Project Description

PLAUSIBLE FUTURES FOR ECONOMIC DEVELOPMENT AND STRUCTURAL ADJUSTMENT IN INDONESIA – IMPACTS AND POLICY IMPLICATIONS FOR THE ASIA-PACIFIC REGION[1]

By

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[1] Research Collaboration between Australian Commissioned and Collaborating Organizations/IARC; International Food Policy Research Institute/IFPRI; Indonesian Center for Agricultural Socio-Economics and Policy Studies/ICASEPS, Indonesia's Ministry of Agriculture/MoA; Institute Pertanian Bogor/IPB or Bogor Agricultural University/IPB; Agency for Trade and Industry Research and Development/TREDA, Indonesia's Ministry of Trade/MoT.

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Plausible Futures for Economic Development and Structural Adjustment in Indonesia – Impacts and Policy Implications for the Asia-Pacific Region[1,2]

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1. Justification

Indonesian capacity to produce food is declining and becoming more volatile, and will likely to continue given plausible future changes in the global environment without appropriate policies on issues such as agricultural technologies, climate change, energy and globalization. To address this, there is a need for Indonesian agricultural policy review and identification of areas requiring assistance with quality policy analysis related to maintaining sustainable economic growth in the face of growing global economic and environmental pressures. Australia also needs to be aware of possible impacts of plausible futures in such issues and to have policies in place that will facilitate adjustment processes and assist economic development.

At international meetings in recent years, the ACIAR Director and IFPRI have discussed the need for and benefits of an Indonesian agricultural policy review and identification of areas requiring assistance with quality policy analysis addressing sustainable economic growth. During a recent scoping study to Indonesia on the project, the Minister of Trade specifically asked for assistance on the impact and policy responses to climate change on trade as will be researched in this project. Senior officials in the MoA

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2 The material is adapted from

3 Senior Research staff.

stated that not only is the longer-term situation important but having some independent analysis including longer-term impacts of key current policies such as on rice before 2009, involving concerted on-the-job training of Indonesian researchers, would be extremely useful in developing better analyzed policies.

Hence a need was realized for an Indonesian agricultural policy review and identification of areas requiring assistance with quality policy analysis related to maintaining sustainable economic growth in the face of growing global economic and environmental pressures.

2. Research and/or Development Strategy

The research strategies are not top-down or bottom up but more side-by-side with strong collaborations on the policy reviews; identifying key areas of capacity building; the development of policy analysis tools such as linked models; strategic policy analysis, including policy options, providing practical on-the-job training within a broad, consistent framework; and broad joint dissemination and adoption through a range of publications and presentations to target groups, especially policymakers.

The approach to promoting project outputs includes developing a broad range of outputs targeted at stakeholders, such as publications like newsletters, policy briefs and research papers that will be placed on a project website, and presentations directly to stakeholders. It also includes having these outputs come from within Indonesian policy advising agencies through institutional and capacity building. An important element in all of the objectives is coordination of policy positions across relevant institutions. ACIAR projects tend to promote this aspect and this will be applied in this project through joint policy dialogues around the developed plausible futures framework, lead by IFPRI. The activities in this project interact and draw from existing, previous and proposed related projects on the problem.

3. Objectives

The aims of the project are to improve capacity within Indonesian policy processes to review agricultural-related policies and agriculture's position in the economy and rural development, and to impact positively upon incomes, poverty and hunger in the longer-term by identifying and examining areas requiring assistance with quality policy analysis that will provide alternative policy options (e.g. in relation to adjustment). It will also bring out broader implications for the rest of Asia-Pacific region, to show how other large economies in the regions, like Australia, might best be able to adjust to policy changes in Indonesia under alternative growth scenarios. Specific objectives are:

1. Review Indonesian agricultural-related policies within broader technology, economic and physical environment;
2. Identify Indonesian agricultural-related policy areas requiring further assistance and strengthening, including the institutions themselves, and technologies to overcome productivity constraints to agricultural growth and effects of global climate change;
3. Develop required policy analysis tools, such as linked models, to strengthen the knowledge and decision support systems within Indonesia and the broader Asia-Pacific region;

4. Analyze priority areas and provide policy options, within a scenario-driven framework that can bring in long-term and economy-wide implications of policy options for both countries, under alternative plausible futures;
5. Disseminate the outcomes and adoption of research recommendations through publications and presentations to policymakers, together with established steering groups of policymakers in both countries; and
6. Provide hands-on training in strategic agricultural-related policy analysis.

Expected outputs include:

1. An overview of Indonesian agricultural technologies and policies towards enhancing economic growth and production efficiency in the face of global environmental and economic change;
2. Prioritized list of Indonesian agricultural-related policy areas requiring intervention, assistance and strengthening, including institutions and policy processes;
3. Enhanced knowledge and decision support system, including suite of developed policy analysis tools, such as linked economic models;
4. Policy analysis disseminated into policy processes through policy briefs, articles in ICASEPS policy newsletter, project website, etc;
5. Policy workshops and reports, commencing by end of 2008;
6. Developed framework containing basic components to enable Indonesia to move toward establishing its own independent and transparent industry policy assessment agencies; and
7. Better trained staff in undertaking strategic policy analysis, including use of developed policy analysis tools that will be disseminated at international professional conferences.

Strengthening Indonesian policy analysis capacity to examine the important issues identified, within independent and transparent institutions, would lead to substantial benefits. Impacts, expected within 5-10 years, include potentially large economic ones, given estimates of costs of current policies like rice import bans; social given the importance of agriculture in Indonesian society; and environmental given agriculture's interaction with Indonesia's significant natural resources.

The project commenced in mid 2009 and completed over 3.5 years , involving data collection and analysis on agricultural-related technology, policies, institutions, and econometric, both partial-equilibrium sector and economy-wide, modeling of policy options. It will also involve policy dialogues, study tours to relevant institutions and interchanges to build practical capacity along with in-project training.

4 Planned impacts and adoption pathways

The project is expected to have impacts at different levels: research and capacity, and community effects. Similar to past projects mentioned above, this project provides documentation on the research methodologies applied such that other scientists can refer to them for succeeding studies. Moreover, on-the-job training is extended to national research staff involved in the project to strengthen their skills and capacity in economic modeling as well as analysis of outputs. It is expected that partners will be confident and able to conduct similar studies in the future including analysis and interpretation leading to development and adoption strategies relevant to planners, policy analysts and policymakers in Indonesia.

Scientific impacts would be shown by novel scientific discoveries in the social science areas that would be picked up by other social scientists in subsequent research.

Capacity building impacts set out by the CIE Review of ACIAR's research on agricultural policies can be identified in terms of appreciation of the benefits of an economy-wide approach, trade liberalization, developing networks, and building, using and maintaining economic models. Although some of this capacity was lost with personnel leaving their analytic positions but, on the other hand, that some of these personnel then moved into more influential policy advising positions, carrying this useful background with them. Networks of researchers, policy advisors and policymakers were also maintained and the capacity building was influential in these networks.

At the community level, the project is expected to have impacts at the economic, social and environmental groupings. Outputs of scenario analysis will provide economic information that will assist the Indonesian government in prioritizing their investment agenda. Such decisions will affect the social welfare of the society particularly dealing with the agricultural sector and at the same time, needs to ensure environmental sustainability for agriculture, trade and other natural resource management approaches.

The project would be expected to have impacts within 5-10 years as it involves a plausible futures concept that has been proven at the aggregate world-wide level being applied at the country level (the information outputs are aimed at a wider audience in the development and implementation of policies that have been successful in other developing countries); good technical capacity of engaged policy areas that lack capacity in applied policy analysis and appropriate institutions; but only a generalized cost/benefit analysis can be undertaken without better parameterization.

In terms of the communication and dissemination strategies it should be appreciated at the outset that the project is very much demand driven and embedded in policy development groups with a strong hands-on capacity building element involving supporting international (IFPRI), Australian (e.g. ANU, UA, ABARE, PC) and Indonesian agencies (e.g. IPB, ICASEPS, CSIS). Thus the focus is on critical users of the information from the project, namely policymakers, with preferred publications such as policy briefs and communication vehicles like policy workshops. The demand-driven and internal embedding approach, in conjunction with transparency to a wider group of stakeholders such as poor consumers, should assist in addressing any constraints to the adoption of such outputs. The more targeted communications and dissemination is built off more substantial publications such as policy reports resulting from on-the-job training, and some academic papers seeking peer review on the policy analysis tools that have been developed, like models. All materials are being made generally available through the development of a project website.

5 Operations

5.1 Methodology

- Review Indonesian agricultural-related policies within the broader technology, economic and physical environment

It involves data collection, including at the regional level, and some preliminary analysis together with agricultural-related technology aspects as well as policies and institutions.

- **Identify Indonesian agricultural-related policy areas requiring further assistance and strengthening, including the institutions themselves**

This component involves applying a methodology that identifies those areas where the return on research will be maximized through the significance of the problem, its solvability, etc. Often priorities are wrongly based on a historical situation or some new fad. The main risk to achieving this objective concerns the underlying information but previous research in this area in Indonesia should provide proxy information when this is not available and sensitivity analysis could be undertaken to assist in the identification of the key policy areas.

- **Develop required policy analysis tools, such as linked models**

This methodology involves data collection and analysis including agricultural-related technology, policies, and institutions, and econometric, both partial-equilibrium sector and economy-wide (especially trade), model development. Key linkages are made between the economic models of agricultural production and growth, climate-driven models of hydrology and water allocation, as well as models of energy use, production and trade (with special emphasis on renewables such as bio-fuels). IFPRI's IMPACT (International Model for Policy Analysis of Agricultural Commodities and Trade) model has been further developed in the international assessment of agricultural science and technology for development project and although there are country level results including on Indonesia, this project requires some further regional disaggregation within Indonesia. This mainly engages the Indonesian side on the data but a greater collaboration is involved in developing the models, the Indonesian side having some capacity in this area from earlier training.

- **Analyze the priority areas and provide policy options, within a plausible futures framework that can bring in long-term and economy-wide implications of policy options for both Indonesia and Australia**

The methodology involves econometric, both partial-equilibrium sector and economy-wide (especially trade), modeling of policy options. Again this is a collaborative effort with the Indonesian focusing on the interpretation of the modeling and the collaborators through their own experiences on how to appropriately formulate the policy problem within the model and to communicate the outcomes in a form that maximizes them being taken up by policy advisers and policymakers. The team has numerous training and application experience in such strategic policy analysis.

- **Disseminate the outcomes and adoption of recommendations of the research through publications and presentations to policymakers, together with established steering groups of policymakers in both countries**

The main risk to achieving this objective concerns about the quality of recommendations proposed.

- **Provide on-the-job training in strategic agricultural-related policy analysis**

This is a collaborative exercise based mainly in Australia but one for Indonesian benefit. The component will also involve policy dialogues as well as interchanges to build practical capacity along with the in-project training.

5.2 Activities and opposed outputs/milestones

Objective 1: To review Indonesian agricultural-related policies (including in relation to decentralization) within the broader technology, economic and physical environment

Outputs/milestones:

1. Data collected for input to model while other secondary information as background materials Indonesian policy briefs
2. An overview of Indonesian agricultural technologies and policies with a view towards enhancing economic growth and production efficiency in the face of global environmental and economic change

Outputs/milestones from ICASEPS:

1. Agricultural policies report
2. Policy brief on agricultural institution structure

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

Outputs/milestones:

1. Prioritized list of Indonesian agricultural-related policy areas requiring intervention, assistance and strengthening, including institutions and policy processes and technologies to overcome productivity constraints to agricultural growth and the effects of global climate change
2. Improvement in capacity of Indonesia partners in implementation of agricultural policies
3. Confidence in identifying and revising policies to better address agricultural sector in relation to economic improvement of Indonesia

Outputs/milestones from ICASEPS:

1. Review paper on agricultural policies
2. Identification of potential areas for capacity strengthening and improvement in agricultural policies
3. Contribution to paper on guidance on capacity building strategies

Objective 3: To develop required policy analysis tools, such as linked agricultural technology assessment, energy, climate and economic (including economy-wide) models which can strengthen the knowledge and decision support systems within Indonesia and the broader Asia-Pacific region

Outputs/milestones:

1. Enhanced knowledge and decision support system, including a suite of developed policy analysis tools, such as linked economic models

2. Application of various economic models

Outputs/milestones from ICASEPS:

1. Paper assessing agricultural sector models
2. Contribution to Paper describing the methodology for linked CGE-IMPACT model
3. Contribution to paper that presents complete results from the application of linked CGE-IMPACT model

Objective 4: ***To analyze the priority areas and provide policy options, within a scenario-driven framework that can bring in long-term and economy-wide implications of policy options for both Indonesia and Australia, under alternative plausible futures***

Outputs/milestones:

1. Identification and assessment of priority areas using economic frameworks for Indonesia and Australia

2. Strategic policy analysis of priority areas in both countries within a plausible futures framework

3. Developed framework containing the basic components to enable Indonesia to move toward establishing its own independent and transparent industry policy assessment agencies

Outputs/milestones from ICASEPS:

1. Contributions through ICASEPS outputs/milestones in Objectives 1, 2 and 3.

Objective 5: ***To disseminate the outcomes and adoption of recommendations of the research through publications and presentations to policymakers, together with established steering groups of policy makers in both countries***

Outputs/milestones:

1. Policy analysis disseminated into policy processes through a website, ICASEPS policy newsletter, etc
2. Policy workshops and reports
3. Publish technical outputs in Indonesia and Australia

Outputs/milestones from ICASEPS:

1. Contribution to dissemination of results of policy analysis into policy processes through a website, ICASEPS policy newsletter, etc.

Objective 6: To provide hands-on capacity building in strategic agricultural-related policy analysis

Outputs/milestones:

1. Better trained staff undertaking strategic policy analysis, including using developed policy analysis tools disseminated at international professional conferences

Outputs/milestones from ICASEPS:

1. Involve in and contribute to training on economic analysis and other policy development related training
2. Involve in and contribute to capacity-building alternatives categorized (formal and informal) and prioritized
3. ICASEPS research personnel become better trained staff undertaking strategic policy analysis, including using developed policy analysis tools disseminated at international professional conferences

6. Final Outputs/milestones produced by ICASEPS as of December 2013:

Objective 1:

Outputs/milestones from ICASEPS:

1. Paper on agricultural institution structure after decentralization: "**Agricultural Policies and Agricultural Institutions under Decentralization: A Decade after Decentralization**" by **Budiman F. Hutabarat, Adi Setiyanto, and Reni Kustiari submitted on June 13, 2013.** This is a revised and extended version of earlier paper presented at the June 7, 2013 Workshop, prepared by **Budiman F. Hutabarat, Adi Setiyanto, and Reni Kustiari** with title **"Indonesia's Agricultural Sector A Decade after Decentralization**" submitted June 6, 2012 .

Objective 2:

Outputs/milestones from ICASEPS:

1. Review paper on agricultural policies was submitted on **November 25, 2013 by Hutabarat, Budiman F. and Reni Kustiari** with title **"Policies Affecting Indonesia's Agricultural Productivity in the Early Millennium" dated November 25, 2013**. This is a revised and extended version of earlier paper submitted on December 19, 2009 by **Hutabarat, Budiman and Reni Kustiari** with title **"Data and Information on Policies Affecting Indonesian Agricultural Productivity in the Early Millennium" dated 2009.**

2. Identification of potential areas for capacity strengthening and improvement in agricultural policies: Two reports were submitted, that is: (i) on **June 6, 2013** by **Kustiari, Reni, Budiman Hutabarat, and Adi Setyanto** with title **"High-Potential Areas For Investment To Revitalize Indonesia's Agriculture Sector"** dated **May 24, 2013** and (ii) Review paper on agricultural-related policies within the context of climate environment was submitted on **June 6, 2013** by **Hutabarat, Budiman F.** with title **"Climate Change And Indonesia's Agriculture"** dated **June 6, 2013.** The first paper is a revised and extended version of the paper presented at the June 7, 2013 Workshop, prepared by the same authors and title**.**
3. Contribution to paper on guidance on capacity building strategies. Materials from papers already submitted.

Objective 3:

Outputs/milestones from ICASEPS:

1. Paper assessing agricultural sector models: Report was submitted on June 6, 2013 prepared by **Hutabarat, Budiman F. and Reni Kustiari** with title **"Agricultural Demand, Supply and Sector Modeling in Indonesia" dated June 5, 2013.** It is a revised version of the same paper written by the same authors and submitted on **August 2, 2010.**
2. Contribution to paper describing the methodology for linked CGE-IMPACT model. It is not required.
3. Contribution to paper that presents complete results from the application of linked CGE-IMPACT model. Report was submitted on **June 6, 2013** with title **"An Examination of Climate Change Impact on Indonesia's Agricultural Sector"** by **Hutabarat, Budiman F., Adi Setiyanto, Reni Kustiari, Timothy B. Sulser and Claudia Ringler** dated on **April 8, 2013**. The paper is a revised and extended version of the paper presented at the June 7, 2013 Workshop, prepared by **Hutabarat, Budiman F., Adi Setiyanto, and Reni Kustiari** with title **"An Examination of Climate Change Impact on Indonesia's Agriculture Sector**".

Objective 4:

Outputs/milestones from ICASEPS:

1. Contributions through ICASEPS outputs/milestones in Objectives 1, 2 and 3.

Objective 5:

Outputs/milestones from ICASEPS:

1. Three policy briefs have been uploaded onto the ICASEPS website address: http://pse.litbang.deptan.go.id. The briefs are as follows:

"High-Potential Areas for Investment to Revitalize Indonesia's Agricultural Sector*" at http://pse.litbang.deptan.go.id/ind/index.php/laporan-hasil-penelitian/policy-brief;

"Agricultural Policies and Agricultural Institutions under Decentralization: A Decade after Decentralization*" athttp://pse.litbang.deptan.go.id/ind/index.php/laporan-hasil-

penelitian/policy-brief/2536-agricultural-policies-and-agricultural-institutions-under-decentralization-a-decade-after-decentralization; and

"Climate Change Impact on Indonesia's Agricultural Sector*"
at http://pse.litbang.deptan.go.id/ind/index.php/laporan-hasil-penelitian/policy-brief/2535-climate-change-impact-on-indonesia-s-agricultural-sector.

2. One paper has also been submitted to *Jurnal Agro Ekonomi*, the ICASEPS's journal (see *Jurnal Agro Ekonomi* 30 (1): 1-23 published in 2012) with **title "Conjecturing production, imports, and consumption of horticulture in Indonesia in 2050: A GAMS simulation through changes in yields induced by climate change"** by **Hutabarat, Budiman, Adi Setiyanto, Reni Kustiari and Timothy B. Sulser**.

Objective 6:

1. Involve in and contribute to training on economic analysis and other policy development related training.
2. Involve in and contribute to capacity-building alternatives categorized (formal and informal) and prioritized.
3. ICASEPS research personnel now have better undertaking to conduct strategic policy analysis, including using developed policy analysis tools. With that skill. These Researchers could be expected to disseminate their research papers at international professional conferences.

7. ICASEPS Report Findings

1. The role of the agricultural sector in Indonesia is still crucial to the growth of the national economy. However, it has been challenged by external and internal factors. Few policies have been adjusted over time so as to put them less burdensome on the government budget outlays. Yet, it is difficult to discontinue support, given the structure of the Indonesian agricultural economy.

2. The approach to agricultural development in principle has changed since the late 1990s, from centralized and elitism of the capital to decentralized and community participation approach by capitalizing all resources from the governments, the private sectors at central, provincial, district/municipal levels, communities and others. But the enactment of decentralization legislations has not altered the formulation of agricultural development policies, because all layers of governments still maintains the governing task of economic sectors development, including in agriculture.

3. 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 percent of the budget. The remaining 80 percent is handled by the regional governments under De-concentration funding scheme. These funds are largely allocated to activities associated with the empowerment of famers groups' and community or the strengthening of farmers groups' capital by establishing the agribusiness groups' checking account in a bank. However, the implementation of De-concentration activities has not been successful in the past, 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.

4. A variety of policies related to agriculture, such as agriculture input and output price controls, fertilizer subsidies; floor price of paddy; financing and agricultural credit, seed subsidies; irrigation and area expansion are decided by line ministries. But the coverage and magnitudes of these policies have considerably scaled down.

5. The estimates of demand elasticities of agricultural products in Indonesia are not all income inelastic. It is explicable because food is quite a broad category, and consists of a mixture of rather different goods and products. An observed fall in the quantity of overall food consumed may be as a result of small higher quality food as well as a large quantity of food products are both in the consumer's bundle.

6. Agricultural products have not shared the same research interests in Indonesia. Some products have been extensively studied, such as rice and sugar and to some extend dairy products but many others have not yet gotten research attention despite, as many scholars have claimed that some of these products may well be substitutes for rice as source of carbohydrate and protein and could generate higher alternative and potential income for farmer. Vegetable, fruit and animal products which are presumed to have high elastic demand only have limited data on elasticity estimates. Research on the supply side is even scanty. Most of the supply studies are devoted also to rice and sugarcane.

7. The supply of crops and livestock products is mostly price inelastic, particularly in the short-run, because (1) the high proportion of fixed inputs, land, the farmer's own labor, building, and equipment; (2) the strong correlation between farm product prices and agricultural input prices; and (3) the fixed resources, land, and farm labor, are residual claimants of the income generated in production.

8. As reliable data on agricultural product consumption do not exist, projection figures reported could be quite different apart from one researcher to another. Some investigators projected that Indonesia would still be a net importer of food crops in the near future, but others predicted otherwise. In both cases demand and supply elasticities are mainly accountable for the results, coupled with the projection formula and scenarios imposed to the models by the investigators which are often formulated to represent alternative possible policy interventions or targets. As projection figures or model results are calculated or derived from inadequate data and models that abstract complex reality, any interpretation made out of them should be done cautiously.

9. Climate change is already affecting Southeast Asia, including Indonesia with rising temperatures, decreasing rainfall, rising sea levels, and increasing frequency and intensity of extreme weather events. These have led to massive flooding, landslides, and droughts causing extensive damages to property, assets, and human life. Climate change is also exacerbating the problem of water stress, affecting agricultural production, causing forest fires, degrading forests, damaging coastal marine resources, and increasing outbreaks of infectious diseases.

10. By the end of the 21st century rice yields is predicted to decline at 3.8% as a consequence of the combined influence of fertilization effects and accompanying thermal stress and water scarcity. Yields of upland crops in Indonesia such as soybean and maize could fall by 20 to 40 percent. The same thing will happen to

industrial crops such as rubber trees, oil palms, coconut, and fruit trees, particularly due to heat and water stresses as well as wildfires. The livestock industry and other industries that are based on natural resources will be lagging. Soil salinization will deteriorate land fertility near the coast which eventually reduces agricultural production.

11. Economic impact of climate change in Indonesia would be very significant. Without further adaptation and mitigation effort, the market and non-market impact would reach at 6.0 percent of GDP in 2100 and if disaster impact is included this costs would rise to 7.0 percent of GDP. The overall effect would be to reduce potential average income. The estimated reduction of yield would cost the rice farmer US$ 10 to US$ 17 annually, the soybean farmer US$ 22 to US $72 and the maize (corn) farmer US$ 25 to US $130 annually.

12. Climate change will confuse farmers for deciding the time to plant their crops. Consequently, crop failures will be unavoidable. The current cropping pattern of rice-rice that predominantly is used in most of the rice growing areas of Indonesia might not be practicable anymore in the future because keeping this cropping pattern may expose Indonesian farmers to more frequent crop failures. Food security in Indonesia will be threatened by climate change due to its impact on precipitation, evaporation, delaying the onset of monsoon rains, run-off water and soil moisture. Food insecurity and loss of livelihood are likely to be exacerbated further by the loss of arable land and fisheries to inundation and coastal erosion in low-lying areas.

13. The adaptation to climate change benefits exceeds its costs. At a cost of just 0.2% of GDP for investment in, for example, sea walls and drought- and heat-resistant crops, the four countries Indonesia, Philippines, Thailand, and Viet Nam could avoid damage amounting to 1.9% of GDP by 2100, on an annual basis. For Indonesia and three other Southeast Asia countries, adaptation costs for agriculture and coastal zone is estimated at US$ 5 billion per annum in 2020. Its annual benefits from deterrence of disaster due to climate change prevention for Indonesia would likely surpass its costs in 2050.

14. This study shows that climate change would bring about mixed results in per capita calorie consumption in Indonesia. For Java households per capita calorie availability would drop by -0.03 to -1.32 percent , while to some extent the Off- Java households experience growth in per capita consumption, except for Off-Java–poor households under Scenario 2050CSIRO_B1 and 2050MIROC_A1b, that would suffer a decrease in consumption ranging from –0.05 to –0.65 percent.

15. 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 be discriminated against other quick-yielding and capital intensive sectors because agriculture is triple-squeezed by force originating from the implementation of decentralization and autonomy. On one side, the devolution of agriculture management only as a voluntary task for regional governments as clearly stated in Government Regulation 38/2007 entails that agriculture will be second to the least priority in their economic development framework.

16. On another side, the authors observed that decentralization policy have seemingly discouraged the agricultural commodity production expansion and agricultural development, and would likely continue to do so in the future if some corrections are not made either in policies or regulations by central and regional governments. The present decentralization practices seem to have built unfavorable condition to agriculture in such a way that this sector is now being squeezed by the following factors: first, the devolution of agriculture management as a voluntary task for regional governments, as stated in Government Regulation 38/2007; second, a tendency to use regional or local regulations in various economic sectors to collect or raise taxes, "retributions," or other forms of charges to ease the limited amounts of regional income and to quickly boost their RGRs; third, high-costs agricultural economies; fourth, conflicting policies and programs to pursue high growth in economy; fifth, the hasty devolvement of authority and misallocation of regional resources.

17. Investment in agricultural sector is efficient because we could gain I unit value-added out of each agricultural commodity by less than 1 unit value of investment in the commodity. Furthermore, the results also show that by enlarge the ICOR value of investment becomes smaller if on-farm activities of the commodity are integrated with its processing and consumption activities, which confirms that the processing and consumption activities also generate a higher value-added. The result evokes that processing, manufacturing and packaging agricultural products is the new yank to fetch Indonesia's agriculture.

8. ICASEPS Recommendation

1. Given how serious the impact of climate change to Indonesia's agriculture and to Indonesia's economy is, it is imperative that Indonesia should actively participate in mitigation and adaptation strategies to abate the climate change occurrence collectively with international communities. For the agriculture sector, there is not much room for mitigation as noted in National Plan of Action for Mitigation and Adaptation to Climate Change.

2. The Ministry of Agriculture has formulated road map strategic plan to anticipate global climate change that consists of infrastructure development, especially irrigation networks to reduce flood and drought risk, enhancement of farmers' capacity on technology adoption, adaptation to and mitigation of climate change. Nevertheless, the availability of the strategic plans, policies and even technologies are necessary but not sufficient to guarantee that Indonesia would be winning in endeavors to manage the climate behavior. Real actions would be required, that is, each party that would affect and would be affected by environmental condition directly and indirectly should start to convince itself that changing climate is factual and alarming and should do something about it with its own responsibility. And all technologies produced by research centers should be incessantly tested and more importantly are made available to ordinary farmers.

3. On decentralization aspect, the authors propose few recommendations; First, the regional governments, particularly those that have substantial existing agricultural resources and agricultural support infrastructure, specifically irrigated land and irrigation infrastructure should be strongly made aware of considerable cost consequences of converting irrigated or agricultural lands; Second, if irrigated or

agricultural lands have to be safeguarded, some kinds of incentive needs to be provided for the land-owners by the central or regional governments. Or the governments could take over the possession of the land from the land-owner through compensation mechanism to assure that land is maintained for paddy cultivation or agricultural use; Third, the central government is also obliged to guarantee the law enforcement and to provide incentive or credits to regional governments that have protected their paddy or agricultural lands, which could be disbursed through any form of budget transfer like Deconcentration, General or Special Allocation, and Assistance Functional Funds; Fourth, decentralization policy should be went along with capacity building for regional elites and leaders; Fifth, regional stakeholders should be also enlightened about the importance and rationale for strengthening regional knowledge networks so they can be more active in the policy process; Sixth, there has to be improvement in coordination between national and local governments to reduce legal uncertainty and promote transparency about regulations, standard operating procedures, and clear implementing guidelines related to public services; Seventh, strong coordinating bodies among neighboring regional governments are also imperative in order to prevent negative externalities emanating from over exploitation of existing natural resources and public infrastructures by unscrupulous investors and unlawful businessmen.

4. In order to develop the rural economy, investments are urgently required in agricultural productivity improvement, agricultural research, extension, rural infrastructure, education, health and improved functioning of markets.

5. Opportunities exist in revolutionizing productivity and production through inputs, techniques and technology, supply chain management, as well as developing new industries, such as food processing, that currently do not develop as expected.

6. There is broad range of potential investment areas in agriculture: (i) infrastructure and inputs provision that include investments in new system, center pivot and drip irrigation, land reclamation/restoration and the renovation of the existing canal-based flood irrigation systems; new and appropriate varieties of seed inputs (seed of adaptive varieties) matched to climatic conditions and cultural and management practices and fertilizers will also be required. Moreover, improvement in infrastructure for handling, storing, and distributing agricultural inputs and outputs are also needed; (ii) highly profitable, healthy-food and environmentally friendly approach stretching from establishing commercial farming units, establishing organic farming agribusiness; (iii) crop production specifically on maize, fruits and vegetables; (iv) livestock production in cost-efficient farming and processing. To get the investment materialize, private companies participation should be encouraged.

9. Closing Remarks

Indonesian capacity to produce food is declining and becoming more volatile, and will likely to continue given plausible future changes in the global environment without appropriate policies on issues such as agricultural technologies, climate change, energy and globalization. To address this, there is a need for Indonesian agricultural policy review and identification of areas requiring assistance with quality policy analysis related to maintaining sustainable economic growth in the face of growing global economic and environmental pressures. This is the intention of the research project, which is briefly explained in this paper. Some specific issues that were addressed by the research was the efforts to improve

capacity within Indonesian policy processes by reviewing agricultural-related policies and agriculture's position in the economy and rural development, and to impact positively upon incomes, poverty and hunger in the longer-term by identifying and examining areas requiring investment assistance with quality policy analysis that will provide alternative policy options (e.g. in relation to adjustment).

The project is done in a collaborative fashion by involving various national and internationally reputable institutions, namely Research Collaboration between Australian Commissioned and Collaborating Organizations/IARC; International Food Policy Research Institute/IFPRI; Indonesian Center for Agricultural Socio-Economics and Policy Studies/ICASEPS, Indonesia's Ministry of Agriculture/MoA; Institute Pertanian Bogor/IPB or Bogor Agricultural University/IPB; Agency for Trade and Industry Research and Development/TREDA, Indonesia's Ministry of Trade/MoT; Australian National University/ANU and University of Adelaide/UA. ICASEPS involvement specifically is aimed to produce some outputs/milestones and play a part in some activities, as follows:

1. Agricultural policies
2. Agricultural institution structure under decentralization report
3. Review paper on agricultural policies affecting agricultural productivity
4. Identification of potential areas for investment and capacity strengthening and improvement
5. Contribution to paper on guidance on capacity building strategies
6. Paper assessing agricultural sector models
7. Review paper on climate change impact on Indonesia's agriculture and paper containing empirical assessment of the impact
8. Contribution to paper describing the methodology for linked CGE- IMPACT model
9. Contribution to paper that presents complete results from the application of linked CGE-IMPACT model
10. Contribution to dissemination of results of policy analysis into policy processes through a website, ICASEPS policy newsletter, etc.
11. Involve in and contribute to training on economic analysis and other policy development related training
12. Involve in and contribute to capacity-building alternatives categorized (formal and informal) and prioritized ICASEPS research personnel become better trained staff undertaking strategic policy analysis, including using developed policy analysis tools disseminated at international professional conferences

Until the writing of this note (December 12, 2013) ICASEPS research staff has prepared ~~5~~ 6 (~~five~~six) working papers in the course of this project. These papers will be upgraded possibly to produce some scientific and publishable papers. In addition, three policy briefs have also uploaded onto and could be accessed from the ICASEPS website address: http://pse.litbang.deptan.go.id. Below are the authors and titles of the papers:

1. **Hutabarat, Budiman F., Adi Setiyanto, and Reni Kustiari. June 12, 2013.** "**Agricultural Policies and Agricultural Institutions under Decentralization: A Decade after Decentralization**".

2. **Hutabarat, Budiman F. and Reni Kustiari. November 25, 2013. "Policies Affecting Indonesia's Agricultural Productivity in the Early Millennium".**

3. **Hutabarat, Budiman F. and Reni Kustiari. June 5, 2013. "Agricultural Demand, Supply and Sector Modeling in Indonesia".**

4. **Hutabarat, Budiman F. June 6, 2013. "Climate Change And Indonesia's Agriculture".**

5. Budiman F. Hutabarat, Adi Setiyanto, Reni Kustiari, Timothy B. Sulser and Claudia Ringler. May 24, 2013. "An Examination of Climate Change Impact on Indonesia's Agricultural Sector".

6. Reni Kustiari, Budiman Hutabarat, and Adi Setyanto. February 1, 2013. "High-Potential Areas for Investment to Revitalize Indonesia's Agriculture Sector".