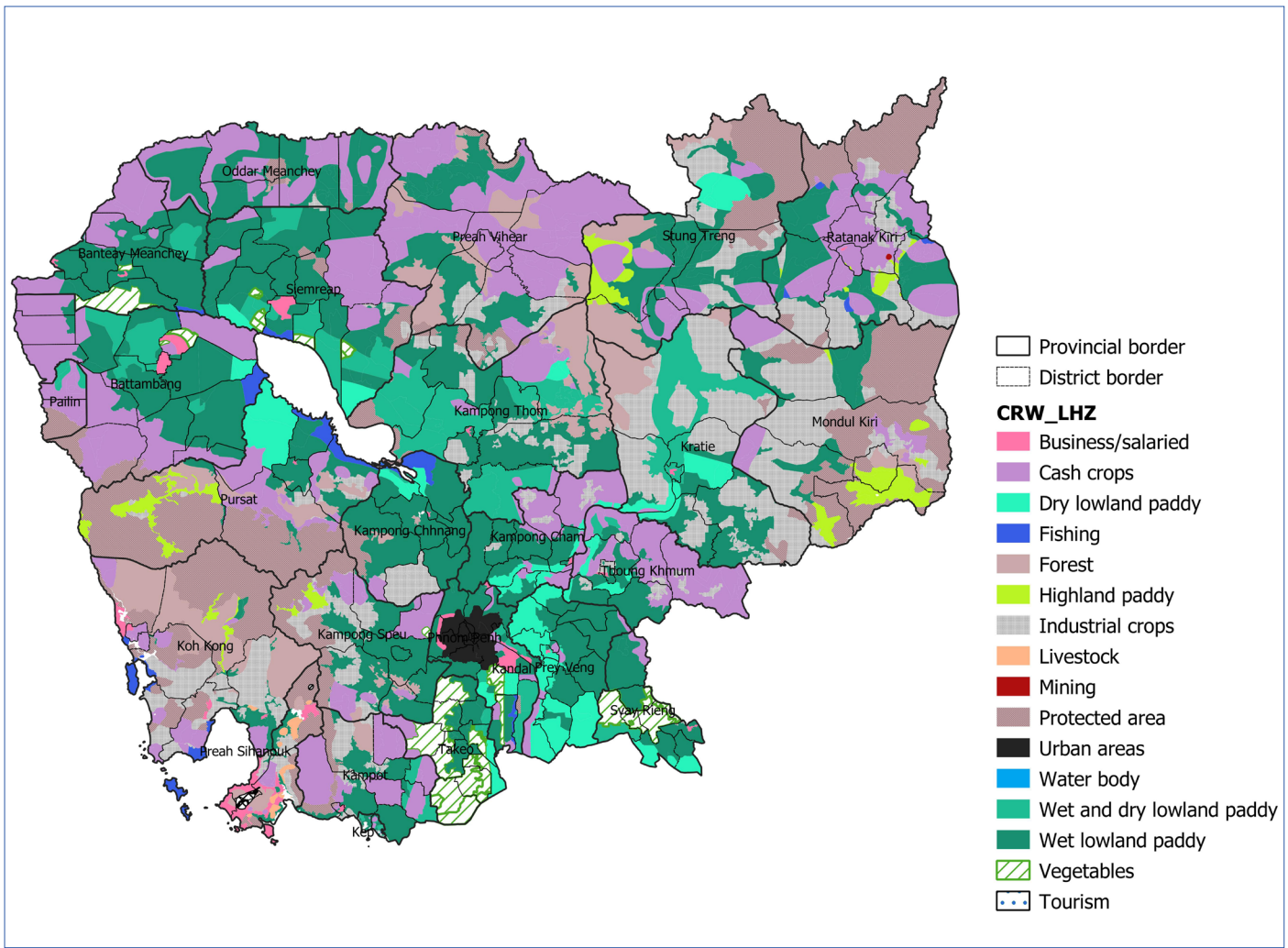


Figure 1b. Updated livelihood-zones based on participatory mapping (2019)

major climate risks within different type of livelihoods and/or cropping system. Especially, a better understanding is required whether those decisions can be supported by specific climate information (e.g., seasonal, short-term weather, pest and disease forecasts). These required information from the agriculture sector shall be communicated regularly and effectively to the climate and agricultural experts to develop and adapt advisories the advisories (i.e. through participatory approaches like agricultural forum at the national level and Local Technical Agro-Climatic Committees at the provincial and district level).

- **Development of database of climate risks and adaptation measures** that is regularly updated and co-produced by local stakeholders in various agroecosystems. To make the preparations for the intervention more effective, this should be linked to meteorological information and an early warning system.
- **More broadly, prepare site-specific adaptation measures, activities, or interventions** to deal with climate risks by

referencing the findings at the workshop and existing local-specific traditional knowledge and provide sustainable agriculture innovations to deal with climate risks in the local context.

- **Coordinate with stakeholders** in the specific agroecosystems, such as governments, business sectors, NGOs, and local farmers' groups, to promote climate services using locally-specific climate and agricultural information, which will ensure food security and improved livelihoods in the target communities.
- **Utilize the updated map of livelihood zones** as the main basis for measuring, monitoring, and assessing future changes in the livelihood activities and impacts on the food system including impacts on food production and food security. This indicates that the livelihood zone map should be regularly updated.
- **Create an improved land use plan** that considers the variety of agricultural ecosystems. It is important to make recommendations for potential crops that can be grown at a certain site based on the biological and geographical requirements of those crops.

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The Applying seasonal climate forecasting and innovative insurance solutions to climate risk management in the agriculture sector in Southeast Asia, also known as the DeRISK SE Asia Project, led by the World Meteorological Organization (WMO), co-implemented by the University of Southern Queensland (USQ) and the Alliance, with funding support from the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), aims to develop climate risk management systems, best practices, and insurance products that will shield smallholder farmers and businesses across the agricultural value chain in key Southeast Asia countries from physical and financial disaster associated with climate change. It will assist the governments in developing national and regional adaptation and risk management strategies. To know more about our project, please visit: <https://deriskseasia.org/>.