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project

Plausible futures for economic development and structural adjustment – impacts and policy implications for Indonesia and Australia

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1 Acknowledgments

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Finally, we would like to thank our project manager, Simon Hearn for his continued support and advice.

2 Executive summary

The overall aims of the project are to improve the capacity of Indonesian policymakers and processes to review the role of agriculture in rural development and the overall economy and to design policies that can impact positively upon incomes, poverty and hunger in the longer-term. The project provides an enhanced set of knowledge and decision support tools that can help Indonesian policymakers to look to future challenges posed by global environmental and economic change and to identify and examine areas in need of alternative policy options (e.g. in relation to adjustment). These aims will bring out broader implications for the rest of the Asia-Pacific region to show how other large economies, like Australia, might best be able to adjust to policy changes in Indonesia under alternative growth scenarios.

Project objectives include: O.1.Review qualitatively, Indonesian agricultural-related policies and relevant data within the broader technology, economic and physical environment; O.2. Identify Indonesian agricultural-related policy areas requiring further assistance and reform, including the institutions themselves, technologies to overcome productivity constraints to agricultural growth and effects of global climate change, and policy reactions in the rest of the world to climate change; O.3. Develop required policy analysis tools that can provide the appropriate forward-looking analysis that is needed to design appropriate policy options to meet the challenges of global economic and environmental change; O.4. Analyse the priority areas and provide policy options, within a plausible futures framework that links key models of economic and natural processes, and that can deliver long-term and economy-wide benefits for both Indonesia and Australia; O.5. Disseminate the outcomes and adoption of recommendations of the research through publications and presentations to policymakers; and O.6. Provide hands-on training in strategic agricultural-related policy analysis, so as to familiarise the final end-users in Indonesia on how best to exploit the available knowledge and decision-support tools and resources made available through this project.

The project involved researchers from both the Agriculture and Trade Ministries in Indonesia as well as the key Agricultural University (IPB Bogor). Key conclusions include that while the project has been able to meet some of the demand for strengthening policy analysis capacity in Indonesia; a large scope for further policy analysis remains in the country. Key demands for policy analysis met included some headway on climate change analysis and trade policy analysis. The main modelling tools for which training was desired and implemented include partial equilibrium agriculture sector models and general equilibrium trade models. Several papers were co-developed among various research teams in the project using these two sets of models and focusing on either climate change, trade in agricultural commodities, particularly livestock, and general agricultural productivity themes. Research and training demands differed somewhat among the Indonesian partners. The Ministry of Agriculture was more interested in climate change and productivity growth, while the Ministry of Trade, understandably, was interested in trade assessments. Prior to the project neither TREDA nor ICASEPS were using PE or CGE models in-house. ICASEPS had been using CGE models and PE models previously, but the earlier capacity had been lost due to staff transfers and projects ending. As a result, the training and model updating and applications did take a significant amount of time, particularly for the Indonesian collaborators. At the same time, it was felt essential for TREDA and ICASEPS do have this capacity in-house to serve their respective ministries. Within the various topics, the project also maneuvered between different ideological interests, particularly regarding agricultural trade between Australia and Indonesia, with the Ministry of Agriculture favouring a self-sufficiency stance and the Ministry of Trade being more open to trade. Here, the project provided key insights on the Australia-Indonesia livestock trade and supported the ongoing debate, not only through research products but also evidence-based op-eds and blogs in Indonesian news outlets. Future areas of support could include assessment of agricultural mitigation, further trade policy analysis, with both more regional integration and sub-national disaggregation of

livestock sector issues, including the role of palm oil, and more work on the non-price impacts of food self-sufficiency versus trade.

3 Background

Indonesian capacity to produce food is declining and becoming more volatile. Without appropriate policies on issues such as agricultural technologies, climate change, energy and globalization, this situation is likely to intensify given plausible future changes in the global socio-economic and natural environment. There is a need for a review of Indonesian agricultural-related policies to identify areas that require, and can benefit from, assistance in the form of quality policy analysis focused on maintaining sustainable economic growth in the face of growing global economic and environmental pressures. There has been a demand at the highest levels of the Indonesian Government for assistance in this area. The above pressures also affect Australia and the rest of the Asia-Pacific region. As such it will be beneficial to the agricultural economy of Indonesia to be aware of possible impacts of plausible futures and have policies in place that can facilitate adjustment processes and assist economic development.

The overall aims of the project were to improve the capacity of Indonesian policymakers and processes to review the role of agriculture in rural development and the overall economy and to design policies that can impact positively upon incomes, poverty and hunger in the longer-term. The project provided an enhanced set of knowledge and decision support tools that can help Indonesian policymakers to look to future challenges posed by global environmental and economic change and to identify and examine areas in need of alternative policy options (e.g. in relation to adjustment).

4 Objectives

Objective 1: To review qualitatively Indonesian agricultural-related policies and relevant data within the broader technology, economic and physical environment;

Objective 2: To identify Indonesian agricultural-related policy areas requiring further assistance and reform, including the institutions themselves, technologies to overcome productivity constraints to agricultural growth and effects of global climate change, and policy reactions in the rest of the world to climate change;

Objective 3: Develop required policy analysis tools that can provide the appropriate forward-looking analysis that is needed to design appropriate policy options to meet the challenges of global economic and environmental change;

Objective 4: Analyse the priority areas and provide policy options, within a plausible futures framework that links key models of economic and natural processes, and that can deliver long-term and economy-wide benefits for both Indonesia and Australia;

Objective 5: Disseminate the outcomes and adoption of recommendations of the research through publications and presentations to policymakers

Objective 6: Provide hands-on training in strategic agricultural-related policy analysis, so as to familiarize the final end-users in Indonesia on how best to exploit the available knowledge and decision-support tools and resources made available through this project.

Expected outputs of these objectives include:

- An overview of Indonesian agricultural technologies, policies and associated data towards enhancing economic growth and production efficiency in the face of global environmental and economic change;
- Prioritized list of Indonesian agricultural-related policy areas requiring revision, assistance and strengthening, including institutions and policy processes;
- Enhanced knowledge and decision support system, including a suite of developed policy analysis tools, such as linked economic and environmental models;
- Policy analysis disseminated into policy processes through policy briefs, articles in the ICASEPS policy newsletter, project website, etc;
- Policy workshops and reports
- Developed framework containing basic components to enable Indonesia to move toward establishing its own independent and transparent industry policy assessment agencies; and
- Better trained staff in undertaking strategic policy analysis, including use of developed policy analysis tools that will be disseminated at international professional conferences.

5 Methodology

Investigating the effects of alternative macro-economic policies and institutions and climate change on Indonesian agriculture under a range of climate and socio-economic futures required an integrated package of approaches. Decisions made by farmers are influenced by a range of variables from relatively unchanging geophysical variables such as elevation, slope and soil characteristics to climate variables to economic variables such as prices, property rights and social infrastructure. The project goal was to combine the modelling of economic and environmental processes, building on simulation techniques that span the macro- and micro-levels to better assess the consequences of climate change itself, agricultural productivity options and trade policies. Simulation techniques that integrate physiological and economic models were used to investigate the effects on rural producers under a range of climatic and socio-economic futures. Three different sets of models were used during the project, to respond to specific training, capacity building and research questions. Figure 1 provides the modelling framework that was used to assess the larger climate change and productivity growth topics (for example, Oktaviani et al. 2011).

Figure 1. Combined modelling framework
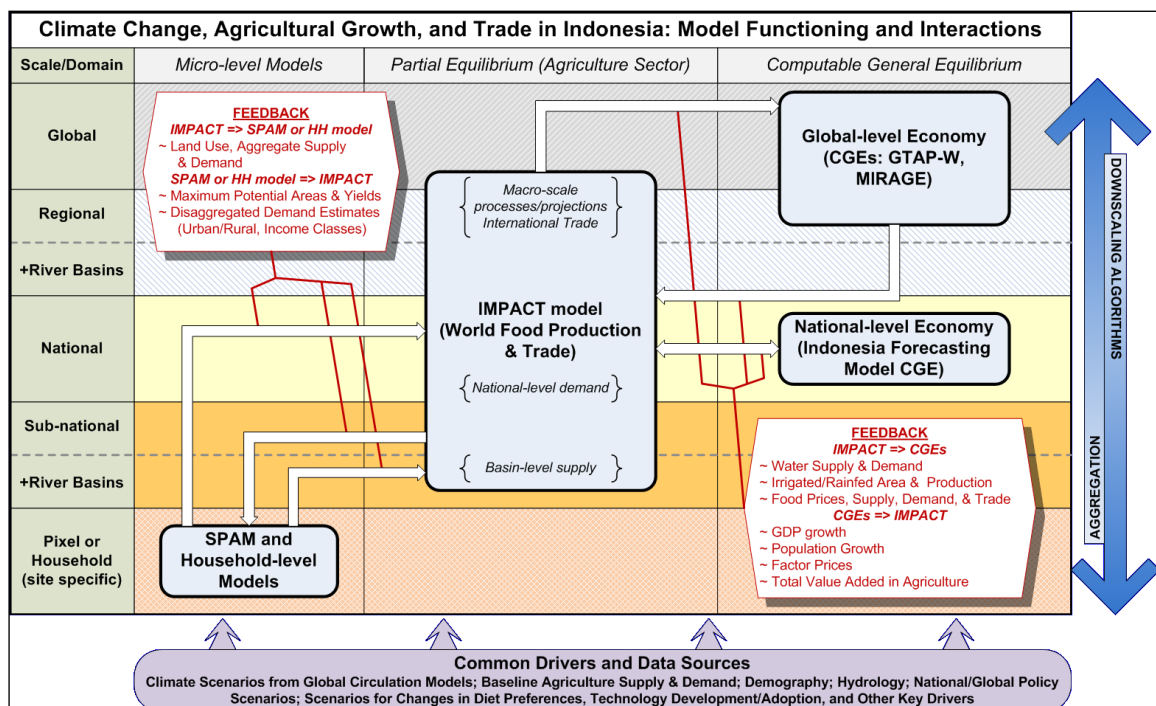
A second modelling strand used a national Indonesia-wide CGE model, which combined earlier Indonesia CGE models ORANI-F, INDOF, WAYANG and ORANIGRD. The national model contains 74 producer goods and services produced by 74 corresponding industries (see Figure 2 for the productions side). A third strand used the global GTAP model, particularly for trade analysis between Australia and Indonesia.

A fourth strand used a partial equilibrium agricultural sector model of Indonesia developed under this project by ICASEPS based on Sayaka et al. (2007a, 2007b) to address climate change questions. Moreover, a meta-econometric and qualitative approaches were used in some papers and reports.

Figure 2. Structure of Production, Indonesia CGE model
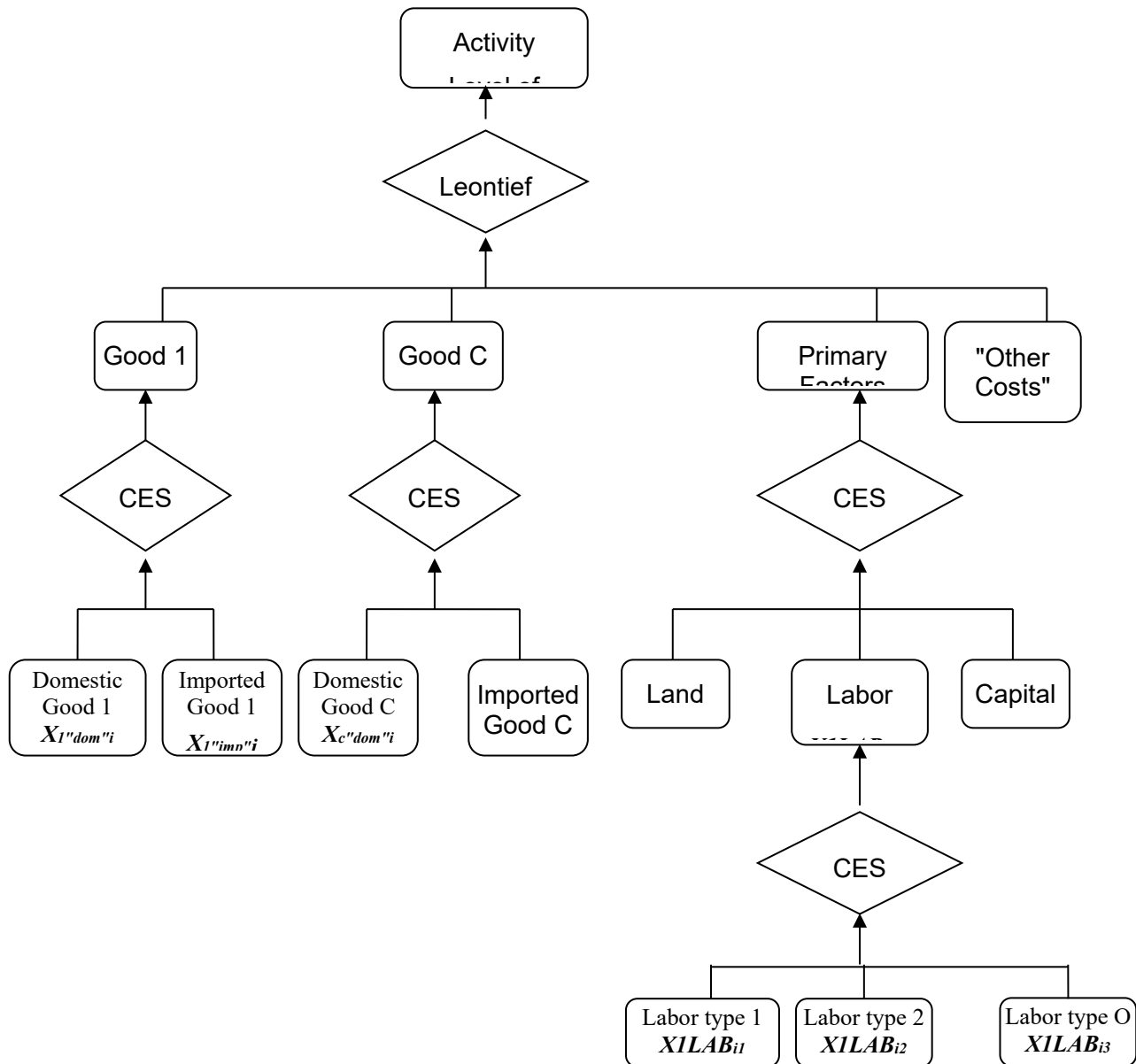
In addition to the models used for capacity building and policy analysis, several trainings took place in Indonesia, Australia and the US, and results were presented by all participants in the project at both national and international conferences, again with a focus on Australian conference outlets.

6 Achievements against activities and outputs/milestones

Objective 1: To review qualitatively Indonesian agricultural-related policies and relevant data within the broader technology, economic and physical environment;

No.	Activity	Outputs/ milestones	Completion date	Comments
1.1	Data gathering and other relevant information from secondary literature	Data collected for input to model while other secondary information as background materials	Planned: 12/2009 Actual: 3/2010	Implemented by IPB/TREDA/ICASEPS
1.2	Overview report on Indonesian agricultural and trade policies	1.2.1 Agricultural technologies and policies report / 1.2.2 Trade policies report	Achieved as planned: 03/2010	1.2.1-ICASEPS/IFPRI [Data and Information on Policies Affecting Indonesian Agricultural Productivity in the Early Millennium (Budiman Hutabarat and Reni Kustiari)] 1.2.2-TREDA/Australian partners. Setyoko, N and M. Bosworth. 2010. Agricultural trade policies in Indonesia: An overview. Project paper for input to the Indonesian Trade Policy Review. Permani, Risti. 2011. "The Impacts of Trade Liberalisation and Technological Change on GDP Growth in Indonesia: A Meta Regression Analysis". Global Economy Journal. 11(4). Article 7.p.1-28.
1.3	Understanding of the institutional structure in relation to decentralization in Indonesia	1.3.1 Policy brief on agricultural institution structure / 1.3.2 Policy brief on trade and macroeconomic policies—related to decentralization	1.3.1 completed in 10/2010 1.3.2 completed 10/2010	1.3.1-ICASEPS/IFPRI--[Agricultural Policies and Agricultural Institutions under Decentralization: A Decade After Agricultural policies and agricultural institutions under decentralization (Budiman Hutabarat, Adi Setiyanto, Reni Kustiari) 1.3.2-TREDA/Australian partners. Setyoko, N.R. "Income disparity, growth of agriculture, and human development: A contemplation of decentralisation in Indonesia." These pieces are "grey" literature and background for subsequent published research, for example on rice self-sufficiency policies.

PC = partner country, A = Australia

Objective 2: To identify Indonesian agricultural-related policy areas requiring further assistance and reform, including the institutions themselves, technologies to overcome productivity constraints to agricultural growth and effects of global climate change, and policy reactions in the rest of the world to climate change;

No.	Activity	Outputs/ milestones	Completion date	Comments

2.1	Review and analyse past and existing institutional arrangements related to implementation of agricultural policies	2.1.1 Review paper on agricultural policies / 2.1.2. Review paper on trade policies	2.1.1 completed 04/2011 2.1.2 completed 02/2010	2.1.1 ICASEPS/IFPRI [High potential areas for investment to enhance agricultural productivity under global environmental and economic change, (Budiman Hutabarat, Reni Kustiari, Adi Setiyanto)] 2.1.2 IPB/TREDA/Australian partners [Indonesian agricultural trade policy at the crossroads (Rina Oktaviani, Nur Rakhman Setyoko, and David Vanzetti)] [Complexity of Indonesian Dairy Industry Development (Rina Oktaviani and Nur Rakhman Setyoko)] [The revival of interest in self-sufficiency in Indonesia and its likely consequences (David Vanzetti, Nur Rakhman Setyoko, Ray Trewin and Risti Permani)]- ["Home grown: Cattle and beef self-sufficiency in Indonesia" Crawford, ANU Policy and Governance Discussion paper (R. Trewin, D. Vanzetti, N. R. Setyoko, and R. Permani) [A comparison of Indonesian and Vietnamese approaches to agriculture in the ASEAN-China FTA (David Vanzetti, Nur Rakhman Setyoko, Nguyen Ngoc Que and Ray Trewin)] [Analysing individual country approaches to agriculture in the ACFTA (Ray Trewin, David Vanzetti, Nur Rakhman Setyoko and Nguyen Ngoc Que)]
2.2	Identify potential areas for capacity strengthening and improvement through informal interviews	Improvement in capacity of Indonesia partners in implementation of agricultural and agricultural trade policies	2.2 completed 06/2010 and 12/2010	ICASEPS with IPB and Australian partners [this activity was completed through a series of training activities instead of a report]
2.3	Provide technical guidance or toolbox on how to achieve these improvements; present examples or similar situations and techniques whenever possible	2.3.1 Confidence in identifying and revising policies to better address agricultural sector in relation to economic improvement of Indonesia / 2.3.2 Paper providing guidance on capacity building strategies	2.3.1: completed 06/2010 and 12/2010. 2.3.2: completed.	2.3.1: ANU and IPB with ICASEPS [completed through ANU General equilibrium training Bogor 6-8th December and Jakarta 9-10th December; and IFPRI Partial equilibrium modeling training 5-8 June, Bogor]. TREDA has identified policy issues on their own, including in relation to the dairy sector and has run their own model simulations for analysing alternative policies such as on regional stocks. 2.3.2: ANU and IPB with UoA and Indonesian partners [completed through ANU General equilibrium training Bogor 6-8th December and Jakarta 9-10th December; and IFPRI Partial equilibrium modelling training 5-8 June, Bogor]

PC = partner country, A = Australia

Objective 3: Develop required policy analysis tools that can provide the appropriate forward-looking analysis that is needed to design appropriate policy options to meet the challenges of global economic and environmental change;

No.	Activity	Outputs/ milestones	Completion date	Comments
3.1	Review and analyse policy analysis tools applied in other developing countries which may be adopted in Indonesia	3.1.1. Paper assessing CGE models for Indonesia 3.1.2. Paper assessing other trade-related models and analysis 3.1.3. Paper assessing agricultural sector models	3.1.1 09/2009 3.1.2 02/2011 3.1.3. 08/2010	3.1.1 IPB with Australian partners [Computable General Equilibrium Modelling for Indonesia (Rina Oktaviani)] 3.1.2. UoA with TREDA (as mentioned in 1.2.2). 3.1.3 ICASEPS with IFPRI [Agricultural demand, supply and sector modelling in Indonesia, (Budiman Hutabarat and Reni Kustiari) The ACFTA paper mentioned in Activity 2.1 included a Vietnamese researcher as an author, and looked at Vietnam and other ASEAN member states as well as China.
3.2	List and assess policy analysis tools or models applied for projections in agricultural technology, climate change and economic assessments	3.2.1. Paper describing the methodology for linked CGE-IMPACT model 3.2.2. Paper describing the methodology for other agricultural trade models	3.2.1 10/2010 3.2.2 02/2011	3.2.1 IFPRI with IPB [This is described in a section of the paper "The impact of global climate change on the Indonesian economy (Rina Oktaviani, Syarifah Amaliah, Claudia Ringler , Mark Rosegrant, Timothy Sulser)] 3.2.2 TREDA with ANU and UoA This is described in a section of the papers e.g. "The revival of interest in self-sufficiency in Indonesia and its likely consequences" (David Vanzetti, Nur Rakhman Setyoko, Ray Trewin and Risti Permani) and "Optimum Level and Welfare Effects of Export Taxes for Cocoa Beans in Indonesia: A Partial Equilibrium Approach" (Risti Permani, David Vanzetti and Nur Rakhman Setyoko)] The research done was demand driven but within the larger framework of evidence-based policy analysis. The key was to co-write papers with partners or to have partners write papers based on trainings received and respond to comments from other partners. It was an iterative approach to develop policy capacity. Indonesian partners from all three agencies also travelled to Australia and two partners travelled to the US to present results at conferences and other outlets.

| 3.3 | Model development and application to agricultural-related technology, trade, climate change, policies and institutions | 3.3.1. Paper presenting complete results from application of linked CGE-IMPACT model for specific case studies

 3.3.2. Paper presenting complete results from application of other agricultural trade models—for specific case studies | 3.3.1 09/2010
 3.3.2 06/2010 | 3.3.1: IFPRI/IPB [The impact of global climate change on the Indonesian economy (Rina Oktaviani, Syarifah Amaliah, Claudia Ringler , Mark Rosegrant, Timothy Sulser)]—Paper was presented at the final policy workshop- and published as IFPRI DP in 2011

 [Global Climate Change Further Implications on Indonesian Agricultural Sector's Employment (Rina Oktaviani, Syarifah Amaliah, Claudia Ringler, Mark W. Rosegrant, and Timothy B. Sulser)]

 ICASEPS prepared an essay paper on the impact of climate change on Indonesia's agriculture and vice versa "Climate Change and Indonesia's Agriculture" (Budiman Hutabarat)

 3.3.2: ANU/TREDA/UoA [The revival of interest in self-sufficiency in Indonesia and its likely consequences (David Vanzetti, Nur Rakhman Setyoko, Ray Trewin and Risti Permani;

 Home grown: Cattle and beef self-sufficiency in Indonesia" Crawford, ANU Policy and Governamce Discussion paper (R. Trewin, D. Vanzetti, N. R. Setyoko, and R. Permani)

 Optimum Level and Welfare Effects of Export Taxes for Cocoa Beans in Indonesia: A Partial Equilibrium Approach (Risti Permani, David Vanzetti and Nur Rakhman Setyoko)]
 [A comparison of Indonesian and Vietnamese approaches to agriculture in the ASEAN-China FTA (David Vanzetti, Nur Rakhman Setyoko, Nguyen Ngoc Que and Ray Trewin)]

 [Analysing individual country approaches to agriculture in the ACFTA (Ray Trewin, David Vanzetti, Nur Rakhman Setyoko and Nguyen Ngoc Que)] |

PC = partner country, A = Australia

Objective 4: Analyse the priority areas and provide policy options, within a plausible futures framework that links key models of economic and natural processes, and that can deliver long-term and economy-wide benefits for both Indonesia and Australia;

No.	Activity	Outputs/ Milestones	Completion date	Comments

| 4.1 | Review and assess long-term economic frameworks and priority areas of Indonesia and Australia | 4.1.1 Identification and assessment of priority areas using economic frameworks for Indonesia and Australia (presented in 1.2.1-.2; 2.1.1-.2)

 4.1.2 Strategic policy analysis of priority areas in both countries within a plausible futures framework (presented in 3.1.1-.3; 3.3.1-.2)

 4.1.3 Developed institutional framework containing the basic components to enable Indonesia to move toward establishing its own independent and transparent industry policy assessment agencies (presented in 1.3.1-.2) | 4.1.1 to be completed
 4.1.2 to be completed
 4.1.3 to be completed | 4.1.1 IFPRI with partners [Agriculture and Food Security under Growing Scarcity: Prospects for Indonesia for 2030/2050; Ringler et al. 2013]

 4.1.2 [Agriculture and Food Security under Growing Scarcity: Prospects for Indonesia for 2030/2050; Ringler et al. 2013]

 4.1.3 Indonesia establishing its own independent and transparent industry policy assessment agencies was a priority of the previous Indonesian Trade Minister and was addressed through funds made available after the start of our project which involved direct interactions between the MoT and Australian agencies such as the Productivity Commission. Freed resources within our project were applied to research on the Indonesian live cattle and beef trade which became a priority issue during the project (see numerous papers and blog pieces on this issue in the final reference section) |
| / | | | | |

PC = partner country, A = Australia

Objective 5: Disseminate the outcomes and adoption of recommendations of the research through publications and presentations to policymakers;

No.	Activity	Outputs/ Milestones	Completion date	Comments

| 5.1 | Dissemination of information | Policy analysis disseminated into policy processes through a website, ICASEPS policy newsletter, etc | | **Several papers were presented by Indonesian collaborators at the AARES meetings in 2010, 2011, 2012 and 2013;

**Rina Oktaviani presented an IFPRI brownbag seminar in 10/2010 and was a discussant at the IFPRI Board seminar on 04/2011. She further presented a CGE model paper on CC in Padang, 01/2011 and the EAAERE (East Asian Association of Environmental & Resource Economics) Conference, in Bandung, 2/2012. She also supervised PhD Student in Agricultura Economics Post Graduate Study Program from TREDA, Kasan Muhri. The Title of dissertation: The Impact of Trade Liberalisation and Climate Change in Agricultural Commodities in Various Countries on Indonesia Macro and Sectoral Economy: General Equilibrium Economic Model Approach.

**ANU (Ray Trewin) and UoA (Risti Permani) published opinion pieces on several news portals including the Jakarta Post and East Asia Forum to respond to export ban on live export to Indonesia which were derived from their joint paper on self-sufficiency in beef. They also made submissions to the senate inquiry based on these opinion pieces.

**Risti Permani (UoA) media statement and interviews on live export were published by a large number of news portals including ABC, SBS, the Australian, etc.

**Ray Trewin (ANU) posting was also picked up by the press (e.g. Australian Financial Review).

The final policy workshop (June/2012) included the following presentations:
- 1. The Impact of Global Climate Change on Indonesian Food Crops Productivity (R. Oktaviani et al.)
2. An Examination of Climate Change Impact on Indonesia's Agriculture Sector (B. Hutabarat et al.)
3. Regional rice stocks, prices and food security: Implications for Indonesia (N.R. Setyoko, R.Trewin, D. Vanzetti)
4. Analysing individual country approaches to agriculture in the ACFTA (Ray Trewin, David Vanzetti, Nur Rakhman Setyoko and Nguyen N.Q)
5. Indonesia's Agricultural Sector after A Decade of Decentralization (B. Hutabarat et al.)
6. Constraints to Agricultural Growth and Policy Options (T. Sulser)
7. Home grown: Cattle and beef self-sufficiency in Indonesia, R. Trewin, D. Vanzetti, N. R. Setyoko, and R. Permani)
8. High Potential Areas for Investment to Revitalize the Indonesia's Agriculture Sector (R. Kustiari, B. Hutabarat, and A. Setyanto)

Each of the papers was discussed by an invited discussant with suggestions for finalization. |

| 5.2 | Publish technical outputs in Indonesia and Australia | Publications (see above outputs under Activities 1,2 and 3):
5.2.1 Overview report
5.2.2 Prioritized list of Indonesian agricultural-related policy areas
5.2.3 Policy briefs on Indonesia institutional framework on independent and transparent industry policy assessment agencies | | In addition to activities listed under 5.1 (the comment column ran out of space), a further publication includes the Adelaide workshop papers, which had been drawn together in an ACIAR Technical paper and submitted.

Moreover, ICASEPS will publish part of the Indonesia climate change paper in their own journal.
1. Conjecturing Production, Imports and Consumption of Horticulture in Indonesia in 2050: A GAMS Simulation through Changes in Yields Induced by Climate Change (B Hutabarat, A. Setiyanto, R. Kustiari, and T.B. Sulser. 2013. Jurnal Agro Ekonomi 30 (1): 1-23)

5.2.2 – ICASEPS Policy Briefs (Draft):
1. Hutabarat, B., A. Setiyanto, and R. Kustiari. 2013. Climate Change Impact on Indonesia's Agricultural Sector
2. Hutabarat, B.. 2013. Agricultural Policies and Agricultural Institutions under Decentralization: A Decade After
3. Hutabarat, B., R. Kustiari, and A. Setiyanto. 2013. High-potential Areas for Investment to Revitalize Indonesia's Agricultural Sector.

5.2.3 - ANU and UA. Focusing on live cattle exports issues, Risti Permani (UA) completed a policy brief on the regulatory underdevelopment in agricultural sectors in Indonesia which contribute to animal welfare incidents. |

PC = partner country, A = Australia

Objective 6: Provide hands-on training in strategic agricultural-related policy analysis, so as to familiarize the final end-users in Indonesia on how best to exploit the available knowledge and decision-support tools and resources made available through this project;

No.	Activity	Outputs/ Milestones	Completion date	Comments

| 6.1 | Provide hands-on training in strategic agricultural-related policy analysis, so as to familiarize the final end-users in Indonesia on how best to exploit the available knowledge and decision-support tools and resources made available through this project | 6.1.1 Training on economic analysis and other policy development related training
6.1.2 Capacity-building alternatives categorised (formal and informal) and prioritised.
6.1.3 Better trained staff undertaking strategic policy analysis, including using developed policy analysis tools disseminated at international professional conferences | 6.1.1 06/2010
6.1.2 12/2010
6.1.4 06/2011
Additional training IFPRI 06/2011 both ICASEPS PE model and hand-on impact training | 6.1.1 - ICASEPS [instead of ICASEPS staff, IPB staff implemented training for TREDA and ICASEPS]
6.1.2 - IFPRI [IFPRI Partial equilibrium modelling training 5-8 June, Bogor]
ANU-IPB [General equilibrium training Bogor 6-8th December and Jakarta 9-10th December]
UoA organized an econometric modelling training with TREDA in August 2011.

There were other instances of hands-on training, in Australia, Indonesia and the US, when ANU/TREDA/ICASEPS and IPB researchers were visiting the other's country. |

PC = partner country, A = Australia

7 Key results and discussion

Key results on the capacity building/model development side include:

Two key training events that are described in more detail.

**Training of 15 Indonesian participants on General equilibrium modelling for three days in Bogor, Indonesia, and 7 additional TREDA staff for 1 day in Jakarta. As a result of the training participants have the ability to examine bilateral tariffs and trade flows for 227 countries at the six digit level using TASTE (no licence required), aggregate to GTAP, run complex tax cutting scenarios, run Indomini and interpreting the results.

**Training of 14 Indonesian participants for four days on several partial equilibrium models for three days in Bogor, Indonesia on the following models: multimarket modelling due to participant interest and past work done by ICASEPS in collaboration with FAO; IFPRI's IMPACT Model in detail; and the DREAM modelling framework that is more commodity specific, but still offers a great amount of flexibility in analysis and is quite user-friendly (see appendix for additional details).

Other training events included a 2-week stay of an ICASEPS staff at IFPRI to work on partial equilibrium modelling, several additional shorter trainings by Australian partners in Indonesia and visits of Indonesian partners to Australia.

Discussion:

Both sets of trainings were highly appreciated, but training is only one step in capacity building. Much more importantly is the following use and application of the training obtained. This was achieved during the ensuing model development/update and policy analyses phases that were accompanied by IFPRI, the Australian partners and also Prof Oktaviani from IPB.

One issue that was raised in both sets of trainings was that not all participants had access to the licenced software that was necessary for the training.

Key results on the model development side

**new ICASEPS partial equilibrium model developed and used to assess climate change impacts on Indonesian agriculture, updating an earlier partial equilibrium model.

**use of GTAP modelling directly by TREDA to asses trade policy issues, including dairy industry assessment and trade in beef;

**update of trade databases for CGE regional GTAP based CGE modelling;

**update of Indonesia CGE model by IPB to incorporate impacts of climate change and other relevant data updates;

**use of some qualitative questionnaires, econometrics and other approaches in some of the research papers to complement PE and CGE modelling approaches

Discussion:

As mentioned, actual updating and use of models is essential for model training to produce and show pay offs. Prior to the project neither TREDA nor ICASEPS were using PE or CGE models in-house. ICASEPS had been using CGE models and PE models previously, but the earlier capacity had been lost due to staff transfers and projects ending. As a result, the training and model updating and applications did take a significant amount of time, particularly for the Indonesian collaborators. At the same time, it was felt essential for TREDA and ICASEPS do have this capacity in-house to serve their respective ministries.

<u>Key results for selected Policy Analysis papers</u> are summarized here. Much more detail is presented in the specific papers (see list of references).

**Decentralization (Hutabarat, B., A. Setiyanto, and R. Kustiari. 2013. Agricultural Policies and Agricultural Institutions under Decentralization: A Decade After.

The approach to agricultural development in principle has changed since the late 1990s, from centralized plans by elites in the capital, to decentralization with community participation. In addition, the new approach capitalizes all resources from the government, the private sector, and the central, provincial and regency/municipal levels. But the enactment of decentralization legislations has not altered the formulation of agricultural development policies, because all layers of government—especially the central government—still maintains the governing task of economic sectors development, including in agriculture. Under the new budget rule, the central government or Ministry of Agriculture that used to fully control the agricultural development budget, now only manages approximately 20% of the budget, the regional governments under De-concentration funding schemes handle the remaining 80%. The implementation of Deconcentration activities has not been successful, because the decentralization legislation has put the governors in an uncomfortable position of being constitutionally accountable to the provincial electorate, yet also acting as representatives of the central government. A variety of policies related to agriculture, such as agriculture input and output price controls, fertilizer subsidies, the floor price of paddy, financing and agricultural credit, seed subsidies, irrigation and area expansion, are decided by various ministries not solely the Ministry of Agriculture. But the coverage and magnitudes of these policies has been considerably scaled down. If some corrections are not made either in policies, government or regional regulations we could envisage that agriculture sector in most of regional administrations in Indonesia would tend to be discriminated against other quick-yielding and capital intensive sectors because agriculture is triple-squeezed by forces originating from the implementation of decentralization and autonomy. On the one side, the devolution of agricultural management is only a voluntary task for regional governments. Second, there is a tendency to collect or raise taxes, 'retributions', or other forms of charges, given the limited amounts of regional incomes through legal *Peraturan Daerah/PERDA* or Regional or Local Regulation in various economic sectors of regions to quickly boost their RGRs. Third, the ruling leaders in regions often find agriculture to be less appealing than other sectors like mining, forestry and fishery or may be services, real estate and manufacturing that are yielding profits faster. A revision of decentralization policies to boost agricultural growth would be beneficial.

**Climate change (Oktaviani, R., S. Amaliah, C. Ringler, M.W. Rosegrant, and T.B. Sulser. 2011. The impact of global climate change on the Indonesian economy)

The policy analysis papers related to climate change find that Indonesian real GDP will slightly decline as a result of climate change, while prices are expected to rise. There is a real appreciation of the Indonesian Rupiah relative to the US Dollar and net export performance is worsened as Indonesia has to allocate more resources to provide adequate supply of strategic food commodities (rice and maize) despite decreased household consumption. If accelerated R&D investments are implemented, adverse climate change impacts can be overcome. Negative impacts for GDP are mostly due to the negative growth of agricultural sectors and agro - base d industry. The largest negative output growth can be seen for soybeans, rice, and paddy. Decreasing output of paddy will harm the food security condition in Indonesia because global climate change will directly increase production risk, particularly in irrigated areas, which use high levels of agrochemical inputs. In line with the impact of global climate change on sectoral output, sectoral employment in agriculture and agro-based industries will decline, except for paddy and maize. An increase in food and beef productivity to counteract climate change impacts, as well as higher international prices of food as a result of climate change, will decrease labor absorption.

**General trade policy (Oktaviani, R., N. Setyoko and D. Vanzetti. 2010. Indonesian agricultural trade policy at the crossroads)

Restrictive trade policies, including specific tariffs on rice and sugar, and quantitative restrictions on imports and exports, have been used in an attempt to meet conflicting objectives of assisting both producers and consumers. Meanwhile, palm oil exports to the European Union are constrained by the importer's concerns about deforestation and its contribution to climate change. Similar constraints may be applied to other commodities as production moves into pristine areas in an attempt to maintain self-sufficiency. On the other hand, more open trade may offer better options to address any agricultural-related costs associated with climate change. A computable general equilibrium model is used to analyze the efficiency and distributional impacts of these agricultural trade policies. The results suggest that removing or reducing tariffs on rice and sugar would increase imports substantially in relative terms but have only a small impact on domestic prices and production. A ban on palm oil exports to the European Union would have a significant impact, although offset somewhat by increased exports elsewhere. In each case the major effects are distributional, involving transfers between producers and consumers. Multiple instruments are necessary to achieve conflicting objectives. For example, social safety nets rather than trade bans should be used to support poor consumers. Support for the agricultural sector should focus on the provision of rural infrastructure, research and development, and the encouragement of private sector investment.

**Livestock trade (Vanzetti, D., N. Setyoko, R. Trewin and R. Permani. 2010. Home grown: Cattle and beef self-sufficiency in Indonesia)

As apparent from the modelling, achieving self-sufficiency in Indonesia across a range of commodities such as beef may be technically feasible, and may moderate the price effects of external shocks in the short-run such as those experienced in 2008, but a self-sufficiency policy with minimal exposure to international market prices imposes high costs to maintain self-sufficiency: - Production costs are higher if self-sufficiency is forced beyond what an open market would deliver as, by definition, marginal costs will be higher than marginal revenues, requiring subsidies of inputs or the higher-cost outputs to encourage more self-sufficient production levels; - Stockholding levels and costs are higher under a self-sufficiency approach; - The quality and variety of products are reduced from what would be provided with a more open market (currently wet markets based around domestic product dominate Indonesian sales with supermarkets selling predominantly imported products). Other implications not directly apparent from the modelling are: - A self-sufficiency policy with minimal reliance on trade leaves the domestic market exposed to the more frequent and relatively higher internal shocks such as those caused by floods, droughts or disease, and less able to be offset by spreading the risk; international competition that encourages international standard performance is lacking; - Indonesia's trading partners, including ASEAN who Indonesia is a member of and who have an agreement on food security, may also object to Indonesian constraints on trade associated with a self-sufficiency policy. Self-sufficiency in Indonesian cattle and beef meat would result in a lost opportunity of Indonesia drawing on relatively cheap, extensively-reared cattle in Australia's near north and New Zealand, and using its comparative advantage in cheap labour to intensively fatten these and competitively provide what could be rapidly increasing supplies to the domestic market as well as export products to some very wealthy near-neighbours or others with similar Halal etc requirements such as Singapore and Brunei; and - There are also environmental concerns with self-sufficiency because of an expansion of new agricultural lands into sensitive tropical forests or peat lands that are holding large amounts of carbon, leading to bans on some Indonesian exports such as CPO and possibly livestock products. It might be argued that there are non-economic benefits from food self-sufficiency that match these costs, such as political stability. However, this is more an argument for food security which can achieve such underlying objectives in a less costly way than a self-sufficiency approach that is so vulnerable to more frequent internal shocks.

Discussion:

This selection of policy analysis paper conclusions using both CGE and partial agriculture equilibrium modelling tools but also qualitative analyses demonstrate the importance and benefits of policy analyses across various agricultural policy areas. Climate change is a relatively new area for the Ministry of Agriculture; despite this particularly little work has been done on the topic of how to maintain productivity of agriculture under climate change. While it is difficult to comprehensively judge the impact of Indonesia's decentralization policy on agriculture, the ICASEPS analysis offers some insights into potential risks for the agriculture sector. The various trade studies focus on the cost of some of the self-sufficiency policies of the Indonesian government. Previous studies have chiefly focused on the key strategic crop rice. This study instead focuses on livestock, which has been understudied previously and is of interest to both Indonesia and Australia. The analysis finds that a ban on imports would lower production by 13 per cent and raise prices by 27 per cent; these are important economic costs that did not go unnoticed at the Ministry of Trade of Indonesia.

8 Impacts

8.1 Scientific impacts – now and in 5 years

The project's key scientific outputs were capacity building for policy analysis, development and updating of modelling tools and implementing policy analysis using these modelling tools addressing policy topics suggested by the Indonesian government agencies and project partners. Several scientific papers, technical reports and newspaper op-eds and blog pieces were produced from the policy analyses, including one ACIAR Technical Report. All collaborators in the project, Indonesians, Australians and IFPRI staff, appreciated the mutual exchange of information and policy analysis tools and gained from learning on joint papers. The policy analysis on the Australia-Indonesia livestock trade already led to policy impact as shown in the recent Ministry of Trade policy decision that over-rode the Ministry of Agriculture policy of cutting back on Australian cattle and beef imports for self-sufficiency reasons.

It is hoped that the incipient thinking about incorporating climate change effects into economic models by Indonesian agencies will lead to much more research in this area. For sure, the interest to further develop work in this area exists with both the university and Ministry of Agriculture agency. The potential for additional work in this area in Indonesia is large. Similarly, the many policy analysis pieces focused on trade, and particularly the livestock trade pieces, will likely continue to have policy impacts in five years as Indonesia's policy stance will likely continue to experience swings between food self-sufficiency and openness to trade thinking. Importantly, the relationships developed between Indonesian, Australian and CGIAR researchers will continue far beyond the project ending and will likely lead to additional scientific work. To sum, we assume that policy research will be more in demand by the Ministry of Agriculture in the future and that the basic tools and skills developed in the project would then be applied to questions of the day, as occurred during this project.

8.2 Capacity impacts – now and in 5 years

ICASEPS, TREDA and IPB have received training on Partial Equilibrium and Computable General Equilibrium modelling. ICASEPS has developed an ICASEPS multi-market model during this project and has used the model to assess the impacts of climate change on agricultural production in Indonesia, which was a key area of interest by ICASEPS and the Ministry of Agriculture. TREDA has applied their training to topical policy issues of key interest to the organization, particularly dairy policies and regional commodity stocks. IPB has used the project to assess the impact of climate change on Indonesian agriculture using their CGE modelling framework.

Prof. Oktaviani spent several days at IFPRI in the Fall of 2010 to present her work on climate change - CGE modelling for Indonesia. Prof. Hutabarat spent two weeks at IFPRI in the Summer of 2011 to be trained on a global partial equilibrium model of the agriculture sector (IMPACT), as well as to help him finalize his partial agriculture equilibrium sector model of the Indonesian economy of Indonesia, on which he was working on with Sherman Robinson and Tim Sulser.

Several Indonesian collaborators from ICASEPS, IPB and TREDA spent time in Australia both to receive hands-on training, to finalize joint policy papers and to present at Australian conferences.

Capacity building was a key intervention area of this project. While key Indonesian project staff were assigned by the relevant directors and while the project did encounter significant staffing changes early on from the Indonesian side, importantly, the project was

able to work with several junior researchers who are the key stakeholders using the capacity built in the future. IPB and ICASEPS involved junior staff in their analysis; and the TREDA staff assigned to the project is himself at the start of a long career at the Ministry of Trade. Finally, ANU worked with a highly capable Indonesian postdoc researcher who will surely continue to work on these topics long after the project has ended.

The most direct policy impact can probably be seen with TREDA. The papers that were developed with TREDA were used to guide Indonesia's trade negotiations on rice stock at a WTO meeting in Bali in 2013 as well as for trade discussions in China. The results on beef trade have also guided Indonesian trade negotiations on this topic.

Specifically, the Indonesia "Policy on Beef reference price" uses information generated from one of the study papers, titled "The revival of interest in self-sufficiency in Indonesia and its likely consequences" by Vanzetti, David, Nur Rakhman Setyoko, Ray Trewin and Risti Permani presented at GTAP Conference 2010.

The paper on public stockholding was used by the Indonesian negotiator in his deliberations as our TREDA collaborator was the trade analyst for this analysis [Setyoko, N., Trewin, R. and Vanzetti, D, 'Regional rice stocks, prices and food security: Implications for Indonesia', presentation at ACIAR Workshop on Plausible Futures, Adelaide, 14th February 2012.]

The cocoa policy on export tax review used contributions by the project paper: "Permani, R., Vanzetti, D. and Setyoko, N. (2011) 'Optimum level and welfare effects of export taxes for cocoa beans in Indonesia: a partial equilibrium approach', contributed paper at the 55th AARES Annual Conference, Melbourne, 9-11th February."

In 2013 and 2014, China was proposing extending ACFTA to ASEAN and reviewing the implementation of ACFTA. TREDA used recommendation of a project paper as a position in discussions with China. [Vanzetti, D., Setyoko, N., Que, N. and Trewin, R. (2011) 'A comparison of Indonesian and Vietnamese approaches to agriculture in the ASEAN-China FTA', contributed paper at the 55th AARES Annual Conference, Melbourne, 9-11th February.]

Several additional Indonesian policies benefited from the capacity building implemented under this project: A feasibility study for the Regional Comprehensive Economic Partnership (RCEP) was conducted with a GTAP modification. The paper was presented at the Ministry of Trade in 2012. The GTAP modification was developed based on the GTAP training course of the project.

TREDA built an Indonesian Trade Policy Model with GAMS, based on the course on PE models taught in the project. The model was used to estimate trade targets for 2015-2019 in cooperation with BAPPENAS.

Various other papers have since been developed by TREDA on trade analysis using GTAP based on the training received under the project.

Since project closure, ICASEPS used the GAMS model developed during the project and modified its database to the year 2011 in a 2013 ICASEPS research project titled "Dampak Makro Perubahan Iklim pada Subsektor Pangan" or Overall Impact of Climate Change on Food Subsector. ICASEPS plans to use the model structure in one of this year's research project with the title "Model Outlook Sektor Petanian Tanaman Pangan" or Modeling the Foodcrop Agricultural Sector Outlook. ICASEPS confirmed that they now also have a full GAMS license and that they will continue to refine the model to use it again and again in the future.

8.3 Community impacts – now and in 5 years

8.3.1 Economic impacts

As the June policy workshop in Indonesia showed, policy analysis of agricultural topics remains a highly relevant and important topic, given the changing agricultural research and trade policies that the Ministry has been engaged in over the last few years. While policy changes ranging from food self-sufficiency to trade barriers have been undertaken by many countries in response to the increased price volatility and higher food prices over the last few years, it is important to discuss, in a neutral setting, either via policy workshops or through accessible policy papers, the impact on domestic prices and the poor of such policies.

Indonesia-Australia agriculture and trade policies have also been affected by changes in global food (and energy prices). Assessing the impact of these changes as well climate change is helping to stimulate national discussions in both countries. The research on the Australia-Indonesia live cattle and beef trade along with some CIE policy analysis provided the only quantitative estimates of the impact of the live cattle ban on both the Indonesian and Australian economies submitted to the Australian Senate inquiry on the issue that recommended the removal of the ban. The economic benefits swamp the full project costs of the research undertaken in the ANU-UA-TREDA collaboration. All Australian live trade is worth $900m but a ban would lead to a $1.5b loss in GDP, $270m in household income and 10,500 jobs. For Indonesia to be self-sufficient in cattle and beef would require $5b in interest rate subsidies over 5 years. Indonesia faces a near $500m loss in (consumer) social welfare as a result of its cattle and beef self-sufficiency policies. A ban would lower production by 13 per cent and raise prices by 27 per cent. A back of the envelope CBA of the livestock research which made up one of only two quantitative submissions to the Senate inquiry into the $1b live cattle trade ban which subsequently removed the ban, would provide a very impressive number.

Our Indonesian collaborators confirm that they continue to use and further develop the policy analysis capacity developed under the project. While difficult to quantify, the capacity building impacts described so far in 8.2 suggested that the economic benefits of the model training and joint policy analysis are likely high.

8.3.2 Social impacts

The policy analysis on the Australia-Indonesia livestock trade was influential as shown in the recent Ministry of Trade policy decision that over-rode the Ministry of Agriculture policy of cutting back on Australian cattle and beef imports for self-sufficiency reasons. This is a perfect illustration of how particular sectors cannot be looked at in isolation on issues of broader economic interest.

The economic impacts listed above will also directly impact social outcomes in the country. Impacts from both global change and poor policy will always affect the poorest Indonesians the most, many of which continue to live in rural areas. The outcomes of this project will raise Indonesians as well as Australians' awareness of the importance of improved productivity as opposed to poorly-targeted blunt trade protectionist instruments. One of the CGE-climate change policy analysis papers (Oktaviani, R, S. Amaliah, C. Ringler, M.W. Rosegrant, and T.B. Sulser. 2012. Global Climate Change Further Implications on Indonesian Agricultural Sector's Employment. Presented at the EAAERE (East Asian Association of Environmental & Resource Economics) Conference, Bandung, 2-4 February 2012.) specifically assessed the impact of climate change on labor outcomes in Indonesia. The paper found that employment effects of climate change in agriculture and agro-based industries will be negative. The paper calls for integrated development policy is needed to reduce vulnerability to climate change. Increasing skilled labour both on- and off-farm as well as in the agro processing sector will be necessary to

increase resilience to climate change in Indonesia. At the same time more work on climate-smart agricultural investments is needed to increase the resilience of the country to climate change and reduce adverse climate change impacts on agriculture.

8.3.3 Environmental impacts

As the project addresses issues on climate change and resource use, it contributes to reduced adverse climate change impacts on agricultural ecosystems, through the assessment of key climate change impacts on agriculture. Similarly, the trade policy analysis, while focused on the economic cost of food self-sufficiency and the benefits of food trade, also provides policy insights for enhanced environmental outcomes. Focusing on food self-sufficiency at all costs rather than producing food based on comparative advantages—including the biophysical environment—would be highly detrimental to the fragile ecology of Indonesia.

8.4 Communication and dissemination activities

Collaborative research projects, training and conferences have built effective communication not only between Australian and Indonesian collaborators but also among Indonesian government agencies. The complementary roles of three Indonesian institutions being involved in this project in terms of shaping Indonesian agricultural trade suggests that the partnerships resulted from this project may provide long-term benefits.

Several final publications include collaborators from all three Indonesian agencies. These include a volume from the Adelaide workshop held in February/2012 as well as numerous working papers, journal articles, and policy briefs. A wider publications' reach has been achieved through connecting many of the papers with a blog piece and twitter. This three way connection works effectively to provide profile to the underlying research.

Another important way of disseminating results is papers and briefs placed on the collaborator's web-pages and published in Indonesian language journals, such as the piece published by ICASEPS " Conjecturing Production, Imports and Consumption of Horticulture in Indonesia in 2050: A GAMS Simulation through Changes in Yields Induced by Climate Change (B Hutabarat, A. Setiyanto, R. Kustiari, and T.B. Sulser. 2013. Jurnal Agro Ekonomi 30 (1): 1-23)". Finally, presentations given by project partners in Indonesian settings are also highly relevant to achieve full outreach, dissemination and impact in Indonesia. A sample of this kind of outreach was Prof. Oktaviani's presentation at the EAAERE (East Asian Association of Environmental & Resource Economics) Conference, Bandung, 2-4 February 2012 on climate change impacts on Indonesian agricultural sector employment.

9 Conclusions and recommendations

9.1 Conclusions

The project has contributed to building capacity for policy analysis on agricultural topics for the Government of Indonesia but has also delivered important learning and policy insights for Australian partners and Australia, as well as the Asia-Pacific region and for IFPRI.

Key conclusions include that while the project has been able to meet some of the demand for strengthening policy analysis capacity in Indonesia; a large scope for further policy analysis remains. The project provided in-house modelling capacity at TREDA and ICASEPS to serve their respective ministries on relevant agricultural sector and agricultural trade policies. The project also maneuvered between different ideological interests, particularly regarding agricultural trade between Australia and Indonesia, with the Ministry of Agriculture favouring a self-sufficiency stance and the Ministry of Trade being more open to trade. Here, the project provided key insights on the Australia-Indonesia livestock trade and supported the ongoing debate, not only through research products but also evidence-based op-eds and blogs in Indonesian news outlets.

Importantly, both the climate change and the trade policy analyses have provided specific numbers on costs and benefits of alternative policy directions and thus provided useful information for future policy development. The modelling and policy analysis is particularly important for agriculture given the large number of people still involved in the sector in Indonesia, the large budgets used for both agricultural research, but also to support poor trade policy choices.

The project can further help the Government of Indonesia and donor organisations, including ACIAR, to identify high potential areas of investment taking into account the current policy setting. For example, the ACIAR-funded IndoBeef and IndoDairy projects would build on this project.

9.2 Recommendations

During capacity building, we repeatedly encountered challenges with access to advanced modelling packages, such as GAMS and GEMPACK by Indonesian partner agencies. Only the university had significant access to such software. The government agencies did have funds to purchase software through the project, if so desired, but such purchases could not be undertaken by the individual collaborating researchers themselves. In future capacity building cum policy analysis projects, it is important to add software availability at partner institutions as a requirement.

TREDA expressed interest for ACIAR to cooperate further with MoT in the continuation to provide better trade policy. Continuing research is required on some issues such as livestock trade. Some issues like stocks and trade were obviously regional in nature and require a regional research perspective as was the case in the IAASTD exercise.

ICASEPS has expressed some interest on more in-depth assessment of climate change impacts and adaptation options as well as agricultural mitigation options. Given the growing fragility of Indonesia's environment—due to not only climate change, but also growing water, land and energy scarcity, an economic analysis of the water-energy-food nexus and implications on the Indonesian environment might be a further area for policy analysis.

The project focused on Indonesia and Indonesia-Australia policies; future projects could include 2 or 3 additional countries in the region, including exchange visits to appreciate

the various policy tools and policy options implemented in the region as well as their relative effects on the other countries in the region.

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10.2 List of publications produced by project

<u>Journal articles</u>

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  - Introduction

    Ray Trewin, Australian National University (ANU)
  - Growth in emerging economies and Indonesian food security by 2030

    Kym Anderson, University of Adelaide (UA), and Anna Strutt, University of Waikato
  - Regional rice stocks, prices, trade and food security: Implications for Indonesia
  - Nur Rakhman Setyoko, TREDA, Ray Trewin, ANU, and David Vanzetti, ANU Indonesian livestock self-sufficiency: A developing story

    Risti Permani, UA, Nur Rakhman Setyoko, TREDA, Ray Trewin, ANU, and David Vanzetti, ANU
  - Drink more milk: Policies supporting the Indonesian dairy industry

    David Vanzetti, ANU, Rina Oktaviani, IPB, and Nur Rakhman Setyoko, TREDA (Being presented again at a June GTAP conference in Shanghai)
  - Agricultural labour productivity and poverty in Indonesia
  - Joe Dewbre, Freelance Economist Policy design and industry development plans: Dairy industry experiences in Asia and Australia

    David Harris, Freelance Economist

Policy Briefs

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11 Appendixes

Appendix 1:

Workshop Notes

Partial Equilibrium Modeling Techniques

Timothy Sulser, Scientist, Environment and Production Technology Division

Indonesian Center for Agriculture Socio Economic and Policy Studies (ICASEPS), Trade Research and Development Agency (TREDA), and Bogor Agricultural University (IPB)

Bogor, Indonesia

5 – 8 June 2010

Summary:

This was a productive workshop, even though we faced a tight timeline and covered a broad number of topics in partial equilibrium agriculture sector modeling. The primary goals were to expose the participants to partial equilibrium modeling techniques and develop plans for making progress on deliverables for the ADP/2005/068 project. We primarily focused on multimarket modeling due to participant interest and past work done by ICASEPS in collaboration with FAO. We also covered IFPRI's IMPACT Model in detail, but this model is not well adapted to quick turn-arounds on training and capacity-building, though IFPRI is working on developing this capacity. The DREAM modeling framework was also covered as another alternative that is more commodity specific, but still offers a great amount of flexibility in analysis and is quite user-friendly.

One of the key constraints encountered in this workshop is the lack of access to more advanced model programming environments. One of the key tools used in applied economic analysis, especially partial equilibrium modeling, is GAMS. Though the "freeware" (a.k.a. "student" or "demo") version of GAMS can implement many worthwhile models, it will be severely limited when implementing moderately detailed models (see specific restrictions at http://www.gams.com/sales/commercialp.htm). The FAO-ICASEPS multimarket model as originally specified actually does work on the freeware version of GAMS, but this model is already nearly 300 variables and expansion will not be possible without purchase of a full license to one or more of the solvers. As another example, multimarket modeling often depends on solvers that can deal with "mixed complementarity problems (MCPs)" which absolutely require a license in GAMS regardless of size. Purchase of modeling software (particularly GAMS) must be made a priority if advances in modeling capacity are a goal.

PE MODEL TRAINING—REPORT, prepared by TIM. B. SULSER

Participants:

Indonesian Center for Agriculture Socio Economic and Policy Studies (ICASEPS)

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2. Adi Setiyanto (m)
3. Muhammad Suryadi (m)
4. Budiman Hutabarat (m)

Bogor Agricultural University (IPB)

5. Rina Oktaviani (f)
6. Syarifah Amaliah (f)
7. Tony Irawan (m)
8. Lukytawat Anggraini (f)
9. Heri [last name?] (m)

Trade Research and Development Agency (TREDA)

10. Nur Rakhman Setyoko (m)
11. Kasan [last name?] (m)
12. Miftah Farid (m)
13. Sefiani Rayadiani (f)
14. Aditya Alhidayat (f)

Annotated Agenda:

<u>Day 1</u>

Objectives: (i) Provide a basic overview of three types of partial equilibrium modeling with a particular focus on IFPRI's IMPACT model and the extensions to partial equilibrium modeling developed in that framework; (ii) gain an understanding of workshop participants' modeling capacity and experience in the context of partial equilibrium agricultural models.

1. Introductions

+ used 00-2010.06.05-INTRODUCTIONS.ppt to orient people to introducing themselves and discussing their backgrounds in economics and economic modeling (both approaches and modeling languages)

2. The IMPACT model

+ used 01-2010.06.05-IMPACT-Overview.ppt and 02-2010.06.05-IMPACT-ClimateChange.ppt as a basic introduction to the power of partial equilibrium approaches and as background on the IMPACT model

>>> there was quite an extended discussion here on the precise manner in which climate change factors are introduced into IMPACT

3. Other types of partial equilibrium analyses (multi-market, single commodity)

+ used 03-2010.06.05-BasicSupplyDemand.ppt to go into a broader discussion about partial equilibrium modeling in general and some of the basic distinctions among the three types that were to be presented through the workshop (IMPACT model, multi-market models (mostly the FAO-ICASEPS), the DREAM model). Materials for this discussion provided in 2010.06.05.PEtrain-IFPRI-printouts.zip, 2010.06.06.PEtrain-IFPRI-DREAM.zip, 2010.06.05.PEtrain-IFPRI-FAO-ICASEPSwork.zip.

Notes: Again, and I think this will always be the case, there were only really one or two people (<10% of total) in the workshop who were actually in line to literally WORK with these models (and GAMS), the rest were just other interested parties, whether ex oficio or by some other obligation.

<u>Day 2</u>

Objectives: (i) Motivate serious thinking on approaches to modeling work in planned case studies; (ii) increase exposure to GAMS modeling language, framework, and partial equilibrium modeling approach

1. Discussion of best modeling approach for case studies

+ used 01-2010.06.06-CaseStudies.ppt to orient discussion around approaches for developing necessary outputs within context of ADP/2005/068 (abstracts/outlines provided by workshop participants also included in 2010.06.07.PEtrain-IFPRI-Day2.zip)

>>> CASE STUDIES

>>> 1. ICASEPS: Productivity changes needed to address global and environmental change in Indonesia

>>> 2. IPB: Climate change impacts on welfare in Indonesia

>>> 3. TREDA: food security based around openness in trade and technologies) vs. subsidies (food self-sufficiency) under plausible futures—palm oil and possibly rice/sugar

2. Step through, in detail, the code for FAO-ICASEPS multimarket model

+ used the original GAMS code for FAO-ICASEPS multimarket model to discuss both GAMS programming and the modeling approach (see 2010.06.05.PEtrain-IFPRI-FAO-ICASEPSwork.zip)

3. Briefly introduced other multimarket model setups

+ used material from N. Minot's (2009) "Using GAMS for Agricultural Policy Analysis" for a basic introduction (see doc contained in 2010.06.05.PEtrain-IFPRI-printouts.zip, also provided supporting files in 2010.06.07.PEtrain-IFPRI-MinotGAMSFiles.zip the following day).

Notes: My initial intent for this day was to motivate people to work with the DREAM modeling framework, but from discussions the previous day, it became obvious that the strongest interest was in pushing forward with the FAO-ICASEPS multimarket model. The work of TREDA and IPB in the context of this project will not rely on partial equilibrium modeling directly, so a significant part of the discussion was on the interaction of CGE and PE models, especially how the IMPACT Model can/does interact with CGE models.

Day 3

Objectives: (i) Increase exposure to other agricultural sector partial equilibrium modeling approaches; (ii) introduce a "hands-on" example of implementing climate change impacts within a partial equilibrium model.

1. Present details on the DREAM model

+ used 01-2010.06.07-DREAMApproach.ppt to introduce DREAM modeling approach and discuss details of how this could be adapted to analysis of climate change impacts

2. Step through the "SimpleTrade" model as a prototype for the IMPACT model

+ used "Key Equations in Simple Trade Model.doc" and original code in SimpleTrade_Training.zip to illustrate more GAMS programming and the approach taken in the IMPACT Model (see 2010.06.07.PEtrain-IFPRI-SimpleTrade.zip).

3. Develop a prototype implementation of climate change impacts in the FAO-ICASEPS multimarket model

+ very simply and quickly developed an adaptation to allow for analysis of climate change impacts on Indonesian agriculture

Notes: This was a lot of material to cover in one day, but this is basically true for each day of this 4-day workshop on partial eq'm modeling. As a consequence, depth of coverage in each of these models had to be balanced with the desire to at least show different examples in enough detail to understand distinguishing features.

Day 4

Objectives: (i) Conclude discussion and learning of partial equilibrium modeling techniques; (ii) develop specific work plans to meet deliverable schedule for case studies for ADP/2005/068.

1. Work through the specific code to implement climate change impacts in FAO-ICASEPS multimarket model.

+ Stepped through changes made to FAO-ICASEPS model for simple implementation of climate change impacts on productivity (see code notes in

DescriptionOfChangesForCC.txt, 01-2010.06.08-FinalItems.ppt, and the actual code in 2010.06.07.PEtrain-IFPRI-FAOWithClimateChange.zip)

2. Wrap up work and discussion on partial equilibrium modeling techniques

     + Gave strong encouragement to participants to individually work through GAMS and multimarket tutorials and did a brief verbal review of models covered during workshop (see slide #3 of 01-2010.06.08-FinalItems.ppt).

3. Discuss approaches to developing studies of interest at ICASEPS, IPB, and TREDA, using climate change as an example and possible points of interaction with IFPRI's IMPACT Model

     + See slides 3-7 of 01-2010.06.08-FinalItems.ppt and examples of climate change literature in 2010.06.08.PEtrain-IFPRI-Day4.zip

4. Break out into groups by institution and develop specific plans for completing case studies particular to ADP/2005/068 by September 2010

     + See plans included in slides 8-10 in 01-2010.06.08-FinalItems.ppt

Notes: A relatively straight-forward day... I committed to sharing with all three institutions the latest yield/area impacts on crop production due to climate change coming out of the IMPACT modeling work (Project Foresight for UK government) as soon as they are available. IPB and TREDA will be sharing data and modeling work to seek out complementarities and synergies in CGE modeling. All three institutions will continue with open channels of communication to seek out further collaborations and ways to complement each other's work.