



**Australian Government**

**Australian Centre for  
International Agricultural Research**

# Project proposal

*project*

## **Developing cassava production and marketing systems to enhance smallholder livelihoods in Cambodia and Laos and Myanmar**

---

*project number*

ASEM/2014/053

---

*proposal phase*

Full - Variation 3

---

*prepared by*

Rob Cramb, Jonathan Newby, Dominic Smith ~~Tin Maung Aye~~

---

*research program  
manager*

Jayne Curnow

---

## Privacy statement

ACIAR, as a Commonwealth government agency, is required to comply with the thirteen Australian Privacy Principles as set out in Schedule 1 of the *Privacy Act 1988*.

The personal information provided in this project proposal (CVs and contact details) is stored in electronic format by ACIAR. The information is reproduced internally for the purpose of meetings to consider project proposals and the names, contact details and CVs of all project members included in this proposal may be shared with external project reviewers as part of the project development cycle. It also forms part of the contract documentation exchanged with the commissioned organisation, collaborating institution(s) and partner-country government(s).

The names and contact details of Project Leaders may be listed with project details on the ACIAR web site, provided to other databases and media in the context of briefings and publicity on the ACIAR project portfolio, and used for mail-outs of ACIAR corporate publications.

ACIAR endeavours to keep this information as up to date as possible, with the assistance of the individuals whose details are recorded.

ACIAR does not divulge any other personal information to third parties for any other purpose.

## Contents

|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b>Project outline .....</b>  | <b>4</b>  |
| 1.1      | Funding request .....   | 4         |
| 1.2      | Key contacts.....   | 4         |
| 1.3      | Project summary .....   | 6         |
| <b>2</b> | <b>Justification .....</b>  | <b>9</b>  |
| 2.1      | Partner country and Australian research and development issues and priorities .....                               | 9         |
| 2.2      | Research and/or development strategy and relationship to other ACIAR investments and other donor activities ..... | 11        |
| <b>3</b> | <b>Objectives .....</b>   | <b>14</b> |
| <b>4</b> | <b>Planned impacts and adoption pathways .....</b>  | <b>16</b> |
| 4.1      | Overview .....  | 16        |
| 4.2      | Scientific impacts .....  | 16        |
| 4.3      | Capacity impacts .....  | 17        |
| 4.4      | Community impacts.....  | 17        |
| 4.5      | Communication and dissemination activities .....  | 20        |
| <b>5</b> | <b>Operations .....</b>   | <b>21</b> |
| 5.1      | Methodology.....  | 21        |
| 5.2      | Activities and outputs/milestones .....   | 23        |
| 5.3      | Project personnel .....   | 26        |
| 5.4      | Intellectual property and other regulatory compliance .....   | 31        |
| 5.5      | Travel table .....  | 31        |
| 5.6      | Literature Consulted .....  | 34        |
| <b>6</b> | <b>Appendix A: Intellectual property register .....</b>   | <b>38</b> |
| 6.1      | Administrative details .....  | 38        |
| 6.2      | Categories of intellectual property and brief description .....   | 38        |
| 6.3      | Foreground, background and third party Intellectual Property .....  | 39        |
| <b>7</b> | <b>Appendix B: Budget .....</b>   | <b>41</b> |
| <b>8</b> | <b>Appendix C: Supporting documentation.....</b>  | <b>42</b> |
| <b>9</b> | <b>Appendix D: Communication and dissemination checklist.....</b>   | <b>43</b> |

## 1 Project outline

|                                  |   |
|----------------------------------|---|
| <b>Project number</b>            | ASEM/2014/053   |
| <b>Project title</b>             | Developing cassava production and marketing systems to enhance smallholder livelihoods in Cambodia and Laos and Myanmar |
| <b>ACIAR program area</b>        | Agricultural Systems Management   |
| <b>Proposal stage</b>            | Full Proposal   |
| <b>Commissioned organisation</b> | The University of Queensland  |
| <b>Project type</b>              | Large   |
| <b>Geographic region(s)</b>      | South-East Asia   |
| <b>Country(s)</b>                | Lao PDR, Cambodia, Myanmar  |
| <b>Project duration</b>          | 4 years   |
| <b>Proposed start date</b>       | 1 August 2015   |
| <b>Proposed finish date</b>      | 30 June 2019 31 December 2019   |
| <b>Time to impact</b>            | Category 2: Projects likely to achieve impacts in 5-10 years  |

### 1.1 Funding request

|                  |                | Amounts A\$      | Totals A\$       |
|------------------|----------------|------------------|------------------|
| Year 1 (2015/16) | Part H Payment | 24,600           | Paid             |
|                  | Pay 1          | 162,293          | 186,893          |
| Year 2 (2016/17) | Pay 2          | 188,579          | 390,620          |
|                  | Pay 3          | 202,041          |                  |
| Year 3 (2017/18) | Pay 4          | 202,041          | 403,517          |
|                  | Pay 5          | 201,476          |                  |
| Year 4 (2018/19) | Pay 6          | 201,476          | 402,809          |
|                  | Pay 7          | 201,333          |                  |
| Year 5 (2019/20) | Pay 8          | 215,057          | 215,057          |
| <b>Total</b>     |                | <b>1,598,895</b> | <b>1,598,895</b> |

### 1.2 Key contacts

#### *Project leader: Australian commissioned organisation / commissioned IARC*

|  |   |
|--|---|
| <b>Title and name</b>                          | Dr Dominic Smith Professor Rob Cramb  |
| <b>Position</b>                                | Senior Research Fellow Professor of Agricultural Development  |
| <b>Organisation</b>                            | The University of Queensland  |
| <b>Phone</b>                                   | +61 (0) 412099264   |
| <b>Fax</b>                                     | +61 7 3365 9016   |
| <b>Email</b>                                   | d.smith1@uq.edu.au  |
| <b>Postal address</b>                          | School of Agriculture and Food Sciences, The University of Queensland, Qld 4072                                     |
| <b>Street address (if different to postal)</b> | Slip Road, Hartley Teakle Building, School of Agriculture and Food Sciences, The University of Queensland, QLD 4072 |

**Administrative Contact: Australian commissioned organisation / commissioned IARC**

|  |   |
|--|---|
| <b>Title and name</b>                          | Mr Ian Harris   |
| <b>Position</b>                                | Director, Research and Postgraduate Studies   |
| <b>Organisation</b>                            | The University of Queensland  |
| <b>Phone</b>                                   | 07 33653969   |
| <b>Fax</b>                                     | 07 33654455   |
| <b>Email</b>                                   | i.harris@research.uq.edu.au   |
| <b>Postal address</b>                          | School of Agriculture and Food Sciences, The University of Queensland, Qld 4072                                     |
| <b>Street address (if different to postal)</b> | Slip Road, Hartley Teakle Building, School of Agriculture and Food Sciences, The University of Queensland, QLD 4072 |

**Collaborating scientist: Australian collaborating organisation / collaborating IARC**

|  |  |
|--|--|
| <b>Title and name</b>                          | Dr Jonathan Newby  |
| <b>Position</b>                                | Research Scientist, Cassava and DAPA   |
| <b>Organisation</b>                            | CIAT (Centro Internacional de Agricultura Tropical)  |
| <b>Phone</b>                                   | +84-12-5826-2512   |
| <b>Fax</b>                                     | +84-4-37570999   |
| <b>Email</b>                                   | j.newby@cgiar.org  |
| <b>Postal address</b>                          | CIAT Asia Regional Office,<br>Agricultural Genetics Institute,<br>Pham Van Dong, Tu Liem, Hanoi, Vietnam |
| <b>Street address (if different to postal)</b> | As above   |

**Project coordinator: Lao PDR**

|  |  |
|--|--|
| <b>Title and name</b>                          | Dr Bounthong Bouahom   |
| <b>Position</b>                                | Director General   |
| <b>Organisation</b>                            | National Agriculture and Forestry Research Institute (NAFRI)       |
| <b>Phone</b>                                   | (856) 21 770093  |
| <b>Fax</b>                                     | (856) 21 770047  |
| <b>Email</b>                                   | <a href="mailto:bounthong@nafri.org.la">bounthong@nafri.org.la</a> |
| <b>Postal address</b>                          | P.O. Box 811, Vientiane, Lao PDR                                   |
| <b>Street address (if different to postal)</b> | Ban Nongviengkham Xaythany District Vientiane Capital Lao PDR      |

**Project coordinator: Cambodia**

|  |   |
|--|---|
| <b>Title and name</b>                          | Dr Ouk Makara   |
| <b>Position</b>                                | Director  |
| <b>Organisation</b>                            | Cambodian Agricultural Research and Development Institute (CARDI)   |
| <b>Phone</b>                                   | +85511911165  |
| <b>Fax</b>                                     |   |
| <b>Email</b>                                   | <a href="mailto:Ou.makara@cardi.org.kh">Ou.makara@cardi.org.kh</a> ; <a href="mailto:ou.makara@gmail.com">ou.makara@gmail.com</a> ; |
| <b>Postal address</b>                          | CARDI, PO Box 01, Phnom Penh, Cambodia  |
| <b>Street address (if different to postal)</b> | National Road 3, Prateah Lang, Dangkor, Phnom Penh, Cambodia  |

### **Project coordinator: Myanmar**

|  |  |
|--|--|
| <b>Title and name</b>                              | Dr U Naing Kyi Win   |
| <b>Position</b>                                    | Director General   |
| <b>Organisation</b>                                | Department of Agricultural Research  |
| <b>Phone</b>                                       | +95 (0)67-415697   |
| <b>Fax</b>   | +95 (0)67-416535   |
| <b>Email</b>                                       | egdardar.moai@gmail.com  |
| <b>Postal address</b>                              | Department of Agriculture Research, Yezin<br>Ministry of Agriculture and Irrigation<br>Myanmar |
| <b>Street address<br/>(if different to postal)</b> |  |

### **Collaborating scientist: partner country collaborating organisation (Myanmar)**

|  |                               |
|--|-------------------------------|
| <b>Title and name</b>                              | Professor Dr Myo Kywe         |
| <b>Position</b>                                    | Rector                        |
| <b>Organisation</b>                                | Yezin Agricultural University |
| <b>Phone</b>                                       | +95 (0)67-416514              |
| <b>Fax</b>   | +95 (0)67-416517              |
| <b>Email</b>                                       | Mkywe1@gmail.com              |
| <b>Postal address</b>                              | Yezin, Nay Pyi Taw, Myanmar   |
| <b>Street address<br/>(if different to postal)</b> |                               |

## **1.3 Project summary**

**The research context** – Dryland farming systems in Southeast Asia have been developing at a rapid rate due to a range of drivers including increasing regional market integration (commodities, capital, and labour), changing labour availability for agriculture, and government policies to encourage commercial alternatives to subsistence-oriented swidden agriculture, all building on a strong impetus within these communities for improved livelihoods. Increasing regional and global demand for animal feed, starch products, and biofuel in Asia is driving a process of commercialisation of dryland farming systems throughout Southeast Asia. Smallholders are adapting their farming systems in response to these changing opportunities and constraints. In some cases this involves sharp trade-offs between subsistence and market activities. It is also changing the ways in which communities manage resources and how benefits are shared within communities, with a general tendency to agrarian differentiation. The cassava sector has experienced rapid growth in Cambodia and Laos with various arrangements emerging between industry and smallholders, varying from large estates to smallholder-oriented models. Cassava has surpassed maize as the second most widely cultivated annual crop in Cambodia and has recently been included as one of seven priority crops in Laos. In both countries many farmers are currently moving out of maize and into cassava. While the industry is on a smaller scale in Myanmar (mainly found in dryland townships in the Ayeyarwady Delta), there is increasing interest in in the country in developing the cassava sector. Foreign and domestic companies are exploring opportunities to expand the industry to meet growing domestic and regional demand for cassava-derived products such as MSG and citric acid.

**The problem** – While commercialisation has often seen average cash incomes rise, it is less clear how this translates into livelihood outcomes such as improved food security and poverty reduction, and how these benefits have been shared within communities (based

on wealth, ethnicity, and gender). Unlike in Indonesia and Vietnam, where smallholder production dominates, large land concessions have been a more common feature of industry growth in Laos and Cambodia, and Myanmar, with often unfavourable impacts on smallholder livelihoods. Adverse environmental consequences of rapid commercialisation are also apparent in fragile dryland farming systems, especially in the sloping uplands. The market outlook for cassava is strongly linked to supply and demand in global starch, grain, and energy markets, exposing smallholders to new risks and threats to their livelihoods. At the same time, the regional shortage of feedstock and growing demand has seen significant investment by domestic and foreign companies in securing feedstock through a range of arrangements from contract farming with selected smallholders through to large-scale land concessions and estates. Thus the potential benefits of the cassava boom are not necessarily being realised by smallholders.

**The opportunity** – There are considerable opportunities to increase the productivity, profitability, and sustainability of the cassava industry through better value-chain linkages between smallholders and industry actors that can deliver the dual objectives of industry development and economic growth, on the one hand, and livelihood security and poverty reduction, on the other. This requires that core value-chain actors are well linked, that they have strong connections to supporting networks and services, and that the institutional framework creates an environment conducive to smallholder development.

Given its agronomic robustness, cassava production is well suited to resource-poor farmers living in marginal dryland areas, who often belong to ethnic minority groups. Despite being able to grow in these marginal conditions, the crop responds well to improved management. Hence improved cassava production offers a profitable livelihood opportunity, provided cultivation is managed sustainably and farmers are linked to both input and output markets. Over the last decade, various technologies have been developed to increase productivity, including improved industrial varieties, fertility management recommendations, development of intercropping systems, and methods for provision of clean planting material. However, there has been differential adoption of these technologies throughout the Southeast Asian region. Understanding the incentives and constraints to adoption is critical to developing a sustainable smallholder sector. This requires a multi-scale appreciation of farming systems and livelihoods, value-chains, and policies and institutions. Capacity building to enable national staff to conduct multi-disciplinary research that produces evidence-based policy advice has been identified as a priority by research leaders in Laos and Cambodia and Myanmar.

**Research questions** – This analysis of the context gives rise to the following questions:

- (1) What is the role of cassava in smallholder livelihoods under different production, processing, and marketing systems, and how have these systems contributed to changes in livelihood outcomes?
- (2) How do alternative production and marketing arrangements affect the adoption of improved technologies and the distribution of benefits from cassava production?
- (3) What are the appropriate support services and policies to ensure that smallholders are involved in profitable and sustainable cassava-based farming systems?

**Aim and objectives** – The overall aim of this project is thus to identify the socio-economic conditions under which improved technology and market booms in commercial crops such as cassava can be harnessed to increase the profitability and sustainability of smallholder farming systems in Mainland Southeast Asia and thereby contribute to poverty reduction. The specific objectives, focusing on the potential for smallholder cassava in Laos and Cambodia, and Myanmar, are as follows:

- (1) Assess the current production, marketing, and institutional arrangements for cassava in major agro-economic zones and value chains in Laos and Cambodia.

(2) Increase the adoption of improved cassava production, resource management, and post-harvest practices (including coordination of harvesting and delivery) by strengthening linkages between farmers and research, extension, and industry actors.

(3) Develop capacity for farming systems research and policy analysis and promote policy dialogue on the opportunities for industry development and livelihood enhancement through supported smallholder models.

**Methods** - The project will involve a combination of agrarian systems analysis and value-chain analysis applied to a number of case-study sites in the three countries, supported by capacity-building activities and on-farm trials and demonstrations. Activities will be developed in consultation with government and industry stakeholders. Demonstration trials will be used for participatory evaluation and also to identify agribusiness opportunities for value-chain actors. Through developing strong industry partnerships the project will reach over 5,000 smallholder farmers, with the aim to identify successful models of smallholder-oriented industry development that will have relevance to cassava-producing regions and other commodity value-chains throughout Asia. Policy research and stakeholder dialogues will be used to address constraints to the development of a profitable and sustainable smallholder sector. This will help develop local solutions and enable lessons to be shared with other regions through regional partnerships.

**Partnerships and linkages** - The project is well aligned with country partner priorities of sustainable industry development, rural livelihood enhancement and policy alleviation, and sustainable use of natural resources. Cassava has become a priority crop in agricultural strategic plans for Laos and Cambodia. ~~In Myanmar, there is growing appreciation of the importance of non-rice crops for poverty alleviation with potential links to the Livelihoods and Food Security Trust Fund (LIFT) and other development donor activities for scaling out technologies and models.~~

Formal partnerships will be developed between the University of Queensland (UQ), the International Centre for Tropical Agriculture (CIAT), the National Agricultural and Forestry Research Institute (NAFRI) in Laos, and the Cambodian Agricultural Research and Development Institute (CARDI). ~~and the Department of Agricultural Research (DAR) and Yezin Agricultural University in Myanmar.~~ The project will also involve extension agents at provincial and district levels to increase their experience and linkages to cassava researchers, industry actors, and farmers (PAFO and DAFO in Laos, PDA in Cambodia). Most important, the project will focus on increasing the capacity of value-chain actors who are seen as key to the sustainability of the approach and maintaining linkages beyond the project (farmers, processors, traders, industry associations).

The project is also linked to several current and proposed ACIAR projects in the region, including an AGB cassava project in Vietnam and Indonesia (AGB/2012/078), and a SMCM/AGB regional project on maize production and marketing. There will be continued liaison with an IFAD-funded project in which SNV and CIAT are developing Inclusive Business Models (IBM) in the cassava industry in Vietnam, Laos, and Cambodia. The project is mapped to the CGIAR CRP, Roots, Tubers and Banana (RTB). The project is also strongly related to additional CRPs including Humid Tropics (HT) and Policy Institutions and Markets (PIM). This will enable strong synergies, with outcomes of the research feeding into a global analysis and the project also benefiting from global analysis and expertise.



---

## 2 Justification

---

### 2.1 Partner country and Australian research and development issues and priorities

Dryland farming systems in Southeast Asia have been developing at a rapid rate due to a number of major drivers – increasing regional market integration (involving cross-border flows of commodities, capital, and labour), changing labour availability for agriculture, and government policies to encourage commercial alternatives to swidden agriculture (shifting cultivation) (Cramb et al., 2009; Mertz et al., 2009; Castella 2012; Rigg 2012; Rigg and Vandergeest 2012). Smallholders are adapting their farming systems in response to these changing opportunities and constraints (Pingali 2004; Coxhead et al. 2010; De Koninck and Rousseau, 2012; Chea 2014; Manivong 2014). In some cases this has involved a sharp trade-off between subsistence-oriented and market-oriented production activities and objectives, with specialisation for the market increasing both production and market risk. In other cases, farmers are making decisions about which annual crop to grow (e.g., maize or cassava) or whether to establish other permanent cropping systems (e.g., rubber or teak) (Sirisuo and Kammeier 2000; Trébuil et al. 2006; Manivong and Cramb 2008; Newby et al. 2012). While commercialisation has seen cash incomes rise, it is less clear how this translates into livelihood outcomes such as improved food security and poverty reduction, and how these benefits have been shared within communities (Newby et al., 2012, 2014; Manivong et al. 2014a). The production and market risks of various cropping systems are also not well understood, often increasing the vulnerability of resource-poor households (Manivong et al. 2014b).

The rapid spread of commercial cassava cultivation has been one of the major land-use changes in recent decades in the Southeast Asian region (De Koninck and Rousseau, 2012; Lefroy 2014). The global trade in cassava products (starch and dried cassava) has increased substantially in recent years and is now valued at around USD 3.5 billion per year. Asia accounts for over 95% of global cassava exports. Changing trade policies and rising incomes in Asia have also seen the market for cassava products become increasingly focused on Asia, particularly China. Cassava production increased rapidly, first in Thailand and then in Vietnam, to meet the new market opportunities. However, there is now limited opportunity for further expansion in these countries, with the industry turning to Laos and Cambodia (Fig. 1). The area of cassava in Cambodia has increased by 15 times in the past 10 years. In Laos the increase has been more recent, with a five-fold increase in the past 5 years. ~~The area in Myanmar is less certain, but FAO statistics show a four-fold increase in the past decade. With Myanmar's proximity to the dominant China market and existing trade into India (an importer of cassava starch), it is expected that the country is likely to see further rapid expansion. (The Starch World Conference 2015 was held in Yangon, highlighting the increased interest in cassava opportunities in Myanmar.)~~

Sustainable commercialisation of dryland farming systems, especially in the sloping uplands, is a policy priority for governments in the region but remains a challenge (Coxhead et al. 2010; Castella 2012; MSU and MDRI, 2013). Cassava production is in many ways an ideal activity for resource-poor farmers, which makes it potentially important for local livelihood development in marginal communities. However, unlike in Vietnam and Indonesia, in many cases the current growth in Laos and Cambodia has also been driven by domestic and foreign companies receiving concessions to establish processing facilities and estates, with smallholders delivering varying amounts of feedstock under different market linkages and/or contractual arrangements (Zola 2008; Wright 2009; Manorom et al 2011; MSU and MDRI, 2013). Lessons from other countries suggest that, in the long run, estates tend to be inefficient cassava producers, with

smallholder production ultimately vital to the success of the industry. Similarly, studies of other commodities (oil palm, rubber) have suggested that the dominant role given to concessions and estates has not been driven by technical or market imperatives but by policy choices (Cramb and Curry 2013; Byerlee 2014). The current dominant role of cassava estates may therefore be reduced over time, but there will be significant impacts on smallholder livelihoods during this transition.

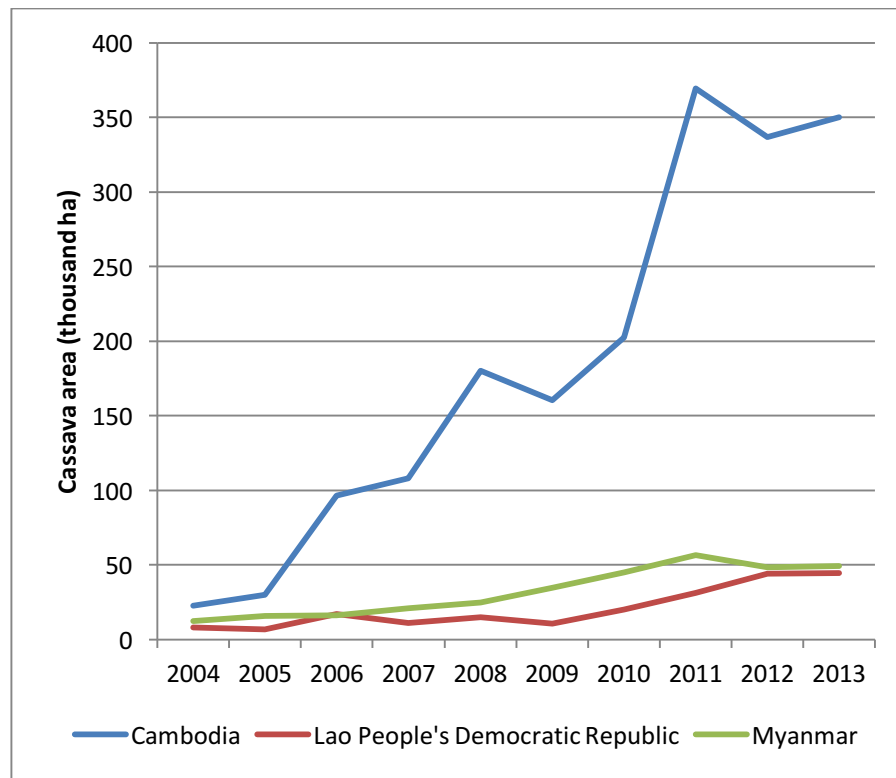


Figure 1. Expansion of cassava area in Laos, Cambodia, and Myanmar, 2004-2013 (ha) (Source: FAOSTAT)

There are various contractual arrangements that may improve the profitability of smallholder production and ensure secure supply of feedstock for large processors (Manorom and Hall 2005; Zola 2008; Manoram et al., 2011). However, in many cases farmers are not well connected to value-chain actors who have an incentive to invest in productivity improvements at the farm level. This especially applies to poor farmers in biophysically, economically, and politically marginal areas. Different arrangements that encourage the adoption of new and more productive technologies among a range of farm-types need to be identified, analysed, and communicated to industry stakeholders. This includes methods of coordinating harvest and delivery of feedstock to minimise economic losses. Similarly, there is a range of small-scale processing options that provide important livelihood opportunities and local economic activity, for which different models are necessary to secure feedstock.

This project will examine opportunities for the development of the cassava industry in ways that lead to improved and more sustainable livelihoods for smallholders. While the private sector is seen as a key stakeholder in getting improved technologies to farmers, it is important to increase our understanding of the strengths and limitations (tradeoffs) of different models and partnerships for various technologies in specific geographical settings and value-chains, including cross border trade in both inputs and cassava products. The research will provide evidence of the current role of cassava in household livelihoods and help determine the impacts of different production and marketing

arrangements on the size and distribution of benefits. The results will establish the profitability and equity of different production and processing arrangements and identify priorities for productive partnerships and policies to increase the beneficial impact of the cassava industry on sustainable rural livelihoods.

The available technologies that can potentially be tested in the project sites include improved varieties and a range of improved crop and soil management practices as described in Howeler (2014) and Howeler and Aye (2014). The adoption of new varieties and improved practices has markedly contributed to the increase in average yields of cassava in Southeast Asia from about 12 t/ha in 1984 to 21 t/ha in 2013, hence there is an expectation that these include “best-bet” technologies for the project sites and beyond. However, it has become clear that progress in developing improved varieties and crop and soil management practices in the project sites has been constrained by limited use of standard evaluation and demonstration trials for the selection of the best adapted varieties and practices with local farmers.

CIAT in conjunction with national breeding programs in Southeast Asia has developed at least 45 new higher-yielding varieties which are now planted on more than 50% of cassava-growing areas. On-farm research in the region has resulted in the identification of high-yielding and high-starch varieties as well as early bulking varieties. Some released varieties have high yield potential - more than 50 t fresh root/ha with 25-30 % starch content. The list of released cassava varieties in Howeler and Aye (2014) gives a brief account of their characteristics and management to address issues of low yield, pests, diseases, and environmental stress. Improved varieties are thus available for testing and adoption in cassava-growing areas of Myanmar, Cambodia, Laos, Indonesia and Vietnam.

There are also proven management practices that are available for testing, adaptation, and uptake in the project sites. Crop management practices include selection of good planting materials, improved tillage practices, fertilizer application methods, soil fertility management and erosion control, efficient weed control, pest and disease management, and the proper use of improved cassava varieties within the context of existing farming systems.

Regarding soil management, thousands of short- and long-term fertilizer trials conducted in Asia have indicated that the response to particular nutrients depends on the original fertility of the soil and may also change over time. Balanced application of N, P, and K mineral fertilizers has increased root yields by 50 to 100 % in many areas and even more in very poor soils. The root starch content has also increased with the application of increased N, P, and K, but most markedly with additional K application. A combination of 100 kg N, 20 kg P and 120 kg K per ha plus returning plant tops has achieved cassava root yields of up to 40 t/ha in many places without declining soil fertility. Previous research has also found that planting contour hedgerows (e.g., *Paspalum atratum*) is usually most effective in reducing erosion by slowing run-off and trapping eroded sediments.

---

## **2.2 Research and/or development strategy and relationship to other ACIAR investments and other donor activities**

The project is well-aligned with the Australian Government’s new aid strategy, which focuses on two development outcomes: supporting private sector development and strengthening human development (DFAT 2014a). In particular, it will contribute to two of the aid program’s 10 strategic targets: #2 Engaging the private sector – exploring innovative ways to promote private sector growth and engage the private sector in achieving development outcomes; #3 Reducing poverty – promoting economic growth in ways that provide pathways out of poverty (DFAT 2014b). While the project is not engaging in gender transformative research, as implied in #4 Empowering women and girls, it will be supported by the RTB Gender Specialist to provide a gender lens on the analysis to ensure outputs are gender responsive. The regional nature of the project will

provide a basis for comparing gender norms in cassava production and marketing between locations.

Within this aid strategy, ACIAR's principal goals are to reduce food insecurity, improve rural livelihoods, and care for the natural resource base for agriculture with a strong emphasis on smallholder farmers. Similarly, the new CGIAR Strategy and Results Framework defines four system-level outcomes: reduction in poverty, increased global food security, improvement of nutrition, and better management of natural resources. The focus of this project fits very well with both of these sets of goals. A more sustainable and profitable cassava production sector, linked to a vibrant and supportive processing sector, will reduce poverty and improve the livelihoods of smallholder cassava producers, as well as the buyers, collectors, and workforce linked to processing. The adoption of better soil management practices will contribute to environmental outcomes within and beyond the farm boundary.

The project will build on the outputs of the existing and previous ASEM program in Mainland Southeast Asia, but with a stronger commodity focus. These projects include:

- ~~ASEM/2011/043 Strengthening institutional capacity, extension services and rural livelihoods in the Central Dry Zone and Ayeyarwady Delta regions of Myanmar;~~
- ASEM/2011/075 Enhancing district delivery and management of agriculture extension in Lao PDR;
- ASEM/2014/009 Smallholder perspectives and decisions about technology adoption in agro-ecological zones and farming systems of Cambodia;
- ASEM/2009/055 Facilitating livelihood adaptation to natural resource pressures in Lao PDR.

The project creates the opportunity for a regional approach, with important technical and policy lessons shared between these countries and those involved in the proposed AGB project in Vietnam and Indonesia (AGB/2012/078), where production of cassava is dominated by smallholders. Through this partnership, the project will provide the opportunity to explore the regional aspects of trade in cassava products and alternative policies to develop the industry and support smallholder livelihoods. This is not only relevant for cassava but also other value-chains such as those for maize, sugarcane, rubber, oil palm, and smallholder forestry. Researchers, industry actors, and policy makers will have opportunities to visit different sites and exchange lessons throughout the project.

A proposed ACIAR project working on sustainable maize value chains in Vietnam, Laos, and Myanmar also presents the opportunity to compare across two interrelated commodities. In several cases, agricultural land has recently been moved out of maize production and into cassava production for a number of market and policy reasons, providing an opportunity for comparison of the two cropping systems and value chains. The projects are anticipated to have several common national partners and, where appropriate, to share field sites and activities. This may include on-farm trials to compare the economics of maize and cassava, common household surveys, and common policy dialogues. Capacity-building activities including workshops on farming systems economics, value-chain analysis, and policy analysis will be conducted jointly between several ACIAR projects in Laos and Cambodia.

CIAT and SNV have been collaborating on developing Inclusive Business Models (IBM) in the cassava industry in Vietnam, Laos, and Cambodia funded by IFAD. The project has demonstrated that having existing technologies that lift the productivity of farmers and the profitability for value-chain actors is the major entry point. These can be adapted through local testing together with farmers and value-chain actors. Furthermore, given the strong competition for feedstock, forming farmer groups for the purpose of increasing farmers' bargaining position in price negotiations is usually not effective. In the absence of new technologies, forming farmer groups is seen as largely unsustainable and difficult to replicate outside a project. This project has also shown the need to build the capacity of

value-chain actors through the life of the project and avoid dependence on ongoing project resources and crowding out of private-sector activities.

The CGIAR Research Programs (CRPs) are leading to a more programmatic approach to development research within and between the CGIAR centres and their partners. The project will be mapped to the Roots, Tubers, and Bananas (RTB) CRP. CIAT is driving the work on cassava within this Program. This provides opportunities for the project to benefit from the long-term work on breeding cassava varieties, cassava agronomy, and managing cassava pests and diseases. The latter will be particularly important in relation to the threat of the Cassava Mealybug (*Phenacoccus manihoti*), one of the most serious pests of cassava worldwide, which has recently reached Asia and is likely to spread in warmer and drier parts of the region (Parsa et al., 2012). Cassava Witches Broom Disease (CWBD) is another serious emerging disease in Southeast Asia. Caused by a phytoplasma pathogen, it is rapidly spreading throughout the region (particularly in Cambodia) and having substantial impact on yields and incomes. Understanding farmers' current practices and perceptions, regional value chains (including cross-border trade) for planting material, and information networks for production methods will be important in addressing these problems.

The CRP on Policies, Institutions, and Markets (PIM), in which CIAT is active in the component on linking farmers to markets, can add value to any activities undertaken as part of the project. Another CRP that will help efforts to understand and improve cassava production, marketing, and processing is the Climate Change, Agriculture, and Food Security (CCAFS) Program in which climate scenarios for cassava are being investigated. Any work on improved management of cassava-based farming systems may benefit from research activities within two other CRPs, namely Water, Land, and Ecosystems (WLE) and the Humid Tropics (HT), both of which could complement work on the productivity and resilience of cassava-based production systems in Southeast Asia.

There are additional CIAT bilateral projects currently operating in the region that will be able to provide technical backstopping for important topics (such as pest and disease management) and capacity-building for project partners. These projects will also benefit from a greater understanding of current knowledge, practices, and potential impact pathways.

---

## 3 Objectives

The overall aim of this project is to identify the socio-economic conditions under which improved technology and market booms in commercial crops such as cassava can be harnessed to increase the profitability and sustainability of smallholder farming systems in the poorer countries of Mainland Southeast Asia and thereby contribute to poverty reduction.

The research questions guiding the project focus on the potential for improving the profitability and sustainability of smallholder cassava production in Laos and Cambodia.

(1) What is the role of cassava in smallholder livelihoods under different production, processing, and marketing systems (value chains), and how have these systems contributed to changes in livelihood outcomes (food security, income generation, resilience) at household and community levels?

(2) How do alternative cassava production and marketing arrangements affect the adoption of better technologies, improvements in farm incomes and livelihoods, and the distribution of benefits within and between communities (including by wealth-class, ethnicity, and gender)?

(3) What are the appropriate support services and policies to ensure that smallholders are involved in profitable and sustainable cassava-based farming systems and that poor and marginalised groups are not adversely affected by industry development?

The project objectives arising from these research questions are as follows:

**Objective 1** – Assess the current production, marketing, and institutional arrangements for cassava in major agro-economic zones and value chains in Laos and Cambodia.

- 1.1 Understand the macro-level drivers for the development of the local cassava industry in different agro-economic zones in each country, including changing market conditions and policy settings.
- 1.2 Map the cassava value chains of inputs, outputs, and supporting services, including how benefits and costs are shared, how information moves along the value chain, and assessing the current capacity of value-chain actors (public and private) to provide information to farmers effectively.
- 1.3 Develop a practical typology of farm households in current cassava-growing regions, including their crop and livestock activities, livelihood strategies, decision-making, and constraints to adoption of improved technologies.
- 1.4 Understand local networks of social and economic relations affecting access to and collective management of farm resources, and access to input and output markets. Compare how factors such as gender and ethnicity impact these norms and implications for approaches in Objective 2.

**Objective 2** – Increase the adoption of improved cassava production, resource management, and post-harvest practices by strengthening linkages between farmers and research, extension, and industry actors.

- 2.1 Assess current production systems for cassava as observed in the different household types and value chains identified under Objective 1, including varieties used, management of planting material, soil and nutrient management, intercropping, labour utilisation (including gender division), and post-harvest practices, and constraints to adoption of improved technologies.
- 2.2 Conduct participatory evaluation of new varieties, fertility management, pest and disease management, intercropping, and post-harvest practices (such as improved

production of dried chips to meet alternative market demands) with farmers and industry stakeholders.

- 2.3 Identify incentives and business opportunities for value-chain actors to increase the adoption of improved technologies (e.g., processors interested in assuring their supply of cassava roots, producers of clean planting material, fertiliser dealers, markets for intercropping).
- 2.4 Develop and document successful models for supporting cassava smallholders in adopting improved practices, highlighting roles for farmer groups, industry stakeholders, and government research and extension services.

**Objective 3** – Develop capacity for farming systems research and policy analysis and promote policy dialogue on the opportunities for industry development and livelihood enhancement through supported smallholder models.

- 3.1 Understand existing local and national policies and priorities and implications for scaling up research outcomes.
- 3.2 Facilitate dialogue between local actors to enable outcomes to inform provincial planning and policies aimed at supporting industry development and smallholder livelihoods.
- 3.3 Facilitate a learning alliance between national partners and industry associations to share lessons from the project between sites and inform national policy.
- 3.4 Develop local capacities for farming systems economics, value chain analysis, and evidence-based policy analysis and dialogue.

---

## 4 Planned impacts and adoption pathways

---

### 4.1 Overview

Impact pathway analysis indicates how project activities are expected to influence agricultural development objectives, recognising the complex and contingent nature of the processes involved (Cramb 2000; Douthwaite et al., 2003; Springer-Heinze et al., 2003). The project “outputs” will be (1) a diagnostic analysis of the current production, marketing, and institutional arrangements for cassava in major agro-economic zones and value chains in Laos, Cambodia, and Myanmar; (2) documentation of innovative ways to increase the adoption of improved cassava technologies that emphasise new linkages between farmers and research, extension, and industry actors; (3) an enhanced capacity for farming systems research and policy analysis and dialogue on smallholder-oriented industry development.

The “outcomes” – measures of technical and institutional change induced by the project outputs that are conditional on broader processes of agricultural innovation – will be wider adoption of improved cassava technologies, increased capacity of value-chain actors to work together in identifying, evaluating, and promoting improved technologies, and an improved evidence-base for policies and programs in support of cassava smallholders and associated agribusiness firms.

While the project will involve a large number of farmers during the implementation phase, the “next users” of the project outputs will be relevant agribusiness firms, industry groups, and government research, extension, and policy agencies. The project outputs will be shared with these users in the course of the project through participatory methods (cross-site visits, stakeholder dialogues), research and policy briefs, and the development of learning alliances between national partners and industry stakeholders to continue the process of innovation and adoption within and between countries. The “final users” will be cassava smallholders and value-chain actors in other locations who benefit from the wider adoption of agribusiness models and supportive policies and the consequent dissemination of improved technologies.

The “impacts” – measures of social, economic, and environmental change that are influenced by broader processes of agricultural development – will be widespread increases in the profitability and sustainability of smallholder cassava production in Laos, Cambodia, and Myanmar and a consequent improvement in rural livelihoods. The project will assess the risks and other external factors potentially disrupting these beneficial impacts, including market and yield risks. It will also examine potential unintended effects, such as impacts on women and children or the exclusion of marginal producers from contractual agreements with traders and processors.

---

### 4.2 Scientific impacts

The scientific knowledge that will be generated through this project will be applicable to scaling out activities to other regions and countries, as well as being highly relevant to other sectors where supported smallholder systems are an alternative to concession or plantation arrangements (e.g., sugarcane, rubber, oil palm, eucalyptus). These scientific impacts will include:

- Understanding the impacts of a commodity boom on the livelihoods of smallholder farmers, how benefits have been shared within the community, and the distribution of benefits and costs between different value-chain actors.



- Quantifying the economics of farming practices in various agroeconomic zones and the influence of economics on the relative advantage and adoption of alternative technologies. This may include information on smallholders' willingness to pay (WTP) for improved genetic material and systems for the provision of clean planting material.
- Identifying opportunities and constraints to working with value-chain actors to increase the adoption of technologies in different production and processing settings. This will give rise to knowledge on how to develop impact pathways in regions with different levels of government activity through partnerships with the private sector.
- Evaluating how alternative business models influence the economic, social, and environmental impacts of cassava production, and the role of policy in balancing these outcomes. In particular, this will include knowledge of how governments with limited resources can work to support smallholder livelihoods and industry development.

The project will publish research outputs in high-level multi-disciplinary journals with a focus on rural livelihoods, value-chain development, and rural development, as well as in ACIAR publications with a wider scientific audience in the region.

---

### 4.3 Capacity impacts

The partnership between international researchers from UQ and CIAT and local partners in the three countries will increase local capacity in five main areas:

- Livelihoods and agrarian systems analysis
- Value-chain analysis and agribusiness interventions
- Variety dispersal and systems for supplying clean planting material
- Soil fertility management and intercropping
- Policy analysis and dialogue

The target audience for capacity building includes staff of NAFRI (Laos) and CARDI (Cambodia). ~~DAR (Myanmar) and Yezin Agricultural University (Myanmar).~~ The project includes staff returning from PhD studies in Australia (John Allwright Fellows) who now occupy senior positions in policy analysis. The project provides an opportunity to strengthen collaboration between countries in both agrarian systems and policy analysis.

The project will also include local extension agencies to increase their experience in establishing demonstration trials for the main cassava technologies. There is significant variation in the level of local extension capacity across the proposed sites, with cassava not always a priority crop. Therefore the project will also focus on increasing the capacity of other value-chain actors as key "next users" in terms of their knowledge of cassava management. This includes both processing factories and intermediaries who link farmers to markets. In each country, training will be conducted mainly in Year 1 by national and international experts, with technical support provided for the remaining period during the establishment of trials and participatory evaluations.

---

### 4.4 Community impacts

#### 4.4.1 Economic impacts

Cassava production has increased rapidly to account for 45,000 ha in Laos (2013) and 362,000 ha in Cambodia (2012-13). ~~and 44,000 ha in Myanmar (2010-11)~~ (Table 1). A good proportion of the planted area is in the form of large-scale land concessions, especially in Cambodia, and there are no readily-available data on the number of smallholders specialising in cassava production. Assuming half the planted area is in the hands of smallholders, who cultivate about 2 ha on average, there may be over 100,000 cassava smallholders in the three countries, with the number growing rapidly. Household survey data collected in two provinces in Cambodia by Kem Sothorn (Allwright Fellow at UQ) show that cassava provides the majority of cash income of farming households in

cassava-growing regions, on average contributing over 60% of household cash income from all sources (Fig. 2). However, many families were heavily dependent on the crop, with limited opportunities for other farming activities in the marginal landscapes they occupied. Farmers currently growing cassava tend to have higher incomes than those not cultivating the crop. However, the findings suggest that households no longer growing cassava have sometimes sold land to repay debts accumulated through expansion into cash cropping and associated with crop failures.

Table 1. Cassava area, output, and yield in Laos and Cambodia

|                   | Laos      | Cambodia  |
|-------------------|-----------|-----------|
| Reference year    | 2013      | 2012-13   |
| Planted area (ha) | 45,185    | 361,854   |
| Output (tonnes)   | 1,254,193 | 7,613,697 |
| Mean yield (t/ha) | 27.8      | 22.5      |

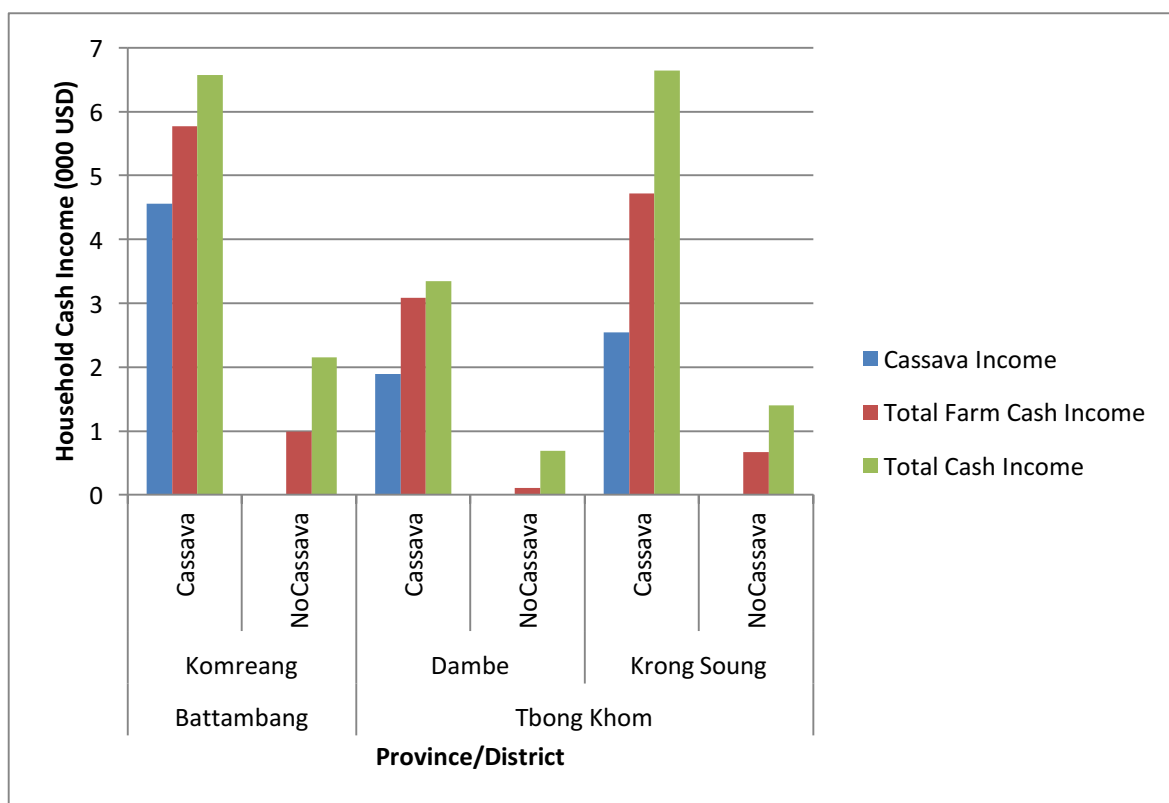


Figure 2. Gross cash cash income of cassava and non-cassava households in three districts in Cambodia (Source: Kem Sothorn field data, November 2014)

Working with industry and government partners, the project seeks to increase the adoption of technologies by at least 5,000 smallholder farmers by the end of the project. This will have significant economic impacts at the farm, local, and national scales. The proposed technical focus in each country will vary based on the value-chain and adoption

analyses. In some cases this will lead to large increases in productivity (>50%) and in other cases it will reduce crop losses due to soil degradation and pests and diseases. Assuming a baseline enterprise gross margin for cassava of USD 1,000-2,000 per household, a 30% improvement in this measure of productivity would amount to USD 300-600 per household, or potentially USD 1.5-3.0 million across the 5,000 smallholders immediately impacted by the project. The project itself will develop budget models to better quantify incremental farm-level gains and risks.

~~In Myanmar, scoping studies indicate that doubling yields is possible in some areas of Ayeyarwady Region, where new varieties, improved land preparation and fertility management, and suitable pest management practices can be easily introduced. There are around 6,000 ha of cassava grown in the three target townships in this region. Working through the network of processors and strengthening industry associations, it would be possible to reach a large percentage of these farmers over the life of the project. The current farm-gate prices are around USD 50/t. A modest 5 t/ha yield improvement would lead to an increase in gross value of USD 1.5 million per year. Additional costs would need to be deducted, but these are expected to be small relative to the additional value of production.~~

~~Further, in the study sites in Myanmar, there are over 200 small scale starch processors each directly linked to 20-30 farmers. Due to limited mechanisation of starch extraction, each small processor employs over 50 staff for harvesting, starch extraction, and drying. Processors estimate that they have excess processing capacity, but at the moment there are limited market outlets for the rough starch. Therefore, prices would fall without further market development, which is an objective of the project. There are also quality issues with the current extraction of starch that need to be addressed to improve market access; several companies are currently looking at investing in improved processing technology.~~

In Cambodia it is anticipated that a strong focus will be on soil management and disease management. Changes in fertility management will increase incomes through better types (nutrient balance), timing, and placement of fertilisers. For example, previous analysis in Cambodia has shown a 600% return on investment through improved fertility management. Cassava witches broom disease (CWBD) is currently spreading rapidly through Cambodia. There is less known about CWBD but initial estimates place losses at 10-15% yield loss with another 25-30% loss in starch content, although entire fields are being abandoned when infestation is high. Systems for clean (disease-free) planting material are being developed, but a better analysis of farmers' willingness to pay for these technologies will help ensure interventions are well-targeted and sustained.

#### **4.4.2 Social impacts**

Smallholder cassava production is well suited to resource-poor farmers living in marginal areas, often ethnic minority groups. The project will seek to ensure that marginal communities remain supported relative to those in other areas with better links to services. A strong focus of the research is to evaluate the social impacts of various agribusiness models and to understand the incentives for private-sector actors to conduct activities and support smallholders only in favourable areas.

Labour productivity is a key criterion that will be used in the analysis of demonstration trials. Gender division of labour will be analysed to ensure increased labour requirements do not burden women or children but rather create equitable opportunities for household labour resources. The regional nature of the project will also enable comparisons of cultural norms and help identify specific gender research questions to be addressed in collaboration with gender specialists in CIAT and the RTB CRP.

Policy dialogues grounded in evidence from Vietnam and Indonesia may contribute to a shift away from policies favouring large-scale land concessions to supported smallholder schemes, with much greater potential for poverty reduction.

### **4.4.3 Environmental impacts**

Cassava cultivation has a poor reputation for causing soil and land degradation. The project has a strong focus on improving the sustainability of cassava production through the adoption of improved soil management and multicropping practices. The project also seeks to examine the extent to which these practices can be supported by the private sector relative to other technologies (production, processing) in different value-chains. Hence there is potential for significant reduction in negative impacts on the resource base.

---

## **4.5 Communication and dissemination activities**

### **4.5.1 Project communication and stakeholder engagement**

The philosophy is to keep stakeholders engaged throughout the project. The inception meeting will bring together researchers and government, industry, and farmer representatives to discuss the design and implementation of the project. Objective 3 seeks to establish and maintain stakeholder engagement at local, national, and international scales. Some resources have been allocated in the budget for regional networking and efforts will be made to link to other regional platforms (eg. the Asian Cassava Breeders Network).

Industry exchanges will be carried out in which processors and traders are taken to other areas (within their own country and potentially elsewhere in the region) to discuss successes in linking with farmers. The project will be engaged with industry associations where they exist (e.g., Cassava Starch Association in Kyonpyaw Township, Myanmar) to involve them in workshops to help disseminate research findings beyond the target sites.

Project staff will report research outcomes and lessons at CIAT's annual program reviews and CRP meetings of RTB and PIM. Through CIAT's communications department it is expected that project activities and outcomes will be highly accessible to external stakeholders. CIAT has a strong open access policy that seeks to ensure that investments in data collection and analysis has the greatest impact.

### **4.5.2 Internal project communication**

Internal project communication will occur through a number of avenues.

- Each year a country-level annual meeting will be held to present research progress and plan for the subsequent year. This will also involve exchanges between the various countries. It is envisaged that there will also be exchange between the AGB and ASEM projects throughout the life of the project.
- A newsletter of project activities will be developed to keep partners informed of upcoming events and research outcomes. This will be produced at least 4 times per year.
- A website will be established for sharing information internally and with external parties.
- To limit the costs of communication, web-based communication software will be utilised (Webex, Skype, Adobe meeting).

---

## 5 Operations

---

### 5.1 Methodology

The project will identify the potential for the adoption of a range of improved technologies (production, processing, resource management) by involving and linking farmers, farmer groups, traders, processors, researchers, government agencies, and industry bodies. This requires a multiple case-study approach in which mixed methods are used to understand the various processes at work and action research is undertaken to experiment with alternative arrangements appropriate to each context. Hence the project will establish sites in each country which represent various production, processing, and marketing systems.

Within these case-study/action research sites a range of conventional quantitative and qualitative techniques will be used, drawn from the repertoires of rural livelihoods analysis, agrarian systems analysis, and value-chain analysis (including primary actors, supporting actors, and the policy environment). The aim of these analyses will be to understand the livelihood resources, strategies, and trajectories of cassava-based smallholders, the influence of the wider agrarian system on the opportunities and constraints faced by these smallholders (e.g., access to land, capacity for collective action, risks, poverty traps, policy constraints), and the attributes and incentive structures of the other actors in the cassava value chain(s) in each site (input suppliers, traders, processors, extension workers, local administrators). These analyses will rely on structured and semi-structured face-to-face interviews with individual actors, small groups, and key informants along the value chain.

On the basis of these analyses, the project will identify stakeholders (primary and supporting actors) and invite their participation in planning and implementing a range of improvements to the cassava value chain in each case-study area. These potential improvements will be drawn from a pool of available and potentially adoptable technical innovations from ongoing international research activities (e.g., CIAT's cassava breeding and pest and disease management programs). A participatory research approach will be used to select, adapt, and promote locally-adoptable cassava technologies, centred on demonstration trials, field days, and participatory evaluations by farmers (men and women) and other industry actors. The participatory evaluation of demonstration trials will help to assess the relative advantage and trialability of the technologies under local conditions and livelihood strategies. Economic analyses will also be undertaken to quantify the returns and risks involved in adopting new practices. As these new arrangements and processes for technology adaptation and promotion are trialled at each site, viable models for improving the profitability and sustainability of smallholder farming systems will be identified and described for a wider audience of end users.

In Cambodia, three case-study sites will be selected for the activities under Objective 1 – one in the east with strong links to the market in Vietnam (e.g., Kampong Cham, Kratie, Mondulkiri), one in the west with strong links to the market in Thailand (e.g., Pailin, Battambang), and one in a location not closely connected to cross-border trade and where lowland rice production is an important livelihood activity (e.g., Kampong Speu, Svay Rieng). A sub-set of these sites will be prioritised for activities under Objective 2.

In Laos, also, three case-study sites will be selected for Objective 1 – Bolikhamxai (where most production had occurred in the past), Vientiane Capital (where production has recently expanded, but marketing problems have damaged smallholder incentives), and Xayaboury (where there has been a recent swing from maize to cassava). Again, based on the analyses undertaken for Objective 1, some prioritisation of sites will occur for Objective 2.

~~In Myanmar, a reconnaissance visit has found that most production is taking place in the Ayeyarwady Region, which encompasses the delta, hence three sites (townships) will be selected from within this region. Some initial scoping studies will also be conducted in the Central Dry Zone where previous variety trials have shown technical opportunities, though there is no current market in this region.~~

In each case-study site, the first phase will involve **value chain analyses** to identify different product pathways (e.g., local production of raw starch for subsequent refining and export; production of dried chips for consumption), characterise the primary actors involved (e.g., small-scale local processors, cross-border traders, large-scale refiners), and assess the capacity of support actors (researchers, extension services, input suppliers). These analyses will be crucial in identifying and assessing potential modes of collaboration among value-chain actors.

On the basis of the value-chain analyses, about 5 villages will be selected in each case-study site (i.e., 15 villages in 3 sites in each of Cambodia and Laos ~~and Myanmar~~) for **key informant interviews, group interviews, and farm household surveys**. These will provide detailed quantitative and qualitative information about agrarian institutions, livelihood strategies, farm types, the evolution of smallholder cassava systems, constraints to adoption of improved technologies and practices, contractual relations with value-chain actors, and potential for technical and institutional innovations. The surveys will also provide a baseline for subsequent evaluation of localised, short-term project impacts. There will be no imposition of a 'control group' as such; rather, evaluation will be based on 'before-after' comparisons of farmers in the baseline survey, interpreted through their articulated reasons for adoption or non-adoption of identified practices and other concurrent changes in their goals and circumstances (Cramb and Purcell 2001). However, villages surveyed for Objective 1 but not directly included in project activities for Objective 2 will provide a kind of 'control' or reference group, though no technologies or services will be withheld from interested parties in this group. Indeed, the aim of the project is to develop the action-research sites as 'nodes of diffusion', hence to encourage wider interactions among value-chain actors across the study regions.

Based on the analysis of the agrarian systems and associated value-chains, and consultations with key stakeholders, **on-farm demonstrations of available cassava technologies** will be established, with support from relevant actors (government, business, development projects, and/or NGOs). These will form the basis of participatory evaluations by farmers and other actors in the value chains, both of the adoptability of the technologies and the potential benefits of industry promotion of improved production systems.

The analyses of production and marketing systems and participatory evaluations of new technologies and institutional arrangements will feed into a **policy analysis and dialogue** with key players in the cassava industry, including government planners and researchers, development project managers, industry actors and associations, farmer groups, and NGOs. The policy analysis will involve quantification of identified improvements to cassava value chains and diagnostic appraisal of binding constraints to the realisation of those potential improvements (Hausmann et al. 2006). Spatial analysis of existing cassava production and marketing systems and potential sites for improvement will also be undertaken. Formal opportunities will be sought to present these analyses to policy advisors but experience has shown us that informal lines of communication can be more effective, along with a general readiness to insert specific policy advice into the policy process as opportunities arise (e.g., an unexpected ministerial request for policy options). Policy analysis is not an exact science (Fforde 2010; Acemoglu and Robinson 2012), but descriptive, 'insider' accounts of how policies change in a given context can be used to improve understanding of the room to manoeuvre.

Until recently, cassava has not been a priority crop in the region. As such there are limited data available to policy makers on current area of production, yields, processing capacity, value chains, and market conditions. A final policy forum will be jointly organised through

this project and its sister project (AGB/2012/078) to present and discuss findings with key policy actors from each of the five countries participating in the two projects.

## 5.2 Activities and outputs/milestones

**Objective 1: Assess the current production, marketing, and institutional arrangements for cassava in major agroeconomic zones and value chains in Laos and Cambodia**

| No. | Activity   | Outputs/ milestones             | Due date of output/ milestone | Risks/ assumptions  | Applications of outputs  |
|-----|--|---------------------------------|-------------------------------|---|--|
| 1.1 | Review information on global and national cassava production, utilisation, trade, and policies.  | Review report                   | Annually                      | Access to reliable national data  | Analysis of market and policy environment (including risks) of smallholder cassava production at the regional and global scale, including implications for local project activities.   |
| 1.2 | Conduct value chain analyses in case study areas (primary and supporting actors, local policy environment).  | Value chain reports             | August 2016<br>February 2017  | Willingness of value-chain actors to provide information; capacity of local partners to conduct value-chain analyses. | (1) Assess current production and marketing systems for cassava in different value chains.<br>(2) Provide baseline data for project evaluation.<br>(3) Spatial analysis of product and information flow for selection of villages in Activity 1.3.<br>(4) Identify and recruit participants for activities under Objective 2.  |
| 1.3 | Conduct key informant and group interviews in case study areas to ascertain socio-economic relations affecting access to and collective management of farm resources and access to input and output markets.               | Socio-economic analysis reports | October 2016<br>April 2017    | Capacity of local partners to conduct effective, semi-structured key informant and group interviews                   | (1) Assess current production and marketing systems in different household types and value chains, including varieties, planting material, soil and nutrient management, intercropping, labour utilisation (including gender division), post-harvest practices, and constraints to adoption of improved technologies.<br>(2) Provide baseline data for project evaluation. |
| 1.4 | Conduct household surveys in case study areas to determine current farm-household types, livelihood activities, production practices, market linkages, decision-making, and constraints to adoption of improved practices. | Household survey reports        | January 2017<br>July 2017     | Capacity of local partners to collect, enter, and analyse survey data in an accurate and timely manner                | (2) Provide baseline data for project evaluation.  |

PC = partner country, A = Australia

**Objective 2: Increase the adoption of improved cassava production, resource management, and post-harvest practices by strengthening linkages between farmers and research, extension, and industry actors.**

| No. | Activity   | Outputs/ milestones  | Due date of output/ milestone  | Risks/ assumptions   | Applications of outputs  |
|-----|--|--|--|--|--|
| 2.1 | Conduct workshops with identified stakeholders in each site to plan, prepare for, and review cooperative activities.   | Workshops successfully conducted and reported.                             | August 2016<br>February 2017   | Willingness of stakeholders to participate.  | Plan of cooperative activities; elements of innovative agribusiness models.  |
| 2.2 | Establish on-farm demonstration trials of improved cassava cultivation practices and conduct participatory evaluation of new varieties, fertility management, pest and disease management, intercropping, and post-harvest practices with farmers and other industry stakeholders.                           | On-farm trials successfully established<br><br>Evaluation reports prepared | Establish Mar-Apr 2016-2017<br><br>Harvest reports in Feb-March 2017-2018<br>2018-2019 | Farmers willing to participate.<br><br>Capacity of project partners to implement on-farm trials. | Locally adapted technologies tested.<br><br>Economic analysis to contribute to Activity 2.3.   |
| 2.3 | Develop business cases for value-chain actors to invest in adoption of improved technologies (e.g., production and supply of clean planting material, dissemination of information on pest and disease management, supply of suitable fertilisers and nutrient management information, provision of credit). | Business cases documented and discussed with stakeholders                  | April 2017<br>October 2017   | Stakeholders willing to participate. Feasible options available to trial.                        | Basis for further development of innovative agribusiness models.   |
| 2.4 | Document successful models for supporting cassava smallholders in adopting improved practices, highlighting roles for farmer groups, industry stakeholders, and government research and extension services.  | Working papers on smallholder models                                       | September 2018<br>March 2019   | Timely and successful completion of preceding activities.  | Major project output to develop impact pathways for different production and marketing settings.<br><br>Share lessons between AGB and ASEM partners with implications beyond the cassava sector. |

PC = partner country, A = Australia



**Objective 3: Develop capacity for farming systems research and policy analysis and promote policy dialogue on the opportunities for industry development and livelihood enhancement through supported smallholder models.**

| No. | Activity   | Outputs/ milestones                                   | Due date of output/ milestone | Risks/ assumptions   | Applications of outputs  |
|-----|--|---|-------------------------------|--|--|
| 3.1 | Review and document local and national policies with regard to smallholder cassava and identify opportunities for scaling up research outcomes.  | Review report   | August 2016<br>February 2017  | Willingness of local and national policy makers to discuss current and potential policies.                       | Options for scaling up technologies and organisational arrangements. |
| 3.2 | Conduct workshops to develop local capacities for on-farm research in cassava, farming systems evaluation, value chain analysis, and evidence-based policy analysis and dialogue.      | Training workshops conducted, evaluated, and reported | August 2016<br>February 2017  | Availability of suitable and motivated personnel in partner organisations to undertake and make use of training. | Capacity to implement activities under Objective 2.                  |
| 3.3 | Develop technical and policy briefs in local languages outlining the opportunities for improvement of a smallholder-based cassava industry.  | Technical and policy briefs disseminated              | August 2018<br>February 2019  | Timely completion of preceding activities. Availability of competent translators.                                | Scaling out and up of research findings.                             |
| 3.4 | Conduct dialogues between local actors to enable outcomes of research to inform provincial planning and policies aimed at supporting industry development and smallholder livelihoods. | Industry dialogues conducted                          | December 2018<br>2019         | Availability and cooperation of industry actors.   | Refinement and wider dissemination of project findings.              |

PC = partner country, A = Australia

## 5.3 Project personnel

### 5.3.1 List of participants involved in the project

#### *Australian commissioned and collaborating organisations (or IARC)*

| Name                                | Sex (m/f) | Agency and position | Discipline and role in project  | Time input (%) | Funding       |
|-------------------------------------|-----------|---------------------|---|----------------|---------------|
| Dominic Smith                       | M         | UQ                  | Value chain specialist – Project leader                               | 25%<br>10%     | ACIAR<br>UQ   |
| Rob Cramb                           | M         | UQ                  | Agricultural economics and policy                                     | 11%<br>5%      | ACIAR<br>UQ   |
| Jonathan Newby                      | M         | CIAT                | Agricultural economics – Project coordinator                          | 30%            | ACIAR         |
| Cassava agronomist<br>Tin Maung Aye | M         | CIAT                | Soils and agronomy - demonstration trials                             | 25%<br>5%      | ACIAR<br>CIAT |
| Lao Thao                            | M         | CIAT                | Technical support and capacity building for agronomic work (Laos)     | 25%            | ACIAR         |
| Sophearith Sok                      | M         | CIAT                | Technical support and capacity building for agronomic work (Cambodia) | 25%            | ACIAR         |
| Kris Wyckhuys,                      | M         | CIAT                | Entomologist – input on pest and disease management. Links to RTB     | 5%             | CIAT          |
| Nozomi Kawarazuka                   | F         | CIAT                | Gender Specialist – input of gender research                          | 5%             | CIAT          |

#### *Partner country institution(s) or collaborating IARC*

##### Lao PDR partners

| Name                          | Sex (m/f) | Agency and position  | Discipline and role in project                          | Time input (%) | Funding |
|-------------------------------|-----------|--|---|----------------|---------|
| Dr Bounthong Bouahom          | M         | NAFRI - Director General                                     | Project coordination and linkages to policy             | 5%             | NAFRI   |
| Dr Vongpaphane Manivong       | M         | NAFRI – Deputy Director Policy Research Centre               | Project leader – socioeconomic and value chain analysis | 50%            | NAFRI   |
| Mrs. Bounthanom Bouahom       | F         | NAFRI – Head of Farming Systems Research Section             | Value chain analysis                                    | 50%            | NAFRI   |
| Mr. Phonepaseuth Souvannavong | M         | NAFRI - Head of Socioeconomic and Marketing Research Section | Socioeconomic analysis                                  | 30%            | NAFRI   |
| Mr. Souny Phomduangsy         | M         | NAFRI - Farming Systems Researcher                           | Farming systems analysis                                | 30%            | NAFRI   |
| Mr. Phunthasin Khanthavong    | M         | NAFRI – Cassava agronomist                                   | Agronomy and farmer participatory evaluations           | 50%            | NAFRI   |
| Mr Saythong Oudthachit        | M         | NAFRI – Cassava agronomist                                   | Agronomy  | 30%            | NAFRI   |

### Cambodia Partners

| Name             | Sex (m/f) | Agency and position            | Discipline and role in project              | Time input (%) | Funding |
|------------------|-----------|--------------------------------|---|----------------|---------|
| Dr Ouk Makara    | M         | Director, CARDI                | Project coordination and linkages to policy | 5%             | CARDI   |
| Dr Chea Sareth   | M         | Head, Socioeconomics, CARDI    | Socioeconomics, marketing                   | 50%            | CARDI   |
| Lim Sophornthida | F         | CARDI                          | Socioeconomic analysis                      | 20%            | CARDI   |
| Tech Ratana      | M         | CARDI                          | Socioeconomic analysis                      | 20%            | CARDI   |
| Theang Veasna    | F         | CARDI                          | Socioeconomic analysis                      | 20%            | CARDI   |
| Ung Sopheap      | M         | Deputy Head, Agronomist, CARDI | Farming systems research                    | 25%            | CARDI   |
| Chea Vuthy       | M         | CARDI Agronomist               | Cropping systems                            | 40%            | CARDI   |
| Siv Sinen (Mr)   | M         | CARDI Agonomist                | Research Assistant – Agronomy               | 20%            | CARDI   |

### Myanmar Partners

| Name               | Sex (m/f) | Agency and position                             | Discipline and role in project                           | Time input (%) | Funding |
|--------------------|-----------|---|--|----------------|---------|
| Dr U-Naing Kyi Win | M         | Director General                                | Project coordination and linkages to policy              | 5%             | DAR     |
| U Thant Lwin Oo    | M         | Director— non rice crop divisions               | Project coordination                                     | 5%             | DAR     |
| Dr Maung-Maung Tar | M         | Deputy Director                                 | Participatory variety selection and demonstration trials | 10%            | DAR     |
| Dr Ni Ni Tint      | F         | DAR—Industrial Crop Division                    | Soil fertility management and demonstration trials       | 30%            | DAR     |
| Ms. Soe Soe Hmwe   | F         | DAR—Industrial Crop Division                    | Value-chain analysis and household survey                | 50%            | DAR     |
| Prof. Dr. Myo Kywe | M         | YAU— Rector                                     | Project coordination and linkages to policy              | 5%             | YAU     |
| Dr Cho Cho San     | F         | YAU— Head, School of Agricultural Economics     | Economic analysis, student supervision                   | 10%            | YAU     |
| Dr Yu Yu Tun       | F         | YAU— Lecturer, School of Agricultural Economics | Value-chain analysis and household survey                | 20%            | YAU     |
| TBA                | TBA       | YAU— Research Assistant                         | Value-chain analysis and household survey                | 50%            | YAU     |

### 5.3.2 Description of the comparative advantage of the institutions involved

The **University of Queensland** has a long record of collaborative, multidisciplinary research in Southeast Asia on farming systems, agricultural development, and natural resource management, including managing numerous ACIAR projects. The School of Agricultural and Food Science is a multi-disciplinary unit within the Faculty of Science with strengths in agricultural economics, agribusiness, rural development, and agrarian systems. The Agribusiness and Rural Livelihoods Group within the School currently has research projects in China, Philippines, Malaysia, Indonesia, Vietnam, Laos, Cambodia, Bangladesh, and Pakistan.

**CIAT's international and national staff** in Southeast Asia have a good understanding of agricultural and farming systems economics, the cassava sector, and connections in the research, production and processing sectors in Laos, Cambodia, and Myanmar, as well as in the region more broadly. The project will draw on the experience of CIAT in cassava agronomy, breeding, pest and disease management, soil management, and linking farmers to markets. The project will gain from the lessons of several CRPs working within Asia and the broader global program. The project will utilise CIAT's national staff to provide technical support to the national agencies, particularly for Objective 2.

**NAFRI (National Agriculture and Forestry Research Institute)** is the research arm of the Lao Ministry of Agriculture and Forestry (MAF). The Agriculture and Forestry Policy Research Centre (AFPRC) is a research centre within NAFRI. AFPRC plays a key role in providing policy-related information and technical analysis to NAFRI and MAF, and in undertaking research on agriculture and forestry policy related to economic development and marketing channels, social issues, culture, natural resources, and farming systems management. AFPRC has been involved in several ACIAR projects in the past and is currently developing a proposal for the Lao-Australian Learning Centre. Capacity building achieved through this project is expected to have benefits for ACIAR's current and future engagement with NAFRI. The Agricultural Research Centre (ARC) within NAFRI conducts research into rice and non-rice crops. The rice and non-rice crop division has a long history of collaborating with ACIAR. ARC has been the main collaborator with CIAT on cassava research in Laos.

**CARDI (Cambodian Agricultural Research and Development Institute)** is the main agricultural research (for development) institute in Cambodia. CARDI's research also addresses rice and non-rice crops. CARDI has research groups in Agricultural Mechanization, Agronomy and Cropping Systems, Plant Breeding, Plant Protection, Soil and Water Science, and Socio-economics. Many senior staff members were trained for higher degrees in Australia. They work with Provincial Agricultural Office-Agronomy group for research and development and with Extension group for development and technology transfer in different Provinces.

~~**The Department of Agricultural Research** (Myanmar) has as its mission to systematically conduct research activities that would suit the needs of all stakeholders, which include producers, distributors, and consumers, in developing and disseminating regionally adapted crop varieties and crop production technologies. DAR has some experience conducting variety trials for cassava throughout Myanmar in collaboration with CIAT. DAR also has experience working in partnership with DOA and YAU on other commodities including rice, maize and legumes. DAR personnel are involved in several ACIAR projects on rice and legumes.~~

~~**Yezin Agricultural University (YAU)** is the sole agricultural university in Myanmar. YAU is currently administered by the MOAI and maintains a total staff of 600, including 140 academic staff, 75% of whom were trained at some level overseas. YAU comprises nine academic and four supporting departments including agronomy, agricultural botany, agricultural chemistry, agricultural economics, agricultural engineering, animal science, horticulture, entomology, and plant pathology. The project will largely work with the Department of Agricultural Economics for livelihood and value chain analyses. The project seeks to build the capacity of the YAU team in value chain analysis and also involve DAR staff in these activities.~~

### 5.3.3 Summary details of the role of each participant involved

**Dr Dominic Smith (UQ)** is the project leader. He is an agricultural economist and market development specialist. As well as overseeing the project, he will be responsible for designing value-chain analyses and identifying agribusiness opportunities with value-chain actors. Having been based in Vietnam for many years he has a strong understanding of agricultural policy development and procedures in the region, critical for facilitating policy dialogues.

**Prof Rob Cramb (UQ)** is an agricultural economist. He will assist the project leader, give guidance on research design and methodology to the project partners, analyse project findings in the light of broader theoretical and empirical trends in agribusiness and agrarian development, and liaise with other related projects within and beyond ACIAR's research program.

**Dr Jonathan Newby (CIAT-UQ)** is an agricultural economist and will serve as the project coordinator. Based within the region he will be responsible for day-to-day coordination of activities under each of the objectives with local partners. In order to understand the adoption of technologies he will be responsible for overseeing the design of household surveys and economic analysis of participatory trials.

**Agronomist (CIAT)** will be responsible for the development, implementation and analysis of participatory trials together with local partners, including variety selection, fertility management, and intercropping systems.

**Mr Sophearith Sok (CIAT)** coordinates CIAT's cassava projects in Cambodia. He contributes to the development and implementation of project activities with a focus on diversified farming systems for increased income and food security of small-scale farmers. Over the past four years, he has worked with the Cambodian Agricultural Research and Development Institute (CARDI). He will assist in the development and management of field activities.

**Mr Lao Thao (CIAT)** has worked with CIAT since 2003. He has provided key support across CIAT's cassava programs with a focus on Lao PDR. He has a bachelor's degree in plant protection from Guangxi University, China, and is based in Vientiane, Lao PDR. As a research assistant, he will work alongside program leaders to implement field trials in Lao PDR and coordinate between CIAT and Lao researchers and Government officials.

**Dr Nozomi Kawarazuka (CIAT-RTB)** is a gender specialist currently conducting research activities in the region supporting a number of programs, particularly related to Roots, Tubers and Bananas. She will provide technical advice in the design of surveys and field activities, analysis of survey data, and participate in more gender strategic research activities where opportunities and needs are identified.

**Dr Kris Wyckhuys (CIAT)** is CIAT's cassava entomologist in Asia, responsible for coordinating research and information-sharing between Southeast Asian stakeholders. Wyckhuys currently manages an Asia-wide cassava IPM network and will provide links between the ACIAR project and broader regional activities in pest and disease management.

**Dr Bounthong Bouahom (NAFRI)** is Director General of NAFRI and will serve as the project leader for Laos. He will oversee project management, fulfil an advisory role, and provide linkages to policy.

**Dr Vongpaphane Manivong (NAFRI)** is an agricultural economist and will act as the project coordinator in Laos. He will be responsible for coordination of activities under NAFRI's responsibility. He will work closely on the implementation of household surveys and economic analysis of participatory trials.

**Mrs Bounthanom Bouahom (NAFRI)** is a marketing development specialist. She has a strong understanding of the value-chain approach. She will be responsible for value-chain analysis and identifying agribusiness opportunities with value-chain actors.

**Mr Phonepaseuth Souvannavong (NAFRI)** is a socio-economist with experience in implementing surveys with farm households and various actors in crop value chains.

**Mr Souny Phomduangsy (NAFRI)** is a farming systems researcher and will be responsible for participatory trials with farmers.

**Mr Phunthasin Khanthavong (NAFRI)** is an agronomist and will be responsible for agronomy and farmer-participatory evaluations.

**Mr Saythong Oudthachit (NAFRI)** is a cassava agronomist with experience in cassava trials. He will be responsible for the implementation and analysis of participatory trials, including variety selection, fertility management, and intercropping systems.

**Dr Ouk Makara (CARDI)** is the Director of CARDI and will have overall responsibility for coordinating project activities in Cambodia. Dr Makara will have an important role in linking the project research outcomes to policy makers within the Cambodian Government.

**Dr Chea Sareth (CARDI)** is the Head of the Socioeconomic Division of CARDI with a PhD in farm management economics from the University of Queensland. He has a long history of collaboration with ACIAR projects and other project members. Dr Sareth will be responsible for the day-to-day management of project activities in Cambodia. He will help design household surveys and oversee their implementation and analysis.

**Ms Lim Sophornthida (CARDI)** is a research assistant in the Socioeconomic Division of CARDI. She will be involved in household surveys and value-chain analyses in Cambodia.

**Mr Tech Ratana (CARDI)** is a trained agronomist with experience in value-chain analyses, including on ACIAR projects. He is a research assistant in the Socioeconomic Division of CARDI. Mr Ratana will be involved in the value-chain analyses of cassava in Cambodia.

**Ms Theang Veasna (CARDI)** is a research assistant in the Socioeconomic Division of CARDI. She has experience in value-chain analyses of the cassava industry for a UNDP-funded project. She also has experience in household surveys. Ms Veasna will work on the value-chain and livelihood analyses in Cambodia.

**Mr Ung Sopheap (CARDI)** is an agronomist with a masters degree from Khon Kaen University. He has participated in cassava research projects in the past and attended several international training events. Mr Sopheap will work on participatory trials and analyses with value-chain actors in Cambodia.

**Mr Chea Vuthy (CARDI)** is an agronomist at CARDI in the cropping system division. Mr Vuthy will be strongly involved in the development and implementation of cassava technology trials in the selected sites in Cambodia.

**Mr Sov Sinen (CARDI)** is a research assistant in the agronomy division of CARDI. Mr Sinen will work as part of the team on participatory trials in Cambodia.

~~**Dr Ye Tint Tun (DAR)** is the Director General of the Department of Agricultural Research. He will be the overall project coordinator in Myanmar. He will assist in understanding the policy linkages and methods of sustaining the project outcomes.~~

~~**Dr U Thant Lwin Oo (DAR)** is a Director at the Department of Agricultural Research. He is responsible for maize and other cereal crops, oil seed crops, food legumes, and industrial crops. He has previously been involved in cassava variety evaluations in the past. Dr U Thant Lwin Oo will have responsibility for project coordination of DAR activities.~~

~~**Dr Maung Maung Tar (DAR)** is a deputy director at DAR and the head of the Industrial Crops Division. He is a plant breeder by training and will oversee agronomic activities in Myanmar and coordination between DAR staff and collaborators in the field sites.~~

~~**Dr Ni Ni Tint (DAR)** will be in charge of the day to day management of agronomic field activities. She is in charge of cassava, jute, and kenaf crops within the Industrial Crop Division.~~

~~**Ms Soe Soe Hmwe (DAR)** is a research assistant in the Industrial Crops Division of DAR. She will assist in the management of agronomic trials.~~

**Prof. Dr. Myo Kywe (YAU)** is the Rector of YAU. He will provide guidance to the project and coordinate between DAR and YAU staff. He will also have a role in linking to policy makers.

~~**Dr Cho Cho San (YAU)** is the Head of the Department of Agricultural Economics. She has experience in Agricultural Production Analysis and Farming Systems Analysis. She will oversee the activities of the Department related to household surveys and value chain analysis. She will also assist in the economic analysis of field results and supervise higher degree students associated with the project.~~

~~**Dr Yu Yu Tun (YAU)** is a Lecturer in the Department of Agricultural Economics with a focus on Production Economics. She will be the main contact in Myanmar for activities related to value chain and livelihood analyses and will be responsible for economic analysis of trial results with value chain actors.~~

---

## 5.4 Intellectual property and other regulatory compliance

No significant intellectual property issues are anticipated.

---

## 5.5 Travel table

### *PART A Commissioned Organisation or IARC*

| Trip no. | Person or position | Estimated date of travel | From / to                       | Purpose  | Duration (days) |
|----------|--------------------|--------------------------|---------------------------------|--|-----------------|
| 1        | Rob Cramb          | Jan 2016                 | Brisbane-Phnom Penh, Vientiane  | Planning meeting   | 15 days         |
| 2        | Dominic Smith      | Jan 2016                 | Brisbane-Phnom Penh, Vientiane  | Planning meeting and VC training                             | 15 days         |
| 3        | Dominic Smith      | May 2016                 | Brisbane-Phnom Penh, Vientiane  | Value chain study review of results                          | 15 days         |
| 4        | Rob Cramb          | May 2016                 | Brisbane-Phnom Penh, Vientiane  | Review of VC study and planning for household survey         | 15 days         |
| 5        | Rob Cramb          | August 2016              | Brisbane-Phnom Penh, Vientiane  | Annual meeting and planning                                  | 15 days         |
| 6        | Dominic Smith      | August 2016              | Brisbane-Phnom Penh, Vientiane  | Annual meeting and planning                                  | 15 days         |
| 7        | Rob Cramb          | Jan 2017                 | Brisbane-Phnom Penh, Vientiane  | Field visit to demonstration sites                           | 15 days         |
| 8        | Dominic Smith      | Jan 2017                 | Brisbane-Phnom Penh, Vientiane  | Discussion with value chain actors                           | 15 days         |
| 9        | Rob Cramb          | August 2017              | Brisbane-Phnom Penh, Vientiane  | Annual meeting and planning                                  | 15 days         |
| 10       | Dominic Smith      | August 2017              | Brisbane-Phnom Penh, Vientiane, | Annual meeting and planning                                  | 15 days         |
| 11       | Rob Cramb          | Jan 2018                 | Brisbane-Phnom Penh, Vientiane  | Field visit to demonstration sites meeting with stakeholders | 15 days         |

| <b>Trip no.</b> | <b>Person or position</b> | <b>Estimated date of travel</b> | <b>From / to</b>               | <b>Purpose</b>   | <b>Duration (days)</b> |
|-----------------|---------------------------|---------------------------------|--------------------------------|--|------------------------|
| 12              | Dominic Smith             | Jan 2018                        | Brisbane-Phnom Penh, Vientiane | Discussion with value chain actors and develop business models           | 15 days                |
| 13              | Rob Cramb                 | August 2018                     | Brisbane-Phnom Penh, Vientiane | Annual meeting   | 15 days                |
| 14              | Dominic Smith             | August 2018                     | Brisbane-Phnom Penh, Vientiane | Annual meeting   | 15 days                |
| 15              | Rob Cramb                 | Jan 2019                        | Brisbane-Phnom Penh, Vientiane | Visit field sites. Discuss outcomes with stakeholders. Economic analysis | 15 days                |
| 16              | Dominic Smith             | Jan 2019                        | Brisbane-Phnom Penh, Vientiane | Visit field sites. Discuss outcomes with stakeholders.                   | 15 days                |
| 17              | Rob Cramb                 | August 2019                     | Brisbane-Phnom Penh, Vientiane | Annual meeting and report writing  | 15 days                |
| 18              | Dominic Smith             | August 2019                     | Brisbane-Phnom Penh, Vientiane | Annual meeting and report writing  | 15 days                |
| 19              | Rob Cramb                 | Dec 2019                        | Brisbane-Hanoi                 | Final policy dialogue for ASEM and AGB (budget in AGB/2012/078)          | 7 days                 |
| 20              | Dominic Smith             | Dec 2019                        | Brisbane-Hanoi                 | Final policy dialogue for ASEM and AGB (budget in AGB/2012/078)          | 7 days                 |

**PC = partner country, A = Australia**

### ***PART B Australian Collaborating Organisation/s***

| <b>Trip no.</b> | <b>Person or position</b> | <b>Estimated date of travel</b> | <b>From / to</b>            | <b>Purpose</b>  | <b>Duration (days)</b> |
|-----------------|---------------------------|---------------------------------|-----------------------------|---|------------------------|
| 1               | Jonathan Newby            | Jan 2016                        | Hanoi-Phnom Penh, Vientiane | Planning meeting  | 15 days                |
| 2               | Agronomist Tin Maung Aye  | Jan 2016                        | Hanoi-Phnom Penh, Vientiane | Planning meeting  | 15 days                |
| 3               | Jonathan Newby            | May 2016                        | Hanoi-Phnom Penh, Vientiane | Value chain study review of results and planning for household survey | 15 days                |
| 4               | Agronomist Tin Maung Aye  | May 2016                        | Hanoi-Phnom Penh, Vientiane | Agronomic training and planning                                       | 15 days                |
| 5               | Jonathan Newby            | August 2016                     | Hanoi-Phnom Penh, Vientiane | Annual meeting and planning   | 15 days                |
| 6               | Agronomist Tin Maung Aye  | August 2016                     | Hanoi-Phnom Penh, Vientiane | Annual meeting and planning for field activities for 2016             | 15 days                |
| 7               | Jonathan Newby            | Jan 2017                        | Hanoi-Phnom Penh, Vientiane | Field visit to demonstration sites                                    | 15 days                |
| 8               | Agronomist Tin Maung Aye  | Jan 2017                        | Hanoi-Phnom Penh, Vientiane | Field visit to demonstration sites and field day                      | 30 days                |



| Trip no. | Person or position       | Estimated date of travel | From / to                   | Purpose  | Duration (days) |
|----------|--------------------------|--------------------------|-----------------------------|--|-----------------|
| 9        | Jonathan Newby           | August 2017              | Hanoi-Phnom Penh, Vientiane | Annual meeting and planning  | 15 days         |
| 10       | Agronomist Tin Maung Aye | August 2017              | Hanoi-Phnom Penh, Vientiane | Annual meeting and planning for 2017 activities                          | 15 days         |
| 11       | Jonathan Newby           | Jan 2018                 | Hanoi-Phnom Penh, Vientiane | Field visit to demonstration sites meeting with stakeholders             | 15 days         |
| 12       | Agronomist Tin Maung Aye | Jan 2018                 | Hanoi-Phnom Penh, Vientiane | Field visit to demonstration sites and field day                         | 30 days         |
| 13       | Jonathan Newby           | August 2018              | Hanoi-Phnom Penh, Vientiane | Annual meeting   | 15 days         |
| 14       | Agronomist Tin Maung Aye | August 2018              | Hanoi-Phnom Penh, Vientiane | Annual meeting   | 15 days         |
| 15       | Jonathan Newby           | Jan 2019                 | Hanoi-Phnom Penh, Vientiane | Visit field sites. Discuss outcomes with stakeholders. Economic analysis | 15 days         |
| 16       | Agronomist Tin Maung Aye | Jan 2019                 | Hanoi-Phnom Penh, Vientiane | Visit field sites. Discuss outcomes with stakeholders.                   | 30 days         |
| 17       | Jonathan Newby           | August 2019              | Hanoi-Phnom Penh, Vientiane | Annual meeting and report writing  | 15 days         |
| 18       | Agronomist Tin Maung Aye | August 2019              | Hanoi-Phnom Penh, Vientiane | Annual meeting and report writing  | 15 days         |

PC = partner country, A = Australia

### **PART C Overseas Partner Organisation/s**

| Trip no. | Person or position | Estimated date of travel | From / to                   | Purpose                                   | Duration (days) |
|----------|--------------------|--------------------------|-----------------------------|---|-----------------|
|          | NAFRI x 2          | August 2016              | Vientiane /Phnom Penh       | Regional meeting 2016 in Phnom Penh       | 5               |
|          | DAR x 1            | August 2016              | Yezin/Phnom Penh            | Regional meeting 2016 in Phnom Penh       | 5               |
|          | YAU x1             | August 2016              | Yezin/Phnom Penh            | Regional meeting 2016 in Phnom Penh       | 5               |
|          | CARDI x 2          | August 2007              | Phnom Penh/Vientiane        | Regional meeting 2017 in Vientiane        | 5               |
|          | DAR x 1            | August 2017              | Yezin/Vientiane             | Regional meeting 2017 in Vientiane        | 5               |
|          | YAU x1             | August 2017              | Yezin/Vientiane             | Regional meeting 2017 in Vientiane        | 5               |
|          | NAFRI x 2          | August 2018              | Vientiane/ Phnom Penh Yezin | Regional meeting 2018 in Yezin Phnom Penh | 5               |
|          | CARDI x 3          | Dec 2019                 | Phnom Penh/Hanoi            | Final policy dialogue for ASEM and AGB    | 5               |
|          | NAFRI x 3          | Dec 2019                 | Vientiane/Hanoi             | Final policy dialogue for ASEM and AGB    | 5               |
|          | DAR x 2            | Dec 2019                 | Yezin/Hanoi                 | Final policy dialogue for ASEM and AGB    | 5               |

|  |           |          |             |  |   |
|--|-----------|----------|-------------|--|---|
|  | Yezin x 4 | Dec-2019 | Yezin/Hanoi | Final policy dialogue for ASEM and AGB | 5 |
|--|-----------|----------|-------------|--|---|

PC = partner country, A = Australia

## 5.6 Literature Consulted

Acemoglu, D., and Robinson, J.A., 2012. *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. New York: Crown Business.

Baird, I., 2009. Land, rubber and people: rapid agrarian changes and responses in Southern Laos. *Journal of Lao Studies* 1: 1-47.

Bird, K., and Hill, H., 2010. Tiny, poor, land-locked, indebted, but growing: lessons for late reforming transition economies from Laos. *Oxford Development Studies* 38: 117-143.

Bloom, D., Canning, D., and Sevilla, J., 2003. *The Demographic Dividend: A New Perspective on the Economic Consequences of Population Change*. Population Matters Monograph. Santa Monica, CA: Rand.

Byerlee, D., 2014. The fall and rise again of plantations in tropical Asia: history repeated? *Land* 3: 574-597; doi:10.3390/land3030574.

Castella, J-C, 2012. Agrarian transition and farming system dynamics in the uplands of South-East Asia. Keynote Paper, 3rd International Conference on Conservation Agriculture in Southeast Asia, Hanoi.

Chea, S., 2014. *Evaluating Cropping System Options for Farmers in the Lowland Rice-Based Systems of Cambodia*. PhD thesis, University of Queensland.

Coxhead, I., Kim, N.B.N., Vu, T.T., Nguyen, T.P.H., 2010. *A Robust Harvest: Strategic Choices for Agricultural and Rural Development in Vietnam*. Hanoi: The Asia Foundation.

Cramb, R.A., 2000. Processes affecting the successful adoption of new technologies by smallholders. In B. Hacker, ed. *Working with Farmers: The Key to the Adoption of Forage Technologies*, pp. 11-22. ACIAR Proceedings No. 95. Canberra: Australian Centre for International Agricultural Research.

Cramb, R.A., 2014. Trajectories of rice-farming households in mainland South-East Asia. In Robins, L. (ed.) *A Policy Dialogue on Rice Futures: Rice-Based Farming Systems Research in the Mekong Region*. Proceedings of a Dialogue held in Phnom Penh, Cambodia, 7-9 May 2014, pp. 15-24. ACIAR Proceedings No. 142. Canberra: Australian Centre for International Agricultural Research.

Cramb, R.A., and Purcell, T., 2001, *How to Monitor and Evaluate Impacts of Participatory Research Projects: A Case Study of the Forages for Smallholders Project*. CIAT Working Document No. 185. Cali: CIAT.

Cramb, R.A., Purcell, T., and Ho, T.C.S., 2004. Participatory assessment of rural livelihoods in the Central Highlands of Vietnam. *Agricultural Systems* 81: 255-272

Cramb, R.A., Colfer, C.J.P., Dressler, W., Laungaramsri, P., Quang, T.L., Mulyoutami, E., Peluso, N.L., and Wadley, R.L., 2009. Swidden transformations and rural livelihoods in Southeast Asia. *Human Ecology* 37:323-346.

Cramb, R.A., and Curry, G.N., 2013. Oil palm and rural livelihoods in the Asia-Pacific region: an overview. *Asia Pacific Viewpoint* 53: 223-239.

Dalton, T.J., Lilja, N.K., Johnson, N., and Howeler, R., 2011. Farmer participatory research and soil conservation in Southeast Asian cassava systems. *World Development* 39: 2176-2186.

Dao, T.A., 2010. The rice-based cropping systems in Vietnam. In B.B. Bong, N.V. Bo, and B.C. Buu (eds.), *Vietnam: Fifty Years of Rice Research and Development*, pp.317-330. Ministry of Agriculture and Rural Development, Vietnam.

Dao, T.T., and Molle, F., 2000. The Chao Phraya delta in perspective: a comparison with the Red River and Mekong deltas, Vietnam. In *The Chao Phraya Delta: Historical Development, Dynamics and Challenges of Thailand's Rice Bowl*. Bangkok: Kasetsart University.

Davis, B., Winters, P., Carletto, G., Covarrubias, K., Quinones, E., Zezza, A., Stamoulis, K., Bonomi, G., and DiGiuseppe, S., 2007. *Rural Income Generating Activities: A Cross Country Comparison*. Background Paper for the World Development Report 2008.

De Koninck, R., and Rousseau, J-F, 2012. *Gambling with the Land: The Contemporary Evolution of Southeast Asian Agriculture*. Singapore: NUS Press.

Delforge, I., 2007. *Contract Farming in Thailand: A View from the Farm*. Occasional Paper 2, Focus on the Global South. Bangkok: CUSRI, Chulalongkorn University.

DFAT, 2014a. *Australian Aid: Promoting Prosperity, Reducing Poverty, Enhancing Stability*. Canberra: Commonwealth of Australia.

DFAT, 2014b. *Making Performance Count: Enhancing the Accountability and Effectiveness of Australian Aid*. Canberra: Commonwealth of Australia.

Dixon, J., 2000. A farming systems contribution to agricultural policy analysis. In *A History of Farming Systems Research*. Collinson, M. (ed.). CAB International, Wallington, UK, pp. 152-160.

Douthwaite, B., Kuby, T., van de Fliert, E., and Schulz, S. (2003). Impact pathway evaluation: an approach for achieving and attributing impact in complex systems *Agricultural Systems* 78: 243–265.

Eliste, P., and Santos, N., 2012. *Lao People's Democratic Republic Rice Policy Study 2012*. Rome: FAO.

Ellis, F., 2000. *Rural Livelihoods and Diversity in Developing Countries*. Oxford: Oxford University Press.

Fforde, A., 2010. Responses to the 'policy science' problem: reflections on the politics of development. *Development in Practice* 20: 188-204.

Gaiha, R., and Thapa, G., 2007. *Supermarkets, Smallholders and Livelihood Prospects in Selected Asian Countries*. Knowledge for Development Effectiveness Occasional Paper No. 4. Rome: International Fund for Agricultural Development.

Glassman J. 2010. The GMS and Thailand's 'spatial fix'. Paper presented at Research Centre for Sustainable Development (RCSD) Conference, Chiang Mai University, 14-15 May 2010. At <<http://rcsd.soc.cmu.ac.th/InterConf/paper/paper23.pdf>>, accessed 2 October 2014.

Gorton, M., Sauer, J., and Supatpongkul, P., 2009. Investigating Thai shopping behaviour: wet-markets, supermarkets and the 'Big Middle'. Contributed paper, International Association of Agricultural Economists Conference, Beijing, China, August 16-22, 2009.

Grosso, P., Tanner, C., and Merlet, M., 1999. *Guidelines for Agrarian Systems Diagnosis*. Rural Development Division. Rome: FAO.

Hazell, P., Poulton, C., Wiggins, S., and Dorward, A., 2007. *The Future of Small Farms for Poverty Reduction and Growth*. 2020 Discussion Paper 42. Washington DC: International Food Policy Research Institute.

Hausmann, R., Rodrik, D., and Velasco, A., 2006. Getting the diagnosis right: a new approach to economic reform. *Finance and Development* 43:1.

Howeler, R. H., 2014. *Sustainable Soil and Crop Management of Cassava in Asia*. Cali: CIAT.

Howeler, R.H., and T.M. Aye, 2014. *Sustainable Management of Cassava in Asia: From Research to Practice*. Cali: CIAT.

Johnston, R., Hoanh, Chu Thai, Lacombe, G., Noble, A., Smakhtin, V., Suhardiman, D., Kam, Suan Pheng, Choo, Poh Sze. 2009. *Scoping Study on Natural Resources and Climate Change in Southeast Asia with a Focus on Agriculture*. Report prepared for the Swedish International Development Cooperation Agency by International Water Management Institute, Southeast Asia (IWMI-SEA). Vientiane, Laos: International Water Management Institute, South East Asia.

Lefroy, R.D.B., 2014. *Non-rice Crops in Rice-based Farming Systems in Mainland Southeast Asia*. Trajectories of Rice-Based Farming Systems in Mainland Southeast Asia, Working Paper No. 4. St Lucia: University of Queensland.

Lipton, M., 2010. From policy aims and small-farm characteristics to farm science needs. *World Development* 38: 1399-1412.

Manivong, V., 2014. *Agrarian Transition in Lowland Southern Laos: Implications for Rural Livelihoods*. PhD thesis, University of Queensland.

Manivong, V., and Cramb, R.A., 2008. Economics of smallholder rubber expansion in Northern Laos. *Agroforestry Systems* 74:113-125.

Manivong, V., Cramb, R.A., and Newby, J.C., 2014a. Rice and remittances: crop intensification versus labour migration in southern Laos. *Human Ecology* 42: 367-379.

Manivong, V., Newby, J.C., and Cramb, R.A., 2014b. Subsistence-oriented rice farming in the rainfed lowlands of central and southern Laos – a policy dilemma. In Robins, L. (ed.) *A Policy Dialogue on Rice Futures: Rice-based Farming Systems Research in the Mekong Region*. Proceedings of a Dialogue held in Phnom Penh, Cambodia, 7-9 May 2014, pp. 128-135. ACIAR Proceedings No. 142. Canberra: Australian Centre for International Agricultural Research.

Manorom, K., and Hall, D., 2005. *Thirty Cases of Contract Farming: An Analytical Overview*. Making Markets Work Better for the Poor (M4P) Program. Manila: Asian Development Bank.

Manoram, K., Hall, D., Lu, X., Katima, S., Medialdia, M.T., Siharath, S., and Srisuphan, P., 2011. *Cross-Border Contract Farming Arrangements: Variations and Implications in the Lao People's Democratic Republic*. Greater Mekong Sub-Region – Phnom Penh Plan for Development Management Research Report Series 1:2. Manila: Asian Development Bank.

Mertz, O., Padoch, C., Fox, J., Cramb, R.A., Leisz, S.J., Nguyen, T.L., Tran, D.V., 2009. Swidden change in Southeast Asia: understanding causes and consequences. *Human Ecology* 37: 259-264.

MSU and MDRI, 2013. *Strategic Choices for the Future of Agriculture in Myanmar*. A summary paper prepared for USAID-Myanmar by Michigan State University and the Myanmar Development Resource Institute, July 2013.

Newby, J.C., Cramb, R.A., Sakanphet, S., and McNamara, S., 2012. Smallholder teak and agrarian change in northern Laos. *Small-Scale Forestry* 11: 27-46.

Newby, J.C., Cramb, R.A., and Sakanphet, S., 2014. Forest transitions and rural livelihoods: multiple pathways of smallholder teak expansion in Northern Laos. *Land* 3: 482-503.

Parsa, S., Kondo, T., and Winotai, A., 2012. The Cassava Mealybug (*Phenacoccus manihoti*) in Asia: first records, potential distribution, and an identification key. *PLoS ONE* 7(10): e47675. doi:10.1371/journal.pone.0047675

Pingali, P., 2004. Agricultural diversification in Asia: opportunities and constraints. *Proceedings of the FAO Rice Conference 2004*, pp. 41-46. Rome: FAO.

Reardon, T., 2014. The emerging quiet revolution in agrifood value chains and livelihoods in Myanmar. Keynote Speech, Livelihoods and Food Security Annual Forum, Naypyitaw, 25 November 2014.

Rigg, J., 2012. *Unplanned Development: Tracking Change in South-East Asia*. London: Zed Books.

Rigg, J., and Vandergeest, P. (eds.), 2012. *Revisiting Rural Places: Pathways to Poverty and Prosperity in Southeast Asia*. Singapore: NUS Press.

Sackloham, S., and Baudran, E., 2005. Using agrarian systems analysis to understand agriculture. In *Improving Livelihoods in the Uplands of Lao PDR*. Vientiane: NAFRI, NAFES, and NUOL, pp. 218-225.

Scoones, I., 2009. Livelihoods perspectives and rural development. *Journal of Peasant Studies* 36: 171-196.

Sirisuo, S., and Kammeier, H.D., 2000. Government policy and farmers' decision making: the agricultural diversification programme for the Chao Phraya river basin (1993-1995) revisited. In *The Chao Phraya Delta: Historical Development, Dynamics and Challenges of Thailand's Rice Bowl*. Bangkok: Kasetsart University.

Sokbunthoeun So, 2010. *Land Rights in Cambodia: An Unfinished Reform*. AsiaPacific Issues No. 97. Honolulu: East-West Center.

Springer-Heinze, A., Hartwich, F., Henderson, J.S., Horton, D., and Minde, I. (2003). Impact pathway analysis: an approach to strengthening the impact orientation of agricultural research *Agricultural Systems* 78: 267-285.

Than, M., 2000. Changing faces of the Ayeyarwady (Irrawaddy) Delta (1850-2000). In *The Chao Phraya Delta: Historical development, Dynamics and Challenges of Thailand's Rice Bowl*. Bangkok: Kasetsart University.

Tomich, T., Kilby, P., and Johnston, B.F., 1995. *Transforming Agrarian Economies: Opportunities Seized, Opportunities Missed*. Ithaca and London: Cornell University Press.

Trébuil, G., Ekasingh, B., and Ekasingh, M., 2006. Agricultural commercialisation, diversification, and conservation of renewable resources in Northern Thailand Highlands. *Moussons* 9-10: 131-155.

World Bank, 2007. *Agriculture for Development: World Development Report, 2008*. Washington DC: The World Bank.

Wright, S., 2009. *Agriculture in Transition: The Impact of Agricultural Commercialisation on Livelihoods and Food Access in the Lao PDR*. Vientiane: UN World Food Programme Laos (draft report).

Zola, A., 2008. *A Preliminary Assessment of Contract Farming Arrangements and Plantations in the Agriculture and Natural Resources Sector of Southern Lao PDR*. Vientiane: Asian Development Bank.

## 6 Appendix A: Intellectual property register

Inquiries concerning completion of this form should be directed to <[contracts@aci-ar.gov.au](mailto:contracts@aci-ar.gov.au)>.

### 6.1 Administrative details

|  |   |
|--|---|
| <b>Project ID</b>                                      | ASEM/2014/053   |
| <b>Project title</b>                                   | Developing cassava production and marketing systems to enhance smallholder livelihoods in Cambodia and Laos and Myanmar |
| <b>Assessment provider</b>                             | Robert Cramb  |
| <b>If not Australian project leader, provide title</b> |   |
| <b>Date of assessment</b>                              | 11 June 2015  |

### 6.2 Categories of intellectual property and brief description

#### *Plant or animal germplasm exchange*

| <b>Does the project involve:</b>   | <b>Yes</b> | <b>No</b> |
|--|------------|-----------|
| provision of germplasm by Australia to a partner country?                                    |            | No        |
| provision of germplasm from a partner country to Australia?                                  |            | No        |
| provision of germplasm from or to an IARC or another organisation and a project participant? |            | No        |
| use of germplasm from a third party  |            | No        |
| material subject to plant breeders/variety rights in Australia or another country?           |            | No        |

If "yes" to any of the above, for each applicable country provide brief details of the material to be exchanged:

If the germplasm exchange can be finalised before the project commencement, provide a Materials Transfer Agreement.

If the specific germplasm to be exchanged cannot be identified until after project commencement, indicate the type of material likely to be exchanged.

| <b>Country</b> | <b>Details of plant or animal germplasm exchange</b> |
|----------------|--|
|                |  |
|                |  |

#### *Proprietary materials, techniques and information*

| <b>Does the project involve provision (from one party to another) of:</b>    | <b>Yes</b> | <b>No</b> |
|--|------------|-----------|
| research materials or reagents (e.g. enzymes, molecular markers, promoters)? |            | No        |
| proprietary techniques or procedures?  |            | No        |
| proprietary computer software?   |            | No        |

If "yes" to any of the above, for each applicable country provide:

brief details of the materials or information, the organisation providing, and the organisation receiving the materials

a copy of any formal contract between the parties.

| <b>Country</b> | <b>Details of proprietary materials, techniques and information</b> |
|----------------|---|
|                |   |
|                |   |

|  |  |
|--|--|
|  |  |
|--|--|

### Other agreements

| Is any aspect of the project work subject to, or dependent upon:             | Yes | No |
|--|-----|----|
| other materials-transfer agreements entered into by any project participant? |     | No |
| confidentiality agreements entered into by any project participant?          |     | No |

If "yes" to any of the above, for each applicable country provide:  
 brief details of the agreements and conditions  
 a copy of any such agreement before project commencement.

| Country | Details of other agreements |
|---------|-----------------------------|
|         |                             |
|         |                             |

## 6.3 Foreground, background and third party Intellectual Property

This includes, but is not limited to patents held or applied for in Australia and/or in partner countries and/or in third countries. For example, Foreground IP includes any new germplasm, reagents (such as vectors, probes, antibodies, vaccines) or software that will be developed by the project.

### Foreground IP (IP that is expected to be developed during the project)

Ownership of or rights to Foreground IP other than as detailed in the ACIAR Standard Conditions must be approved by ACIAR.

|  | Yes | No |
|--|-----|----|
| Is it expected that there will be Foreground IP? |     | No |

If "yes",

for each applicable country provide brief details of the IP and who will have rights to use the IP (e.g. Commissioned Organisation, Australian collaborating organisation/s partner countries).

If a patent, give details of patent status (provisional, application, granted), priority date and designated countries.

| Country | Details of foreground IP |
|---------|--------------------------|
|         |                          |
|         |                          |

### Background IP (IP that is necessary for the success of the project but that has already been created and is owned by parties to the project)

Any agreements in place regarding Background IP should be provided to ACIAR prior to project commencement.

|  | Yes | No |
|--|-----|----|
| Is it there Background IP?   |     | No |
| If "yes", are there any restrictions on the project's ability to use the Background IP?  |     |    |
| would there be any restriction on ACIAR or the overseas collaborator claiming their rights to IP for the project based on the Background IP (refer ACIAR Standard Conditions)? |     |    |

If "yes", for each applicable country provide brief details of:

the source of the Background IP.

whether the Commissioned Organisation and/or Australian collaborators and/or developing country collaborators own it.

any conditions or restrictions on its use.

| country | Details of background IP |
|---------|--------------------------|
|         |                          |
|         |                          |

### ***Third Party IP (IP that is owned by or licensed from other parties)***

Agreements governing the use of third party IP can be related to research materials, research equipment or machinery, techniques or processes, software, information and databases.

|  | Yes | No |
|--|-----|----|
| Is there any relevant Third Party IP that is essential to the project?   |     | No |
| If "yes", would there be any restriction on ACIAR claiming its rights to IP for the project (refer ACIAR Standard Conditions)? |     |    |

If "yes", for each applicable country provide brief details of:

the source of the Third Party IP.

the applicable country/ies, the circumstances/agreement/arrangement under which the IP is to be obtained or used by the project partners (for example, material transfer agreement, germplasm acquisition agreement, confidentiality agreement, research agreement or other arrangements).

any conditions or restrictions on its use.

| Country | Details of third party IP |
|---------|---------------------------|
|         |                           |
|         |                           |

### ***Other contracts, licences or legal arrangements***

|   | Yes | No |
|---|-----|----|
| Are there any other contracts, licences or other legal arrangements that relate to the project? |     | No |

If "yes", for each applicable country provide brief details.

| Country | Details of other contracts, licences or legal arrangements |
|---------|--|
|         |  |
|         |  |



---

## 7 Appendix B: Budget

---

## **8 Appendix C: Supporting documentation**

Documents attached:

Letters of support

Letters of approval

Curricula vitae

## 9 Appendix D: Communication and dissemination checklist

This section is only required for FULL PROPOSALS.

|   |  |
|---|--|
| <p>How would you define impact within the context of the project?<br/>(e.g. farmers in project field trials adopt new variety)</p>                |  |
| <p>Who are the main target groups/intended users for this research?</p>   | <input checked="" type="checkbox"/> Farmers<br><input checked="" type="checkbox"/> Extension workers<br><input checked="" type="checkbox"/> Policy makers<br><input type="checkbox"/> Scientists<br><input checked="" type="checkbox"/> Commercial sector<br><input type="checkbox"/> Non-government organisations<br><input type="checkbox"/> Funding providers<br><input type="checkbox"/> Other   |
| <p>What types of outputs do you anticipate the project generating?</p>  | <input type="checkbox"/> New crop varieties<br><input type="checkbox"/> New management techniques (husbandry, tillage, planting cycles etc)<br><input type="checkbox"/> New tools (direct drill ploughing, computer models etc)<br><input checked="" type="checkbox"/> New coordination/management practices for accessing markets or value chains<br><input checked="" type="checkbox"/> Publication(s) (within the ACIAR scientific publications series)<br><input checked="" type="checkbox"/> Other media (posters, brochures, DVDs, CDs etc)<br><input checked="" type="checkbox"/> Case studies<br><input checked="" type="checkbox"/> Demonstration plots, on-farm participatory trials etc |
| <p>What is the incentive or incentives for the main target groups in adopting this research?</p>  | <p>Strong market demand for cassava outputs<br/>           Increased competition for feedstock<br/>           Private sectors operating below capacity and interested to increase linkages to smallholders</p>   |
| <p>What is the anticipated time within the project until first outputs are at a point where you would want to disseminate these to end users?</p> | <input type="checkbox"/> Immediately<br><input type="checkbox"/> During year 1<br><input checked="" type="checkbox"/> During year 2<br><input type="checkbox"/> During year 3<br><input type="checkbox"/> During year 4<br><input type="checkbox"/> Post project   |
| <p>What way do you think is best to raise awareness of outputs with end users?</p>  | <input checked="" type="checkbox"/> Publication<br><input type="checkbox"/> Mainstream/local media<br><input checked="" type="checkbox"/> Workshop<br><input type="checkbox"/> Training courses<br><input type="checkbox"/> Social media (Facebook, Twitter)<br><input type="checkbox"/> Mobile phone (text messaging, mobile application)<br><input type="checkbox"/> Field days<br><input type="checkbox"/> Field trials<br><input checked="" type="checkbox"/> Demonstration plots<br><input type="checkbox"/> Farmer visits<br><input type="checkbox"/> Media engagement   |
| <p>What communication products would be useful for this project (ensure these are budgeted for)?</p>  | <input checked="" type="checkbox"/> Brochures<br><input type="checkbox"/> Posters<br><input checked="" type="checkbox"/> Website<br><input type="checkbox"/> DVDs  |

|  |   |                             |
|--|---|-----------------------------|
|  | <input type="checkbox"/> CD-ROM<br><input type="checkbox"/> Hard copy publications<br><input checked="" type="checkbox"/> Events  |                             |
| Who are the major target groups and what mechanisms are available for disseminating project information to these groups?                             | List Target groups  | List appropriate mechanisms |
|  |   |                             |
| Indicate if this dissemination is a project responsibility and if so at what stage?  | <input type="checkbox"/> Yes<br><input type="checkbox"/> Pilot stage<br><input type="checkbox"/> Field trials/demonstrations<br><input type="checkbox"/> Full scale out<br><input type="checkbox"/> No  |                             |
| Is there an existing network, association, organisation etc in place to communicate with end users?  | <input type="checkbox"/> Yes<br><input type="checkbox"/> Village-based<br><input type="checkbox"/> Farmer associations<br><input type="checkbox"/> Extension services<br><input type="checkbox"/> Government research organisations<br><input type="checkbox"/> University/academic<br><input type="checkbox"/> Commercial sector<br><input type="checkbox"/> Non-government organisations<br><input type="checkbox"/> No |                             |
| Can this network be utilised by the project team for delivering outputs/information?   | <input type="checkbox"/> Yes<br><input type="checkbox"/> No   |                             |
| Does this network, association, organisation etc have a track record in delivering outputs/information?  | <input type="checkbox"/> Yes<br><input type="checkbox"/> No<br>If no what could improve the chances of this network delivering research outputs/information?  |                             |
| Would an on-the-ground communications person (such as an Australian Youth Ambassador for Development) help in disseminating information and outputs? | <input type="checkbox"/> Yes<br><input type="checkbox"/> No   |                             |
| Would engagement with a third party organisation, such as an NGO, help in delivering output information to end users?                                | <input type="checkbox"/> Yes<br><input type="checkbox"/> Within the project<br><input type="checkbox"/> Scale up beyond the project<br><input type="checkbox"/> No  |                             |
| If such engagement would help to disseminate information are there suitable organisations operating in this area?                                    | <input type="checkbox"/> Yes<br>List:   |                             |
| How would you gauge efficacy of communications activities?   | For example:<br># of workshop attendees<br>Level of media coverage (i.e. ten articles in local paper)<br>Website visits<br>Brochures/posters etc distributed to villages  |                             |

Should you wish to discuss aspects of the project's communications strategy with ACIAR, please contact the Communications Unit for advice and assistance <[aciar@aciar.gov.au](mailto:aciar@aciar.gov.au)>.

APPENDIX E

Cassava production in Lao PDR (2013)

| <b>Province</b>                 | <b>Area (ha)</b>     | <b>Production (t)</b> | <b>Yield (t/ha)</b> |
|---------------------------------|----------------------|-----------------------|---------------------|
| Attapeu                         | 620                  | 18,390                | 29.7                |
| Bokeo                           | 110                  | 770                   | 7.0                 |
| <b><i>Bolikhamxai</i></b>       | <b><i>9,615</i></b>  | <b><i>298,650</i></b> | <b><i>31.1</i></b>  |
| Champasak                       | 685                  | 47,950                | 70.0 <sup>1</sup>   |
| Huaphan                         | 1,780                | 26,475                | 14.9                |
| Khamoune                        | 1,870                | 66,290                | 35.4                |
| Luangnamtha                     | 1,320                | 33,165                | 25.1                |
| Luangprabang                    | 2,950                | 41,480                | 14.1                |
| Oudomxay                        | 295                  | 3,915                 | 13.3                |
| Phongsaly                       | 665                  | 4,840                 | 7.3                 |
| Saravane                        | 1,035                | 15,200                | 14.7                |
| Savannakhet                     | 2,785                | 31,290                | 11.2                |
| Sekong                          | 415                  | 7,875                 | 19.0                |
| Vientiane                       | 3,410                | 74,440                | 21.8                |
| <b><i>Vientiane Capital</i></b> | <b><i>10,610</i></b> | <b><i>407,570</i></b> | <b><i>38.4</i></b>  |
| <b><i>Xayabuly</i></b>          | <b><i>4,305</i></b>  | <b><i>145,018</i></b> | <b><i>33.7</i></b>  |
| Xiengkhuang                     | 2,715                | 30,875                | 11.4                |
| <b>Total</b>                    | <b>45,185</b>        | <b>1,254,193</b>      | <b>27.8</b>         |

<sup>1</sup> Error expected in official data

### Cambodia cassava production (2012-13)

| Province          | 2012-13<br>Planted<br>Area | 2012-13<br>Harvested<br>Area | 2012-13<br>Production | 2012-13<br>Yield | 2013-14<br>Planted<br>Area | 2013-14<br>Harvested<br>Area | 2013-14<br>Production | 2013-14<br>Yield | Change in<br>area | Change in<br>production |
|-------------------|----------------------------|------------------------------|-----------------------|------------------|----------------------------|------------------------------|-----------------------|------------------|-------------------|-------------------------|
| Banteay Mean Chey | 46,951                     | 44,979                       | 911,994               | 19.4             | 55,666                     | 48,264                       | 953,125               | 17.1             | 18.6%             | 4.5%                    |
| Battambang        | 57,064                     | 56,413                       | 2,003,801             | 35.1             | 61,695                     | 47,157                       | 1,699,123             | 27.5             | 8.1%              | -15.2%                  |
| Kampong Cham      | 67,427                     | 45,996                       | 970,558               | 14.4             | 67,625                     | 67,446                       | 1,327,847             | 19.6             | 0.3%              | 36.8%                   |
| Kampong Chhnang   | 1,854                      | 1,854                        | 13,080                | 7.1              | 1,737                      | 1,737                        | 10,116                | 5.8              | -6.3%             | -22.7%                  |
| Kampong Speu      | 7,171                      | 7,171                        | 107,482               | 15.0             | 3,402                      | 3,402                        | 101,765               | 29.9             | -52.6%            | -5.3%                   |
| Kampong Thom      | 29,270                     | 29,270                       | 420,883               | 14.4             | 36,725                     | 36,600                       | 530,379               | 14.4             | 25.5%             | 26.0%                   |
| Kampot            | 1,453                      | 1,453                        | 19,809                | 13.6             | 816                        | 816                          | 1,839                 | 2.3              | -43.8%            | -90.7%                  |
| Kandal            | 57                         | 57                           | 372                   | 6.5              | 27                         | 27                           | 216                   | 8.0              | -52.6%            | -41.9%                  |
| Koh Kong          | 317                        | 317                          | 6,397                 | 20.2             | 334                        | 334                          | 6,956                 | 20.8             | 5.4%              | 8.7%                    |
| Kratie            | 33,136                     | 33,136                       | 737,625               | 22.3             | 46,810                     | 46,810                       | 1,042,378             | 22.3             | 41.3%             | 41.3%                   |
| Mondulkiri        | 9,391                      | 9,391                        | 145,240               | 15.5             | 10,271                     | 10,271                       | 157,505               | 15.3             | 9.4%              | 8.4%                    |
| Phnom Penh City   | 57                         | 57                           | 510                   | 8.9              | 72                         | 72                           | 535                   | 7.4              | 26.3%             | 4.9%                    |
| Preah Vihear      | 10,135                     | 10,135                       | 121,620               | 12.0             | 12,650                     | 12,650                       | 139,150               | 11.0             | 24.8%             | 14.4%                   |
| Prey Veng         | 3,977                      | 3,977                        | 44,809                | 11.3             | 1,969                      | 1,969                        | 35,442                | 18.0             | -50.5%            | -20.9%                  |

|                             |                |                |                  |             |                |                |                  |             |              |             |
|-----------------------------|----------------|----------------|------------------|-------------|----------------|----------------|------------------|-------------|--------------|-------------|
| <b>Pursat</b>               | 2,795          | 2,795          | 49,363           | 17.7        | 6,583          | 6,583          | 181,357          | 27.5        | 135.5%       | 267.4%      |
| <b>Rotanakiri</b>           | 14,577         | 14,577         | 322,005          | 22.1        | 13,590         | 13,356         | 273,794          | 20.1        | -6.8%        | -15.0%      |
| <b>Siem Reap</b>            | 10,265         | 10,265         | 154,929          | 15.1        | 11,510         | 10,515         | 158,763          | 13.8        | 12.1%        | 2.5%        |
| <b>Krong Preah Sihanouk</b> | 560            | 560            | 8,400            | 15.0        | 470            | 470            | 6,110            | 13.0        | -16.1%       | -27.3%      |
| <b>Stueng Treng</b>         | 16,840         | 16,840         | 303,120          | 18.0        | 19,622         | 2,910          | 58,200           | 3.0         | 16.5%        | -80.8%      |
| <b>Svay Rieng</b>           | 12,766         | 12,766         | 239,840          | 18.8        | 17,597         | 17,352         | 273,129          | 15.5        | 37.8%        | 13.9%       |
| <b>Takeo</b>                | 937            | 937            | 8,433            | 9.0         | 1,331          | 1,331          | 11,979           | 9.0         | 42.0%        | 42.0%       |
| <b>Otdar Mean Chey</b>      | 14,470         | 14,470         | 315,340          | 21.8        | 25,125         | 22,850         | 528,631          | 21.0        | 73.6%        | 67.6%       |
| <b>Krong Kep</b>            | 224            | 224            | 2,487            | 11.1        | 100            | 100            | 1,468            | 14.7        | -55.4%       | -41.0%      |
| <b>Krong Pailin</b>         | 20,160         | 20,160         | 705,600          | 35.0        | 25,648         | 24,217         | 433,575          | 16.9        | 27.2%        | -38.6%      |
| <b>TOTAL</b>                | <b>361,854</b> | <b>337,800</b> | <b>7,613,697</b> | <b>21.0</b> | <b>421,375</b> | <b>377,239</b> | <b>7,933,382</b> | <b>18.8</b> | <b>16.4%</b> | <b>4.2%</b> |

Cassava production in Myanmar—2010–11

| State/Division | Sown Area (ha) | Yield (t/ha) | Production (t) |
|----------------|----------------|--------------|----------------|
| Ayerawady      | 14,547         | 16.7         | 242,298        |
| Bago           | 1,039          | 32.6         | 9,599          |
| Chin           | 107            | 4.4          | 474            |
| Kachin         | 22,022         | 13.1         | 289,099        |
| Kayah          | -              | 0.0          | -              |
| Kayin          | 490            | 7.3          | 3,598          |
| Magway         | -              | 0.0          | -              |
| Mandalay       | 0              | 4.8          | 2              |
| Mon            | 336            | 15.2         | 5,111          |
| Rakhine        | 278            | 6.7          | 1,862          |
| Sagaing        | 1,953          | 7.1          | 13,831         |
| Shan           | 1,482          | 20.1         | 17,540         |
| Taninthayi     | 686            | 12.7         | 8,683          |
| Yangon         | 823            | 19.8         | 16,273         |
| <b>Total</b>   | <b>43,764</b>  | <b>11.5</b>  | <b>608,371</b> |



**Cassava production in Ayeyarwaddy in 2012-2013**

|          | District /Township         | Sown/Harvested area<br>(ha) | Root Yield<br>(ton/ha) | Production<br>(ton) |
|----------|----------------------------|-----------------------------|------------------------|---------------------|
| <b>1</b> | <b>Patheingyi District</b> | <b>7669</b>                 | <b>14.10</b>           | <b>108154</b>       |
|          | Patheingyi                 | 54                          | 14.00                  | 756                 |
|          | Kangyidaunt                | 24                          | 13.50                  | 324                 |
|          | Tharapaung                 | 468                         | 13.75                  | 6435                |
|          | Ngaputaw                   | 348                         | 13.00                  | 4524                |
|          | Kyongpyaw                  | 6514                        | 14.20                  | 92497               |
|          | Yegyi                      | 213                         | 14.00                  | 2982                |
|          | Kyaunggon                  | 48                          | 13.25                  | 636                 |
| <b>2</b> | <b>Hinthada District</b>   | <b>4136</b>                 | <b>14.18</b>           | <b>58648</b>        |
|          | Hinthada                   | 1521                        | 14.12                  | 21811               |
|          | Lemyethna                  | 2389                        | 14.09                  | 33661               |
|          | Myanaung                   | 12                          | 14.29                  | 171                 |
|          | Kyangin                    | 1                           | 13.00                  | 13                  |
|          | Ingapu                     | 213                         | 14.05                  | 2992                |
| <b>3</b> | <b>Myaungmya District</b>  | <b>2484</b>                 | <b>14.02</b>           | <b>34825</b>        |
|          | Myaungmya                  | 2484                        | 14.02                  | 34825               |
| <b>4</b> | <b>Labutta District</b>    | <b>484</b>                  | <b>13.50</b>           | <b>6534</b>         |
|          | Labutta                    | 484                         | 13.50                  | 6534                |
| <b>5</b> | <b>Maubin District</b>     | <b>6</b>                    | <b>12.50</b>           | <b>75</b>           |
|          | Maubin                     | 6                           | 12.50                  | 75                  |
|          | <b>Total</b>               | <b>14779</b>                | <b>14.09</b>           | <b>208236</b>       |