The agricultural landscape of the Lao PDR is experiencing important changes. During the first decade of the twenty-first century, the share of agriculture in the total economy declined, although the total agricultural population grew, the area used by those households for agriculture increased significantly, and the agricultural production became more commercialized and increasingly productive. This picture is, however, far from uniform across the country, and great differences in agricultural production patterns and their dynamics exist among the different regions.

This first Atlas of Agriculture in the Lao PDR draws on the rich statistical database of the agricultural censuses of 1999 and 2011, and presents highly detailed maps of the manifold aspects of the Lao household’s agricultural production, and reveals the respective changes they underwent during the first decade of the century.

The depth of new insights into the dynamics in the agricultural sector presented in this atlas is expected to aid rural development analysis, planning and respective decision-making among a wide range of public and private users.

The atlas was developed jointly by the Ministry of Agriculture and Forestry MAF of the Government of the Lao PDR, and the Centre for Development and Environment CDE of the University of Bern, Switzerland, within the frame of the Lao DECIDE info initiative. The initiative is funded by the Government of Switzerland through the Swiss Agency for Development and Cooperation SDC, and aims at promoting information sharing and integration towards enhanced development analysis and planning.
Atlas of Agriculture in the Lao PDR
Patterns and trends between 1999 and 2011
Disclaimer:

The boundaries, colours, denominations, and any other information shown on the maps of this atlas do not imply any judgement on the legal status of any territory, or any official endorsement or acceptance of the boundaries on the part of the government of the Lao PDR.

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List of abbreviations

ACIAR  Australian Centre for International Agricultural Research
ASEAN  Association of Southeast Asian Nations
CDE    Centre for Development and Environment, University of Bern
CIAT   International Center for Tropical Agriculture
DALaM  Department of Agricultural Land Management and Development
EU     European Union
FAO    Food and Agriculture Organization of the United Nations
FMD    Foot and Mouth Disease
GAP    Good Organic Practices
GDP    Gross Domestic Product
GI     Geographical Indicators
GIS    Geographic Information Systems
GIZ    German Corporation for International Cooperation GmbH
GoL    Government of the Lao PDR
ha     Hectare
hh     household
HS     Haemorrhagic Septicaemia
IRRI   International Rice Research Institute
JICA   Japan International Cooperation Agency
km     Kilometre
Lao PDR Lao People’s Democratic Republic
LCA    Lao Census of Agriculture
m      Metre
MAF    Ministry of Agriculture and Forestry
masl   Metre above sea level
NAFRI  National Agriculture and Forestry Research Institute
NBCA   National Biodiversity Conservation Areas
NGD    National Geographic Department of the Lao PDR
NRA    National Regulatory Authority
NSEDP  National Socioeconomic Development Plan
NTFPs  Non-Timber Forest Products
OA     Organic Agriculture
SDC    Swiss Agency for Development and Cooperation
SDG    Sustainable Development Goals
UN     United Nations
UXO    Unexploded Ordnance
Foreword

The Government of the Lao PDR has always recognized the great importance of the development of the country’s immense agricultural potential. The sector’s very significant contribution to the strong national growth, and the country’s promising path towards a smooth graduation from the status of least developed countries, is evidence of the wise guidance by the country’s leaders.

The Censuses of Agriculture, conducted first in 1999 and subsequently in 2011, constitute a landmark in information development for analysis, planning, and decision-making in the agricultural sector of the Lao PDR. Providing insights on key aspects of agricultural production of each household, the censuses are the most significant national statistical information on rural livelihood activities of the Lao population.

Using detailed geographic information, combined with the rich statistical data of the census, the variations of local characteristics of agricultural production across the country and over time is revealed for the first time in great detail.

Such new knowledge is essential not only for monitoring progress towards stated development goals such as those set out in the 8th National Socioeconomic Development Plan, but also as a vital evidence base for drawing up sustainable development pathways in the agricultural sector specifically, and for rural development in general, as outlined in key documents such as the Agriculture Development Strategy 2025.

It is my hope that this new knowledge base will be used widely as a reference among planners and decision makers within the Government to support the continued sustainable development of our great country.

Dr. Phouang Parisak Pravongviengkham
Deputy Minister of the Ministry of Agriculture and Forestry
Preface

There is general agreement that agricultural development will be crucial to successful implementation of the United Nations 2030 Agenda for Sustainable Development. The challenge for the agricultural sector lies not just in increasing productivity to feed a growing population, but in promoting agricultural development such that it supports rural development in an intact environment while contributing global environmental services. In this respect, multifunctional agriculture is a promising way forward. This concept goes beyond the provision of food, fodder, fibres, and biofuels: It addresses other agricultural functions as well, such as environmental protection, landscape preservation, employment, and public health, and it also takes into account the important role that agriculture plays in preserving local cultures and traditions.

For a long time, agricultural policies and agricultural research focused mainly on increasing productivity by means of technical innovations. Advancements were made in the fields of seeds, animal breeding, soil fertility, and irrigation, among others. This major worldwide effort - known as the Green Revolution - more than doubled global food production within 30 years. More recently, these developments have been followed by other fundamental changes in the agricultural system, including in the Lao PDR. Their main driver is the increasing globalization of agriculture and food systems. Developments like trade liberalization, foreign direct investments, and urbanization are changing agricultural structures and markets at an unprecedented speed. While increasingly globalized agriculture provides new opportunities, including economic growth, it also poses risks to people and the environment and calls for new policies and decision-making processes.

A future-oriented agriculture in an increasingly globalized world that contributes to achieving the 2030 Agenda will require knowledge and competences, financial resources, and an enabling policy environment. Governments, civil society, the private sector, and, not least, farmers’ organizations will need a precise compass to guide them in their efforts. The present Atlas of Agriculture in the Lao PDR meets this need by providing comprehensive information and knowledge about key agricultural features and their dynamics.

It is my hope and my conviction that this unique atlas will serve as a powerful tool for planning, decision-making, policy formulation, and subsequent implementation on behalf of sustainable agricultural development in the Lao PDR and of global sustainable development in general.

Prof. Dr. Thomas Breu
Director of the Centre for Development and Environment CDE,
University of Bern
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Besides the dedicated contributions of a large number of individuals listed as authors in this book, over 20 individual resource persons were consulted, who provided valuable insights for the interpretation of the detected spatial patterns of agricultural production in the Lao PDR. We would like to express our sincere thanks to the following experts for their time and insights:

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- Mr. Somsamay Vongthirath, Senior Researcher on Water Resources Management/Irrigation Engineering, Agriculture and Forestry Policy Research Centre, NAFRI
- Dr. Phetmanyseng Xangsayasane, Deputy Director of Rice Research Centre, NAFRI
Background on the atlas and the censuses

This atlas of agriculture presents a comprehensive spatial analysis of the agricultural activities and production patterns in the Lao PDR in 2011, and the respective changes during the first decade of the 21st century. It presents the household-based statistics of the country’s last Census of Agriculture (CFA) of 2011 at the village level, and the respective changes since the first Census of Agriculture in 1999.

The Censuses of Agriculture of 1999 and 2011 constitute important milestones in consistent statistical data collection, compilation, and analysis towards a growing national information base necessary to support well-informed planning and decision making in the agricultural sector and related sectors associated with rural development. Both censuses included a full enumeration of all households in the country, collecting basic demographic information, along with information on each household’s agricultural activities, including number and types of livestock raised, as well as types and areas of annual and perennial crops. Additionally, much more detailed information on household activities was collected from a random sample of 5 percent of all households. In 2011, a village-level questionnaire was also administered, collecting information on aspects such as UXO and natural disaster afflection, climatic and soil conditions, service infrastructure and facilities, etc. and are included in this atlas.

While the results of those censuses constitute an enormously rich source of information, both with regard to the current status of agriculture but also the trends and patterns of change in agriculture over time, the direct use and interpretation of those detailed statistics can be a big challenge. Systematic analysis of the data is therefore essential to make it useful for planning and decision making.

The nature of a census, covering by definition all households of a nation, offers a great opportunity for highly detailed geographic analysis and representation of spatial patterns and trends that are otherwise not visible in the statistical data. In order to be able to use this potential, detailed information on the location of each individual record of the census was necessary. To that end, digital geographic information – separately collected and compiled in 2012 by the Ministry of Agriculture and Forestry (MAF) in collaboration with the National Geographic Department (NGD) – was linked to the information in the census database.

A wide range of indicators, calculated and aggregated from the individual- and household-level census data were mapped at village level. In addition, the 2011 data was spatially linked to the 1999 data, to allow for a detailed analysis and spatial representation of trends across time and space between the two censuses.

The results, compiled in this comprehensive atlas, complement a large set of summary tabulations that have been produced and published in the Highlights of the Lao Census of Agriculture 2010/11 (ACO, 2012) and on www.decide.la, along with additional analysis of specific thematic issues published in the Lao Census of Agriculture 2010/11 – Analysis of Selected Themes (FAO, 2014).

The following limitations of the geographic analysis and presentation of the statistical data of the censuses need to be considered when interpreting the maps in this atlas:

1. The Censuses collected information from households only, meaning that agricultural production from companies is not included and represented on the maps. This is particularly important to remember when it comes to crops that are often grown in large scale by companies (such as e.g. rubber, etc.).

2. Crop production is mapped in the village in which the owner resides, assuming that the owner of the plots resides in the village where his or her land is. While this is the case in most instances, there are certainly also cases where people in urban areas cultivate land in villages beyond the one of respective residence.

3. The geographic information on the location of each village was recorded at the administrative centre of the village as a point. In the absence of official village boundaries for much of the rural areas of the Lao PDR, “village polygons” were drawn around the village points to allow a smooth geographic representation of the census data. These village areas, or village polygons, are for illustrative purposes only, and do not reflect any administrative boundaries.

The atlas is structures in four thematic sections: this brief section on the background and context of the atlas precedes a thematically structured presentation of individual variables derived from the censuses by broad thematic areas: a general geographic introduction is followed by an overview of agricultural activities, before a main chapter on crop production that follows. Crop production patterns are presented with differentiation between annual and perennial crops. The final chapter of this atlas presents the results of the geographic analysis of data on household-level livestock raising.

There are four types of maps used in this atlas:

1. Choropleth map at village level - The Agricultural Census 2010/11 captured the administrative centres of villages, but did not explicitly include village boundaries in part because these have yet to be defined for most villages. In the absence of comprehensive village boundaries, village polygons were generated using the factor of an equal travel distance between the village administrative location points. The village polygon thus represents the likely village area according to related GIS base data. This can lead to misinterpretations when viewing choropleth maps of village level data. The Agricultural Census data at village level was then linked to the GIS base data and the census maps of various variables at village level were generated. For these village choropleth maps, only relative numbers can be shown.

2. Choropleth map at provincial level - The provincial boundaries used are from the National Geographic Department (NGD) of the Lao PDR from 2009. The calculated Agricultural Census data at province level was linked to these provincial boundaries. Through these provincial choropleth maps it is possible to compare data across provinces. Additionally, circular and square charts are shown, which vary in size depending on the absolute numbers of the variables they represent, such as absolute number of households, area in hectares, or number of heads of livestock. The colouring used in these charts represents an additional dimension in absolute numbers. For example, the two coloured halves of the circle diagram shown indicate the total number of households (yellow) and the number of agricultural households (red). In the annual crop maps, for example, the two halves represent the dry and the wet season.

3. Hexagon choropleth map comparing 1999 to 2011 data - The hexagon choropleth maps are used to compare the 1999 and 2011 Agricultural Census data. In 1999, there were 11,126 administrative villages in the Lao PDR, whereas in 2011 there were only 8,643 administrative villages. As such, many village polygons changed (villages were resettled, merged or split) and also many village codes changed. These shifts were addressed using a “geometric method” which makes use of a regular grid of identical polygons. Village data within hexagons was aggregated separately and then compared afterwards.

4. Hexagon choropleth map - Hexagon choropleth maps are used to represent absolute numbers aggregated as hexagons of proportionate scale so that various variables such as UXO distribution or potential agricultural area can be visualized. Another variation of the hexagon choropleth maps is used to show increases and decreases in absolute numbers as in the example here of changes in the cassava cultivation area between 1999 and 2011.