Socio-Economic Analysis and Policy Implications of the Roles of Agriculture in Developing Countries

The Roles of Agriculture in Development: Policy Implications and Guidance

Research Programme
Summary Report 2007

Roles of Agriculture Project

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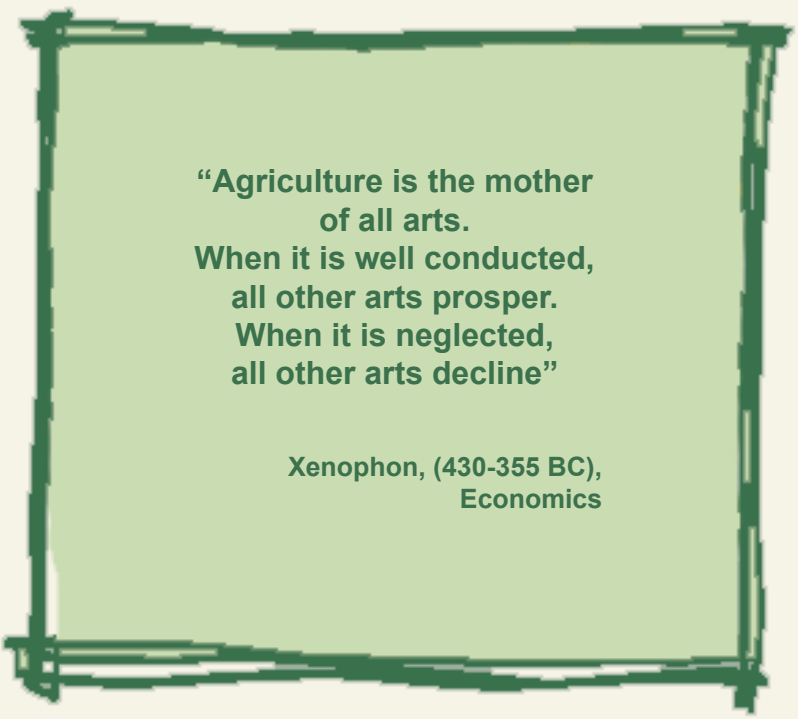

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Highlights

- The 'roles of agriculture' examined in this project are indirect functions with externality characteristics that the agriculture sector has or is expected to have in society and include the contributions to poverty alleviation, household food security, the provision of environmental services, out-migration control, buffer in times of economic crisis and national cultural identity.

- The indirect roles of agriculture have been poorly understood, seldom analyzed in the context of development and rarely reflected in actual policy formulation in developing countries. Such a limited appreciation of agriculture's contributions is considered to be one of the main reasons why the agriculture sector in developing countries does not realize its full potential for economic and social development.

- The Roles of Agriculture Project was undertaken from 2000 to 2006 to identify, describe, and to the extent possible, quantify the indirect roles of agriculture with externality characteristics and to draw policy implications and deliver policy guidance and tools to take best advantage of those roles in development strategies. Findings, insights and lessons drawn from the project are expected to contribute to sustainable agricultural and rural development prescribed in such global agreements as the Agenda 21 in 1992 and the Rome Declaration on World Food Security in 1996.

- Key findings from the Project are:
  - Indirect roles of agriculture with externality characteristics do exist in developing countries and can be quantified when appropriate data and techniques are available.
  - The indirect roles of agriculture appreciated by society are shaped by diverse economic, social and environmental factors in general and by the stage of development in particular.
  - The limited awareness of and attention to these indirect roles stem mainly from the lack of sufficient data and information on their incidence, prevalence and magnitude.
  - These indirect roles are under-supplied from a social point of view since farmers and other stakeholders do not face the right incentives to take their social benefits into consideration due to the combination of market, policy and institutional failures.
  - Results of empirical analysis and policy guidance and tools generated from the Project are proved to be a significant first step towards a deeper appreciation of the external roles played by agriculture and their reflection into decision making processes.
  - More needs to be done towards full-fledged recognition and reflection of the indirect roles of agriculture into policy formulation in the domain of both research and policy.

- Key messages from the Project for policy makers and the development community are:
  - Policy makers and the development community should pay due attention to the existence and contributions of the indirect roles of agriculture and integrate these social values into their decision making.
  - Maximum efforts should be made to collect basic data and information on the incidence, prevalence and magnitude of the indirect roles of agriculture.
  - Governments, communities, firms and households should invest their resources more in agriculture by reversing its declining trend in both public and private sectors, given the much higher social rate of return on the investment in the agriculture sector if its external benefits are taken into consideration.
  - Market, policy and institutional failures hampering agriculture's potentials should be redressed so that decision makers of resource allocation face the right incentives by incorporating its social benefits.
  - Those policy responses should take due account of the changing roles of agriculture in the course of development. There is no one-size-fits-all approach and an appropriate policy mix should be found.

Contents

Preface

This report summarizes the insights, findings and lessons drawn from the second phase of a research programme termed the 'Socio-Economic Analysis and Policy Implications of the Roles of Agriculture in Developing Countries' (project symbol: GCP/INT/916/JPN). This programme, known as the Roles of Agriculture (ROA) Project, is funded by the Ministry of Agriculture, Forestry and Fisheries of Japan and managed by the Agricultural Development Economics Division (ESA), Economic and Social Development Department, Food and Agriculture Organization of the United Nations.

The overall objectives of the Project are to explore such indirect roles of agriculture with externality characteristics as poverty alleviation, food security, environmental services, out-migration control, buffer in times of economic crisis and national cultural identity and to reflect them in policy formulation. To this end, Phase I of the project from 2000 to 2003 pursued empirical analysis to identify, describe and to the extent possible quantify these roles of agriculture, while its Phase II from 2004 to 2006 undertook prescriptive analysis to draw policy implications and deliver policy guidance and tools to take best advantage of these indirect roles in development strategies. The main results from the Phase I are summarized and published in a similar report entitled 'Socio-Economic Analysis and Policy Implications of the Roles of Agriculture in Developing Countries: Research Programme Summary Report 2004'. The current report provides key policy findings and lessons from the Phase II, built on the experiences drawn from the Phase I.

This report is a result of a collaborative effort between the ROA Project Central Team, national experts, consultants and participants to various meetings. In contrast to the Phase I of the project, the Phase II concentrated on the incentives for environmental service in conformity with poverty alleviation and policy reforms for linking agricultural growth with poverty alleviation and food security. Policy case studies were implemented in 10 developing countries in the area of these two research components of the Phase II. The results of the case studies were initially discussed in national workshops and subsequently presented in a mid-term expert workshop held in May-June 2005 and a ROA final workshop held in December 2006. As a result of these accumulated efforts, policy implications and guidance on the two research components were formulated, overall findings and lessons from the entire project including its Phase I were drawn and possible activities for follow-up were identified, as summarized in this report.

A list of contributors to, and publications from, the ROA Project Phase II is provided in Annex 1 and 2, respectively, in this report. As this project, begun in2000, reaches its conclusion, the ROA Project Central Team and ESA extend their sincere appreciation to the Ministry of Agriculture, Forestry and Fisheries of Japan for its funding for the past 7 years and making this work possible.

Takumi Sakuyama
Team Leader
Roles of Agriculture Project Phase II

Overall Approach[1]

Background, rationale and objectives

The smaller share for agriculture of economic output and workers as incomes increase over time is the most robust 'stylized fact' describing the structural transformation. Does this mean that agriculture is unimportant given that its relative share of the economy declines in any case? Such a widespread misconception led to development strategies that squeezed agriculture and rural areas on behalf of the more dynamic industrial sector and urban centers in the 1950s. This 'squeeze agriculture' paradigm gave way to a more balanced growth strategy and, at present, the development consensus is that a strongly performing agricultural sector is fundamental for overall economic growth.

The performance of the agriculture sector in developing countries is still far from satisfactory, however. More than 800 million people are undernourished and poverty and food insecurity persist not only in Sub-Saharan Africa but even in emerging Asian countries. Environmental benefits from traditional agriculture diminish while environmental degradation accelerates, resulting either from persistent poverty that hampers proper investment in resource bases or increased intensification and expansion of agricultural production. Some 800 million people have moved from the countryside to urban areas in the past 50 years, often leading to congestion, a high incidence of crime and deteriorated living conditions in large cities. Rapidly expanded labor markets in urban areas made up of many informal workers are vulnerable to economic shocks and crises that hit developing economies frequently. Cultural traditions deep rooted in agriculture and rural areas are fading away in the course of development.

The underlying cause of these problems in developing countries may originate from the fact that the roles of agriculture appreciated by policy-makers are still limited to direct and tangible contributions to a country's development. In other words, even though the agriculture sector has much greater potentials for contributing to help solve these problems, such potentials are not fully materialized owing to the combination of market, policy and institutional failures. These potentials should correctly be seen as an externality whose value cannot be properly reflected in decision making to be made based on private costs and benefits. This is the basic presumption on which the Roles of Agriculture Project is based. The roles of agriculture with externality characteristics include contributions to poverty alleviation, food security, environmental services, out-migration control, buffer in times of economic crisis and national cultural identity.

The overall objectives of the Project are to explore the indirect roles of agriculture with externality characteristics and to reflect them in policy formulation. To this end, the initial task addressed by the Project during its Phase I from 2000 to 2003 was empirical in nature: identifying, describing and to the extent possible quantifying these roles of agriculture. In contrast, the major challenge in its Phase II from 2004 to 2006 was prescriptive: drawing policy implications and delivering policy guidance and tools to take best advantage of these indirect roles in development strategies. Findings, insights and lessons drawn from the project are expected to contribute to the goal of 'Sustainable Agricultural and Rural Development' (SARD) prescribed in such global agreements as the Agenda 21 and the Rome Declaration on World Food Security.

Roles of agriculture examined: conceptual foundation

There are numerous terms describing the indirect roles, functions and contributions of agriculture other than the provision of food and fiber. Such terminologies include 'roles of agriculture', 'multifunctionality of agriculture' and 'non-trade concerns'. It is important to recognize, however, that these terms are not synonymous and have emerged in a specific context. For example, although multifunctionality and non-trade concerns are common in that both terms are extensively used in OECD countries, multifunctionality is a concept related to domestic policy objectives and their impacts on trade liberalization, whereas non-trade concerns is a notion defined purely in relation to international trade. The indirect roles of agriculture with externality characteristics to be examined in the Project can be best termed as 'roles of agriculture', given that it focuses exclusively on developing countries and aims at promoting better domestic policies that will take advantage of such indirect contributions (Box 1).

The roles of agriculture can be defined in general terms as 'the function that agriculture has or is expected to have in society'. Such a definition is too broad to operationalize for meaningful analysis, however, and a more concrete and focused definition supported by solid conceptual basis is warranted. Table 1 provides the conceptual foundation to differentiate the roles to be examined in the project from other existing roles, and the scope of the project is represented in the shaded area. In this table, various roles of agriculture are classified based on the degree of directness of their impacts (row) and the degree of internalization of their cost of provision (column). For example, the most visible, inherent and well-recognized role of agriculture is the provision of food and fiber. The production of food and fiber in turn generates income for their producers and provides employment opportunities. These are 'direct roles providing private goods and services' in that their benefits are

[1] This section is partly based on Sakuyama, 2006a.

Box 1 Comparison between FAO's roles of agriculture and OECD's multifunctionality

The 'raison d'être' of the ROA project can be clarified by contrasting its analytical approach with OECD's work on multifunctionality (OECD, 2001). There are numerous differences between these two projects in terms of scope, objective and key concepts. Firstly, the ROA project covers developing countries whereas the OECD work focuses on developed countries. Secondly, the ROA project is domestic policy-oriented attempting to provide policy guidance to take best advantage of the indirect roles of agriculture in development strategies, while the OECD work focuses on the domestic-international policy interface aiming at establishing good policy principles to harmonize multifunctionality objectives with trade liberalization. Thirdly, 'roles of agriculture' encompass a normative element (i.e. how it ought to be) and are characterized by indirect linkages and externalities, whereas 'multifunctionality' is defined as a positive concept (i.e. how it works) and distinguished by joint production and externality and public goods characteristics.

	Roles of agriculture (FAO)	Multifunctionality (OECD)
Scope	developing countries	developed countries
Objective	providing policy guidance to take best advantage of the roles of agriculture in development strategies	establishing good policy principles to harmonize multifunctionality objectives with trade liberalization
Definition	indirect functions with externality characteristics that agriculture has or is expected to have in society	non-commodity outputs with externalities and public goods characteristics that are jointly produced with commodities
Key concepts	• indirect linkages • externalities	• joint production • externalities • public goods

remunerated through market transactions (Sphere A).

In addition to such traditional roles of agriculture, market-mediated indirect contributions of agriculture to society are increasingly recognized since the 1960s. Johnston and Mellor outlined the following five roles to this end:

- providing labor for an urbanized workforce
- supplying savings for investment in industry
- enlarging markets for industrial outputs
- providing export earnings to pay for imported capital goods
- producing primary materials for agro-processing industries.

These can be termed 'indirect roles providing private goods and services' in the sense that, although they are neither direct nor visible as food production, their contributions are still rewarded in a market economy (Sphere B).

The ROA project goes further, focusing on agriculture's 'indirect roles providing goods and services with externality characteristics' which have too often been neglected in development strategies (Sphere D). Externalities signify the unintended spill-over effects that the agriculture sector generate to the third party in which external costs and benefits from these indirect roles are not incorporated into decision making in a competitive market, thereby causing their sub-optimal provision (i.e. market failure). These roles include:

- poverty alleviation
- food security
- environmental externalities from agriculture
- reduction in out-migration from rural areas
- buffer to mitigate the surge in urban unemployment in times of economic shock
- enriching the rural sector's contribution to national cultural identity

Table 1 Classification of roles of agriculture

	provision of private goods and services	**provision of goods and service with externalities**
Direct impacts	**Sphere A** • food production • income generation • employment opportunity	**Sphere C** • poverty alleviation (within household) • food security (within household)
Indirect impacts	**Sphere B** • surplus labor provision • saving for investment • market for industrial goods • export earnings • materials for agro-processing industries	**Sphere D** • poverty alleviation (spill-over) • food security (spill-over) • environmental externalities • out-migration control • buffer in times of economic shock • culture formation

Two caveats are required. As for the poverty alleviation and food security roles, it should be noted that agriculture creates both private and public benefits with externalities. Poverty alleviation and improved food security in farm and non-farm households as a result of increased agricultural production per se do not pose externalities. When societies have established minimal standards to be met in terms of human rights, however, the lack of ability to fulfill those standards creates a negative externality and thus the alleviation of poverty and food insecurity is considered to be a reduction of such a negative externality for society (Sphere C). Furthermore, alleviation of poverty and food insecurity will deliver significant spillover benefits to a society at large through better nutrition, health and education, leading to higher economic growth and improved welfare (Sphere D). In light of the latter characteristics of poverty alleviation and food security which meet the above criteria, these roles as a whole are covered in the project.

The second caveat is mainly related to environmental externalities. It is well known that the agriculture sector generates both positive as well as negative externalities, and that the latter may be more prevalent especially in developing countries. Even though the project focuses mainly on the positive contributions of agriculture to society, this does not mean disregarding its negative environmental externalities. On the contrary, this is clearly in the scope of the project given that, as analogous to the previous case, the reduction of negative environmental externalities is considered to be a positive contribution to society.

Table 2 Comparison between Phase I and II

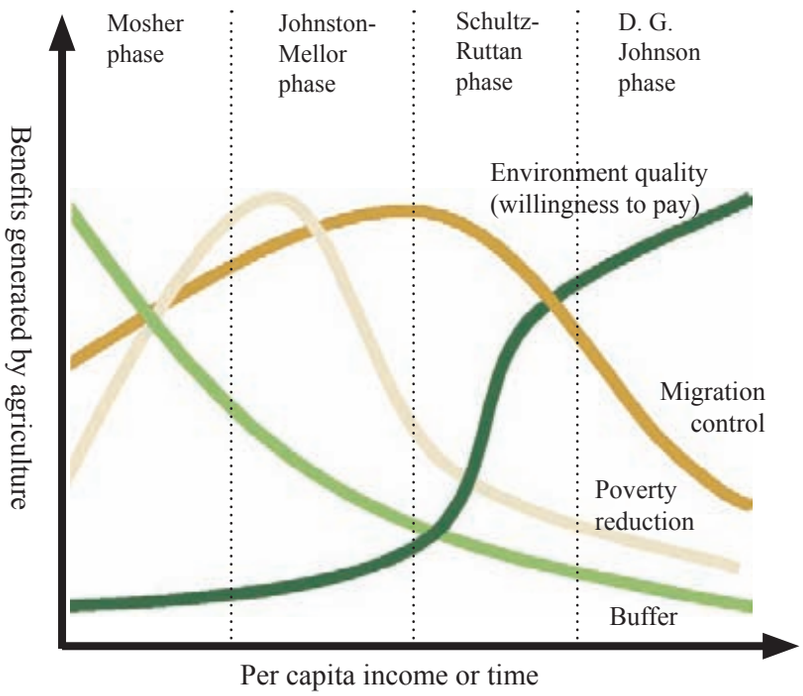
	ROA Phase I (2000-2003)	ROA Phase II (2004-2006)
challenge	indirect roles of agriculture are poorly understood and seldom analyzed in the context of development	indirect roles of agriculture have rarely been reflected in actual policy formulation in developing countries
objectives	identify, describe and to the extent possible quantify indirect roles of agriculture	to deliver policy guidance and tools to take best advantage of indirect roles of agriculture
approach	empirical	prescriptive
roles examined (modules)	• poverty alleviation • household food security • environmental externalities • out-migration control • buffer in times of economic shock • culture formation	• poverty alleviation and food security (PAFS) • environmental services (ES)
activities	country case studies on above 6 modules in 11 developing countries	• 3 policy case studies for PAFS module • 7 policy case studies for ES module
outputs	analytical framework and cross-country synthesis reports	policy guidance reports and analytical tools

Evolving emphasis of the Project: from empirical to prescriptive analysis

The Roles of Agriculture Project is composed of two distinct, but closely related, phases. The Phase I was implemented from 2000 to 2003 in an attempt to identify, describe and to the extent possible quantify indirect roles of agriculture with externality characteristics in developing countries, while the Phase II has been undertaken from 2004 to 2006 with a view to draw policy implications and deliver policy guidance and tools to take best advantage of those roles in their policy formulation. This two-step approach is justified in an effort to address different policy questions in the right sequence in the Phase I and II, and analytical approaches and specific activities are tailored accordingly so as to accommodate the policy questions. Table 2 compares and contrasts the main attributes of the two phases in the ROA Project.

The main challenge facing the ROA Phase I was that indirect roles of agriculture with externality characteristics are poorly understood and seldom analyzed in the context of developing countries. It was indispensable, as an initial step, to build a solid analytical framework on the scope and nature of the roles of agriculture to be examined. To this end, an important consideration in the Phase I was that the roles of agriculture perceived to be crucial vary according to numerous conditions in general and on the stage of economic development of a country in particular. Therefore, the ROA project developed a hypothesis on the changing

Figure 1 Roles of agriculture in development



indirect roles of agriculture in the course of four different stages in economic development (Figure 1).

Based on this analytical framework and other guiding materials, empirical case studies on various roles of agriculture were undertaken in 11 developing countries from Asia, Africa and Latin America. As such, the analytical approach in the ROA Phase I was characterized as 'empirical'. As a result of these activities, case study reports on six different modules were prepared in 11 countries, and these reports were synthesized to deliver cross-country synthesis reports as an intermediate outputs and the overall summary report as a final product.

Having confirmed the existence of diverse indirect roles of agriculture with externality characteristics and quantified them through various techniques, the main challenge the Phase II faced was the fact that these indirect roles have rarely been reflected in actual policy formulation in developing countries to date. It was considered to be logical and necessary, therefore, to shift the emphasis of the project towards a 'prescriptive' approach, and to deliver policy guidance and tools to assist policy-makers to take best advantage of the indirect roles of agriculture in development strategies.

In pursuing such a prescriptive approach, the Phase II concentrated on two modules (poverty alleviation and food security, and environmental services) compared with 6 modules in the previous phase. The rationale behind this is that one of the greatest challenges for the global community in the 21st century is to feed a growing world population that will reach 8 billion by 2030 while preserving environmental benefits and minimizing environmental costs from agriculture. As such, poverty alleviation and environmental sustainability in agriculture are the most policy relevant roles of agriculture that form two sides of the same coin. The FAO is better suited to this end and can add value by fully utilizing its comparative advantage. Building on policy case studies for these two modules, the Project delivers policy guidance and analytical tools to assist policy-makers in taking best advantages of indirect roles of agriculture in actual policy formulation in developing countries.

The modalities of both research components i.e. environmental service incentives (ESIs) and poverty alleviation and food security (PAFS), are characterized by the following common steps:

- Formulating a work plan that identifies objectives, activities, outputs and timeline
- Establishing an analytical framework and methodologies to guide policy case studies
- Implementing selected policy case studies in collaboration with universities and local research institutes
- Holding mid-term expert workshops in May/June 2005 to guide future work by assessing the validity of project approach and the evolution of policy case studies
- Organizing a final workshop in December 2006 to present major findings and lessons from the ROA phase II and to discuss future challenges for research and policies

Policy dimension in the ROA Phase II

In the ROA Phase II, the focus moved towards a 'prescriptive' approach, with the objective of drawing specific policy implications and delivering policy guidance, based on general analysis, on particular case or policy studies and on the use of specially designed quantitative tools. The search for concrete policy guidance was facilitated by the concentration of the analytical work on only two topics: ESIs and PAFS components. Whereas the first component is precise and easy to circumscribe (although it can take many various forms in practice), the second one represents a more complex cluster including many interrelated components. Although ESIs can aim at various objectives in the environment and socio-economic fields, ROA analysis concentrated on the possible impact of ESIs on poverty alleviation, thereby limiting overlap with other work related to ESIs. As a result of this approach, 'poverty alleviation' appears as the over-arching theme for ROA II and as the basic policy objective.

In spite of this basic consistency in the policy approach to the two components of ROA Phase II, these were implemented through different modalities, which had an incidence on the nature of the policy guidance drawn from the analysis. The ESI component includes both general analytical work and specific policy case studies. As indicated in their titles, these case studies are specifically designed to analyze the policy dimension of ESIs. While some of them analyze the impact of 'real' ESI policies, in particular on poverty alleviation, others analyze 'hypothetical' cases for which ESIs could be designed. This reflects the fact that there are not yet many cases of actual ESI schemes in developing countries, but it also means that there is a rather large and diversified potential for ESIs to be applied, in particular in a 'pro-poor' perspective. This approach is therefore very much forward-looking and creative, and the specific examples analyzed could be of broader interest.

To this effect, the ESI work defines the conditions under which ESI policies could be further applied, discussing in particular the conditions linked to the different phases of 'design, implementation and enforcement'. In doing so, the ESI work, whilst based on concrete examples, draws elements of policy guidance which are of general interest, and to which policy makers should pay attention when thinking about introducing an ESI scheme. Among these elements, one can mention targeting, compliance requirements, transaction costs, technical and institutional capacity, market creation, etc. The key conclusion that ESIs can, under certain conditions, 'contribute to both environmental sustainability and poverty alleviation', is of high policy relevance. However, more work would be needed in order to provide additional elements of policy guidance on key issues such as financing (by the beneficiaries or by the state), pro-poor targeting, political and practical feasibility, institutional requirements, etc.

In relation to poverty alleviation and food security, ROA Phase I identified the channels and links through which agriculture impact on them, concluding that agriculture is more effective than other sectors at reducing poverty and hunger in both urban and rural areas. However, ROA Phase I did not provide specific insight about the type of policies which would maximize this positive impact. The objective of ROA Phase II is to provide policy guidance in this respect. To this effect, ROA Phase II developed a 'Policy Analysis Tool', based on a multi-market model. This tool deepens the analysis of the channels through which agriculture impacts on poverty alleviation and food security, disaggregating the analysis according to various household categories defined by the level and composition of incomes. The major advantage is its capacity to measure the impact of various policy scenarios, in particular with regard to the poorest segments of the population. The analysis addresses two basic questions: (i) how can agricultural policies contribute to poverty alleviation with the maximum efficiency? and (ii) what would be the most efficient 'policy mix' to promote rural development and alleviate poverty, in particular for poor households?

The PAFS approach is applied only to a limited number of countries. It is typically 'country-specific' as it reflects the particular structure of the markets of a given country, and as it analyzes policy scenarios which are selected according to the actual policy concerns of the country. Whilst this approach proves very valuable for the analysis and design of agricultural and related policies in the context of a given country, it makes it difficult to draw general conclusions. However, it gives further concrete evidence as to the capacity of agricultural policies to optimize the contribution of agriculture to alleviate poverty, in particular for the poorest groups. It highlights once again the need to improve the coherence between agricultural and other policies, in particular social policies, in order to achieve the poverty alleviation objective. Furthermore, the 'Policy Analysis Tool' appears as an instrument which can be used for a wide variety of policy scenarios and which could be replicated in other countries: its potential goes much beyond its application in the present ROA Phase II activity.

In summary, it appears that ROA Phase II contributes effectively to policy analysis and to policy guidance, including through specific analytical tools. It confirms that the contribution of agriculture to poverty alleviation can be maximized through the use of efficient agricultural and related policies. The following sections describe those policies in more detail. The ROA Phase II work also shows that many concerns and objectives are valid across the board: policy coherence (in particular between agricultural, environmental and social policies), identification of trade-offs and complementarities between policies, pro-poor targeting, improvement of the institutional framework at all levels, participatory approach to policy design and implementation, better assessment of the respective roles of markets and policies in a dynamic context, etc.

Environmental Service Incentives in Conformity with Poverty Alleviation[2]

The overall objective of the Roles of Agriculture Project Phase II is to assist policy-makers in taking the best advantage of indirect roles of agriculture with externality characteristics in development strategies. As a means to meet this general objective, the ESI component is designed to draw policy implications on the possible impacts of ESIs on poverty and to deliver practical policy guidance to design, implement and enforce ESIs in conformity with poverty alleviation. The main sources of information for this purpose are policy case studies implemented in specific sites in selected countries. The limited experiences in applying ESIs in developing countries in general and in agricultural sector in particular necessitate original policy case studies in the context of the ROA project.

Against this background, the activities in the environmental service incentives component are organized by the following sequence. First, the analytical framework was prepared to guide the policy case studies by providing conceptual foundations on the key elements to be clarified through these case studies. Second, the policy case studies were undertaken in 7 countries to draw findings and lessons by examining the feasibility of various forms of actual or hypothetical ESIs. Finally, policy implications on poverty impacts of ESIs were drawn and policy guidance on pro-poor ESIs was formulated based not only on the ROA policy case studies but also on ROA background papers and other existing literature.

The issues to be clarified through the environmental service incentives research can be distilled into the following three distinct, but interrelated, research questions:

- What are the main obstacles hampering socially optimal provision of environmental services from agriculture in developing countries? (causes)
- How and to what extent can ESIs for agricultural sector contribute to poverty reduction, in addition to other policy goals? (potentials)
- How should ESIs be designed, implemented and enforced to make them propoor to the maximum extent? (policy responses)

Analytical framework for policy case studies

Environmental service incentives in theory

Environmental services generated from agriculture are a fraction of diverse ecosystem services, which are 'the benefits that people obtain from ecosystems'. Most ecosystem functions often have externalities and public goods characteristics. These peculiar features of environmental services cause market failure, i.e. markets fail to reflect the full social costs or benefits of a good or service thereby leading to sub-optimal allocation of scarce resources. In the second phase of the ROA project, 'environmental services' refer to positive environmental externalities and public goods generated through agricultural production process. However, 'negative externalities' remain in use to describe environmental 'disservices'.

Initiatives for addressing environmental externalities and public goods can be broadly classified based on who is the main actor of an initiative (i.e. community, public or market) and on who bears the costs for the provision of environmental services (i.e. provider, taxpayer, beneficiary or consumer). Table 3 presents the taxonomy of such initiatives based on these two criteria together with specific examples. The scope of ESIs to be examined in the ROA Project is represented in the shaded area. In the environmental service incentives component of the project, 'environmental service incentives' (ESIs) are used to describe positive incentives for remunerating environmental services and an ESI is defined as 'a mechanism in which the costs of providing environmental services are directly or indirectly remunerated by the third party through financial transfer'. The third parties include taxpayers, beneficiaries and consumers.

Table 3 Scope of ESIs in the ROA Project

approach	examples	cost bearer
community	customary rules land care groups	provider
public	taxes and charges regulation (e.g. protected areas)	provider
	direct payments	taxpayer
market	direct payments eco-tourism conservation trusts entrance fees	beneficiary (of environmental service)
	market price premiums labeling, standards and certification community supported agriculture	consumer (of product)

[2] This section is based on Sakuyama, 2007a, 2007b and 2007c

Environmental service incentives in practice

Actual ESI initiatives in the field in fact originate from diverse motivations. The origins can be broadly divided into two sources: one stems from the agricultural policy domain in OECD countries in the 1980s and another is from forest conservation initiatives in Latin America in the 1990s. These two distinct origins exert implications on the policy and research in ESIs. There is little communication between agri-environmental experts in OECD countries and forest conservation circles in developing countries and few attempts have been made to learn from each other's experiences. Therefore, it is imperative to identify future research needs by comparing and contrasting ESIs currently in place in developed and developing countries.

Based on the definition of ESIs in the ROA project presented earlier, differences seem to outweigh commonalities in terms of how ESIs are designed and implemented in developed and developing countries. First, the main target for application is different. ESIs in developing countries have emerged from the need for forest conservation, whereas those in OECD countries originate from the domain of agricultural policy. Second, in relation to the first point, the nature of financial transfer is different. ESIs in developing countries are largely the remuneration for maintaining environmental benefits from natural ecosystems, but, in OECD countries, those are also often employed as a tool to reduce environmental damages originating from agriculture. Third, the source of financing tends to be different. Developing countries put emphasis on the Coasian approach to formulate compensation mechanisms between providers and beneficiaries of an environmental service through negotiations and agreements, while OECD countries pursue the Pigouvian approach by relying mainly on incentive payments funded by governments.

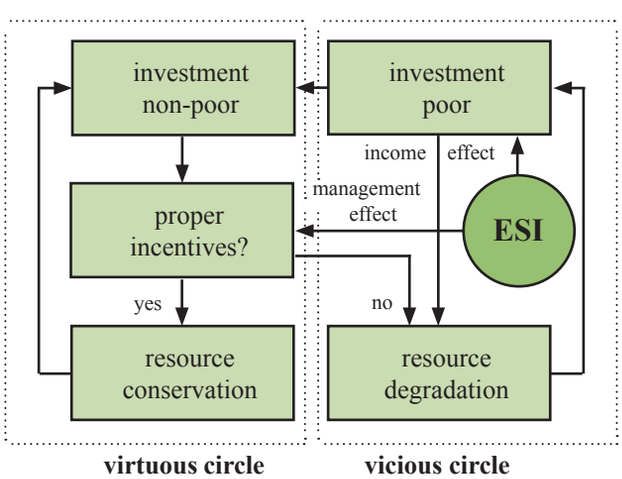
ESIs and poverty alleviation

There is a growing expectation in development circles that ESIs can also contribute to poverty alleviation. The underlying logic of this notion seems to be that persistent poverty (i.e. lack of resources to manage the environment sustainably) is the root cause of environmental degradation in many developing countries and thus ESIs will help the poor by providing them additional incomes and enabling them to manage their resource base in a sustainable manner. Although such a notion is highly attractive from a development policy point of view, its validity needs to be scrutinized carefully.

Recent research indicates that these relationships are far more complex, and a 'win-win' outcome between poverty alleviation and environmental conservation is by no means automatic. Two considerations are crucial in understanding such complex interactions. The first is a clear distinction between 'welfare poverty' and 'investment poverty'. While the former can be defined as inability to meet basic human needs, the latter refers to the situation where, even if they are not poor by the welfare definition, households still lack adequate wealth to invest in sustainable resource management. The second key consideration is that households must perceive proper incentives to invest in resource management. When proper incentives are lacking, the capacity for responsible resource management is irrelevant.

Based on these two key considerations, Figure 2 describes the implications of the status of resource users (i.e. whether households are poor or non-poor in terms of their investment capacity) on resource management. When households are too poor to invest in resource management, it will induce the degradation of a resource base, which in turn deteriorates poverty further. This cycle, illustrated in Figure 2, represents a well-known 'vicious circle'. However, even if households are not poor in the sense of investment capacity, degradation of a resource base can occur if they do not perceive the right incentives to manage it properly. As this conceptual framework shows, poverty alleviation is necessary, but not sufficient to ensure sustainable resource management. There is no reason to believe that additional income to alleviate poverty is invested for environmental conservation. What really matters is providing proper incentives to make use of a resource base on which they depend in a sustainable way.

Figure 2 Poverty-environment nexus: conceptual framework

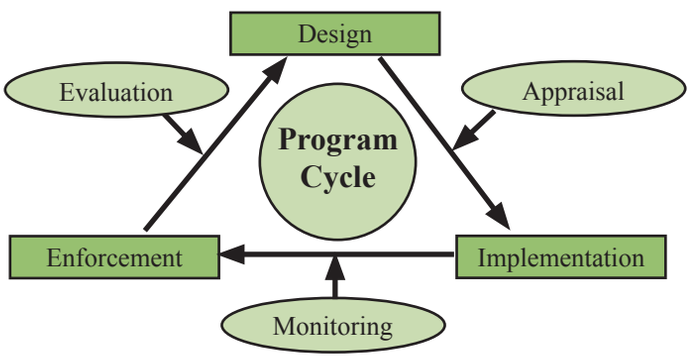


Need of policy guidance for pro-poor ESIs

The limited application of ESI initiatives to the agriculture sector in developing countries implies the existence of underlying obstacles. The principle of ESIs is straightforward but its mechanisms are rather complex in many cases, and it is likely that many developing countries fail to overcome the obstacles for translating the theory of ESIs into action. These obstacles can include, broadly speaking, the lack of scientific information, institutional developments and financial and human resources. This is the exact reason why practical policy guidance for pro-poor ESIs is urgently needed.

One of the ways to organize the policy guidance is to focus on the different stages of undertaking an ESI, as is shown in a schematic illustration in Figure 3. In an initial 'design' stage, the key parameters characterizing a scheme are determined. The implementation stage covers for example concluding a contract and undertaking compliance requirements. The enforcement of ESIs needs to be monitored and a proper punishment mechanism has to be triggered if ESIs are not enforced as originally planned.

Figure 3 Program cycle of ESIs



Summary of policy case studies

The policy case studies have been undertaken in 7 developing countries: 3 sites in Africa (Kenya, Morocco and Uganda), 2 sites from Asia (Bhutan and the Philippines) and 2 sites from Latin America (Mexico and Panama). The main features of these case-studies are summarized in Table 4. Countries and specific case study sites were selected so as to enable drawing broad policy lessons by covering a wide range of factors and attributes in shaping ESIs. These include (i) states of economic, social and institutional development, (ii) types of dominant farming system in a location, (iii) types of environmental service, (iv) types of mechanisms for transferring funds to providers, and (v) sources of financing ESIs. A succinct summary of the main policy issues in, and the key findings from, 7 case study sites is presented below.

Table 4 Overview of policy case studies

country	study location	farming type	environmental service examined	transfer mechanism	financing source
Bhutan	Selected sites	crop and livestock farming	wildlife habitat	direct payment (hypothetical)	to be determined
Kenya	Amboseli National Park	pastoral farming	wildlife habitat	direct payment (hypothetical)	bed fee in lodges
Mexico	Nationwide	forest	water supply	direct payment (actual)	water user fees
Morocco	Western High Atlas Region	mountain farming	scenic landscape	agro-tourism (actual)	tourists
Panama	Panama Canal Watershed	crop and livestock farming	water supply and soil erosion prevention	direct payment (hypothetical)	toll from the Panama Canal and water user fees
Philippines	Nationwide	rice farming	genetic diversity	direct payment (hypothetical)	taxpayers
Uganda	Pallisa District	wetlands	water supply	direct payment (hypothetical)	beneficiaries

Bhutan: wildlife habitat in crop and livestock farming[3]

The destruction of crops by wild boars and the predation of cattle by cats and other predators are the two main problems that the research study will illuminate. The Bhutan case study will point towards resolution of this wildlife-farming conflict that is presently hindering alleviation of poverty which is primarily a rural phenomenon, i.e. affecting smaller farmers more than rest of the population (Ura, 2006). The main aims of the basic research are: (i) to assess the losses of crops and livestock incurred by the farmers to pests and predators through a survey of randomly sampled farm households throughout the country, (ii) to provide an overview of current activities supported by the government to mitigate destructions of crops by wildlife, and (iii) to suggest short- and long-term operational frameworks for financial compensation pertaining to losses caused by pests and predators.

The research methodology can broadly be divided into three parts. The first part consists of appraisal and analysis of secondary data such as reports, legislations, resolutions and proceedings of the National Assembly, official decrees and circulars, land use and livestock statistics, agricultural statistics, labor and employment statistics, complaint reports of wild life predations received by officials etc. The second part consists of the collection of primary data through random sample surveys of about 300 farm households to seek both qualitative and quantitative information on the extent of damages and losses, as well as the degree of foregone production. The third part consists of stakeholders' meetings between the researcher and the stakeholders at both the district and central levels in order to seek their views on the problem and scope of solutions to it.

Kenya: wildlife habitat in pastoral farming

The Kenyan case study examines the opportunity to establish an international payment system for non-use values associated with wildlife (elephant) conservation near Kenya's Amboseli National Park (Bulte, Boone, Stringer and Thornton, 2006). Amboseli National Park is fundamental to Kenya's tourist industry, typically ranking second in annual park gate fees, around US $3.5 million in 2004. The Amboseli ecosystem is home to Masai pastoralists, whose long-practiced livestock activities are well adapted to the variable habitat. However, whereas the majority of Masai households receive no direct benefits from the wildlife tourism, the Masai receive direct benefits from renting out their land for cropping and thus increasingly rent out large areas for irrigated or rain-fed agriculture. Some of the irrigated land is now fenced to protect onions and tomatoes from wildlife, impeding access to water, food, breeding grounds and the seasonal migration of wildlife.

The Kenya study concludes that ESIs may be a powerful tool in the Amboseli ecosystem because it promotes conservation and contributes to the alleviation of poverty. Moreover, and interestingly, the study's behavioral model suggests that these beneficial effects seem to mutually reinforce each other: there is no trade-off between making the Masai less poor and protecting elephants. In the Amboseli ecosystem, which is a very popular tourist destination with 200,000 tourist days a year, such an ESI program could be easily funded with a relatively minor increase in the Park entrance fee (from US $30 to US $31), or with the introduction of a modest environmental bed tax collected by local lodges.

Mexico: water supply from forests

The key feature of the case study in Mexico is that it examines the performance of an actual payment scheme for environmental service implemented in the field (Alix-Garcia, de Janvry, Sadoulet and Torres, 2005). Forests provide not only private benefits through the extraction of timber but also a variety of environmental services ranging from carbon sequestration and biodiversity protection to water resource conservation. These environmental services are being increasingly threatened by deforestation in Mexico. A particular concern for policy makers is the growing scarcity of water. The federal government of Mexico thus initiated the payment for environmental service program in 2003 with the purpose of conserving hydrological services from forests. The essence of the program is a conditional incentive payment in exchange for conservation activities.

The review of Mexico's ESI program suggests that there is room for improving its policy design, especially in terms of its targeting mechanism. According to a census survey in 2003, 80 percent of the recipient area is located in aquifers which are not overexploited, suggesting a mismatch between an original target and actual beneficiaries. It is also reported that 70 percent of recipients were estimated to have low risk of deforestation, implying that trees would have been conserved even without the program. On the other hand, more than 70 percent of the enrolled area is located in highly marginalized areas with many poor forest holders. This means that the ESI programme can indirectly contribute to poverty alleviation.

Morocco: scenic landscape in mountain farming

A case study in Morocco is distinct from other studies under the ROA Phase II environmental service module in a number of ways. In particular, it focuses on agro-tourism, a market-based incentive mechanism according to the classification of the ROA project, as a means of rewarding for environmental services as well as of contributing to poverty alleviation in the context of the Western High Atlas Region in Morocco (Allali, 2006). The Region includes several areas with well-established tourism activities. Scenic landscape originating from the combination of crop cultivation, livestock grazing and tree planting in mountainous areas is attracting a number of domestic and international tourists. 134 farmers interviewed in the Region were classified into the following four groups according to their degree of involvement in tourism

[3] This section is based on a progress report since the policy case study in Bhutan is still ongoing.

activities: (i) those providing board and lodging only, (ii) those providing support and guide only, (iii) those providing both board/lodging and support and guide, and (iv) those providing no service for tourists.

The results from the analysis are striking. It is the income from tourism activities that make a difference in annual income among these four groups: those farmers heavily engaged in agro-tourism earn an annual income twice as high as the average. Furthermore, a clear negative correlation was observed between the level of tourism income and the incidence of poverty, implying tremendous contribution of tourism on poverty alleviation in this region. One of the most valuable lessons learned from this case study is the fact that the revenue from tourism can provide a significant source in financing the provision of environmental services. Given the limited availability of public funds and the insufficient institutional developments in many developing countries, the case in Morocco implies the potential of market-based mechanisms, of which tourism is an example, as an alternative means for rewarding for environmental services.

Panama: Water supply and soil erosion prevention in Panama Canal watershed[4]

The case study on the Panama Canal Watershed (PCW) assesses the suitability of ESIs for maintaining and improving water quantity and quality and reducing soil erosion in the Canal area (Sarmiento, Zurek and Antle, 2006). The PCW produces fresh water to power the Panama Canal, supplies water to half of the country's population and contributes to the generation of electricity for the urban sector. Over the past 50 years, however, the PCW has suffered massive deforestation and soil degradation, reducing its forest cover by more than 70% and eroding its river valleys and lakeshores. This situation calls for ecologically sound and economically viable activities to safeguard the long-term existence of the PCW by protecting the water supply for Panama Canal operations, industrial use, and human consumption. Current agricultural production practices are having adverse environmental impacts, and alternative practices have been developed and tested in the area.

Using the minimum-data approach to analysis of ESIs developed by Montana State University with various partners, the study will investigate the economic feasibility of ESIs to improve water quantity and quality in the PCW study areas. The management alternatives chosen to be investigated further result from discussion with farmers and other stakeholders in the study area. The model will be used to assess the economic impact of introducing an ESI scheme and the costs to water users of attaining alternative levels of environmental improvement. The study also aims at shedding light on the demand for and the willingness to pay by potential buyers for the services. For that a set of informal interviews with the two main buyers, the Panama Canal Authorities (PCA) and the water suppliers of Panama city, have been carried out, in addition to establishing ties with other institutions in Panama working on ESI schemes.

Philippines: genetic diversity in rice farming

The case study in the Philippines addresses plant genetic diversity values through the maintenance of traditional rice varieties and examines the impact of different payment schemes on genetic diversity and poverty alleviation (Fuwa and Sajise, 2006). While there exist some estimated 140,000 rice varieties, it is widely recognized that the number of rice varieties has declined dramatically, especially since the introduction of the high-yielding rice varieties in the 1960s. In the Philippines alone, there were "more than a few thousand" rice varieties grown in the 1950s. Today, only two varieties cover 98% of the land planted with rice. In the Philippines case study, the focus is placed on the practice of growing 'traditional' rice varieties, i.e., in situ on-farm conservation of traditional varieties, as an environmentally friendly agricultural technology that the government might consider encouraging farmers to adopt.

The Philippines case study is characterized by a policy simulation on the possible impacts of different forms of hypothetical payments on rice genetic diversity and poverty alleviation. The key lesson is that policy makers have to confront various tradeoffs between different objectives and to strike a right balance between them. One of them is the conflict between the conservation of genetic diversity and poverty alleviation. This dilemma originates from the fact that the main beneficiaries of the hypothetical environmental payments to revert to traditional rice varieties are generally high income farmers who have adopted modern rice varieties. The other is the conflict between the effectiveness of targeted environmental payment and the information requirement for implementing such schemes. While compensating the exact amount of profit losses due to the adoption of traditional varieties is more effective to eliminate possible leakages, the information requirement for such a scheme would be prohibitively high.

Uganda: water supply in wetlands

The case study in Uganda examines how environmental services can help protect the water supply in the Pallisa District (Nalukenge, Antle and Stoorvogel, 2006). In the Pallisa District, population pressure together with the declining soil fertility and prolonged drought has led to heavy encroachment of wetlands by the farming and pastoral communities. At present, about 68 percent of the wetland areas have undergone extensive reclamation to open up land for rice growing and other agricultural activities. One concern is that as wetland encroachment progresses, there is a high likelihood that producers will use increasing amounts of nutrients and pesticides impacting on water quality and human health. As the wetlands are drained, wildlife habitats are lost along with the other environmental services they provide.

The policy simulation relies on a simple static model to analyze farmers'

[4] This section is based on a progress report since the policy case study in Panama is still ongoing.

participation in ecosystem service contracts. An empirical analysis was carried out utilizing the minimum-data (MD) methods described by Antle and Valdivia. Results show that, with the Minimum Data approach, the supply of environmental services in terms of the percentage of farmers that are willing to participate in ESI contracts significantly increases with various applications of ESIs. Under these circumstances, ESIs may indeed provide a viable alternative approach to protecting wetlands areas. The key challenge to implementing an ESI system here would be to identify the demand for the environmental services provided by the wetlands. Thus the question of who would pay for the environmental services must be addressed.

Policy implications from ESI impacts on poverty alleviation

The policy case studies make it clear that 'pro-poor' ESIs need to be defined more clearly in order to disentangle the confusion over the concept. The primary source of confusion is whether poverty alleviation should be treated as an ex-ante objective of ESIs or an ex-post consequence from the ESIs. Some regard this concept as an attempt to pursue dual objectives of environmental outcome and poverty alleviation by one policy instrument, whereas others understand poverty alleviation as a consequence of ESIs, not as their primary objective comparable to environmental concern. The conclusion of the ROA project is that the focus should be placed on the ex-post impacts of ESIs on poverty alleviation. By definition, the primary objective of ESIs is an environmental concern and ESIs cannot necessarily address poverty given the heterogeneity and site-specificity of the incidence of both environmental services and poverty. The policy guidance thus should be seen as a reference material to design, implement and enforce ESIs so as to ensure positive impacts or avoid negative impacts on poverty alleviation.

Such a pragmatic interpretation of 'pro-poor' ESIs leads to the following twin-track approaches in linking poverty alleviation consideration with ESIs. The first one is a 'proactive' approach that takes poverty alleviation into consideration in an explicit manner by its design. A precondition for a proactive approach is that there must be above all a coincidence between the provision of an environmental service and the incidence of poverty in terms of geographical areas. In contrast, the other is a 'reactive' approach whose priority lies in designing, implementing and enforcing ESIs so as not to worsen existing inequalities. This reactive approach will be warranted if there is no overlap between the provision of an environmental service and the incidence of poverty and, moreover, if a negative correlation between the two variables is observed. In these cases, the priority must be placed to design ESIs so as not to exclude poor land users.

Policy guidance for pro-poor ESIs

Policy guidance is structured based on the programme cycle of ESIs presented in Figure 2. The following provides a concise summary of the major elements.

Design of ESIs should address the issues of where, how much, for what and from whom to pay providers of environmental services

- Defining targeting criteria for eligible areas: the criteria include the provision of environmental services often approximated by a particular type of land use or agricultural practices, the possibility of their loss without an intervention, and the existence of their beneficiaries.
- Determining contract types and payment levels: the heterogeneity of producers' opportunity costs and the attributes of the conservation outputs determine the types of contracts (e.g. standardized, auction, specific), while the amount of premium must lie between the minimum WTA (willingness-to-accept) of landowners to change their land use or agricultural practices and the maximum WTP (willingness-to-pay) of the beneficiaries.
- Establishing compliance requirements: a modest approach is to make a payment in exchange for the continuation of existing land use or management practices, whereas a more active approach obliges landowners to take tangible actions that incur additional costs. The choice is partly dependent on the distribution of property rights on the use of particular land.
- Finding sustainable financing sources: the beneficiaries of an environmental service should bear its costs of provision (Beneficiary Pays Principle), implying that beneficiaries as well as cost bearers can vary depending on the spread of an environmental service concerned.
- Reducing transaction costs for collecting information on scheme design: The key challenge is to obtain information on the 'existence' as well as the 'risk of deterioration' of an environmental service in a low-cost way. Indices based on land uses can serve for the former, while particular land uses or topographic conditions can for the latter.

Challenges for pro-poor ESIs in the implementation stage can be overcome through innovative devices

- Addressing insecure land tenure: Contractual payments with individual farmers cannot be applied to the land with insecure tenure, common land or common property resources. Forming and implementing a contract collectively by members who manage an environmental service irrespective of the ownership of the land can be a solution.
- Overcoming initial investment requirements: This is an issue when ESIs oblige participants to take additional actions that incur opportunity costs and thus necessitate considerable investment. A possible approach is front-loading payments with a large part of the payment in the early years and much smaller payments in later years.
- Easing technical capacity constraints: In light of the limited cases of ESIs in developing countries in general and those

for agricultural sector in particular, broad-based capacity building should be an integral part of ESI initiatives not only for participants but also their initiators (e.g. policy makers and local NGOs).

- Reducing transaction costs for arranging and implementing a contract: transaction costs create inherent incentives to favor large-scale farmers who are often wealthier than small-scale counterparts. Possible solutions include standardizing a contract, simplifying the procedure and compensating the transaction costs incurred in the implementation of ESIs.

Credible enforcement mechanisms should be built in ESIs to maximize their effectiveness

- Establishing an effective punishment scheme: landowners participating in ESIs have an inherent incentive to free-ride the programme without a credible punishment scheme.
- Reducing transaction costs for monitoring a contract: an information asymmetry between recipients and initiators of ESIs creates high transaction costs for monitoring. Innovative devices for reducing monitoring costs include the use of satellite images to monitor compliance and a collective punishment in which all participants are obliged to repay all payments they received even if only one member violates a contract.

Appraisal, monitoring and evaluation must be an integral part to make ESIs efficient, effective and accountable

As articulated in Figure 3, policy appraisal, monitoring and evaluation must be an integral part of the programme cycle of ESIs in order to make ESIs efficient, effective and accountable. To this end, the policy case studies in the ROA project made particular contributions in developing and applying ex-ante policy appraisal tools. Hypothetical cases of ESIs in Kenya, Panama, the Philippines and Uganda employed various forms of models to estimate the possible impacts of ESIs, which provide useful information for policy makers. In light of the limited physical and economic data available in developing countries in general, the validity of the minimum-data approach developed by Antle and Valdivia was confirmed to be particularly useful in assessing the economic feasibility of ESIs.

Linking Agriculture Policies to Poverty Alleviation and Food Security[5]

Work being carried out as a part of the ROA Phase I and a substantial and growing body of literature show that agricultural growth has a strong positive impact on poverty alleviation. As a whole, the ROA Phase I results suggest that poverty reduction policies should take into consideration the strategic importance of agricultural growth and its transformation, the output mix characterizing the sector, and four key transmission channels through which agriculture contributes to poverty alleviation, namely: (i) the direct effect through farm income; (ii) the indirect effect on non-farm income; (iii) the food price effect; and (iv) the employment and wage effects for unskilled labor.

The second phase of the ROA project further explores quantitatively the roles that these channels play in mediating the impact of agricultural policy reforms on poverty and food security at the household and sub-national level. The ROA Phase II pursues a more detailed assessment of how policies, institutions, household assets and human capital, and infrastructure impact on household income, poverty and food security. The ultimate goal of ROA Phase II is to move from a positive to a prescriptive approach devising an analytical tool that can support the design of development strategies and the implementation of specific programs. The objective of the policy assessment tool is to provide policy makers with information on what would be the impact on poverty and food security of policy changes that are aimed at improving agriculture's performance.

Analytical framework for policy case studies

The challenge of poverty reduction in the design of agricultural policies

Awareness about the effectiveness of agricultural growth in reducing poverty has focused attention on the importance of a new agenda for a pro-poor agricultural growth strategy where the focus is on the quality of government intervention in agricultural and rural markets and on a decentralized and bottom-up approach to reflecting local preferences, endowments and resource constraints

The coexistence of small and large farms and of commercial and subsistence oriented producers in many developing countries requires policy making to become more focused on the differential impact that policy reforms may have across producers and their implications in terms of poverty and food security. To that end, the design of a pro-poor agricultural development strategy needs to be grounded on a useful typology of farm households that allows identifying those households for which agricultural growth offers a realistic way out of poverty and those for which other complementary strategies need to be devised.

From the point of view of agricultural policy making, it is important to recognize that only under specific conditions will agricultural growth have a decisive impact on poverty alleviation at the household level. Contrary to off-farm activities, for many small farm households, farming plays and will continue to play a minor role in income formation, while, for many of the chronic poor households, exit from agricultural production or welfare assistance are the only reasonable paths out of poverty. By identifying those households for which agricultural growth has the potential of increasing their income levels and move them out of poverty, definition of a meaningful household typology creates the conditions for improving the targeting of agricultural policies and for strengthening their coordination with other policies in a wider pro-poor development strategy.

To better focus the design of agricultural policies on the over-arching goal of poverty reduction, one should distinguish the different nature of the goods and services that agricultural policy can deliver to farmers and the rationale behind their privatization and subsidization. Such goods and services can be generally identified by their degree of excludability and rivalry with respect to other users as well as by the externalities that can be generated by their consumption or use. Information flows between government, farmers, and private firms is far from perfect and many markets are imperfect or absent.

These characteristics are relevant in the design of agricultural policies because, in conjunction with the definition of household typologies described above, they allow to organize intervention in markets for services and goods in a coherent and cost-effective way, for instance allocating subsidies only under very specific conditions (e.g. public goods and positive externalities) and then mainly targeted to poor farmers to reduce unwarranted leakages.

Summarizing the previous discussion, the approach followed by the ROA Phase II is to strengthen the effectiveness of agricultural growth in reducing poverty and food insecurity by incorporating two principles in the design of agricultural policies: (i) target available resources on farmers for which agricultural growth represents a viable path out of poverty; and (ii) seek the appropriate mix of policies by balancing agricultural policies with other social development policies, including safety nets.

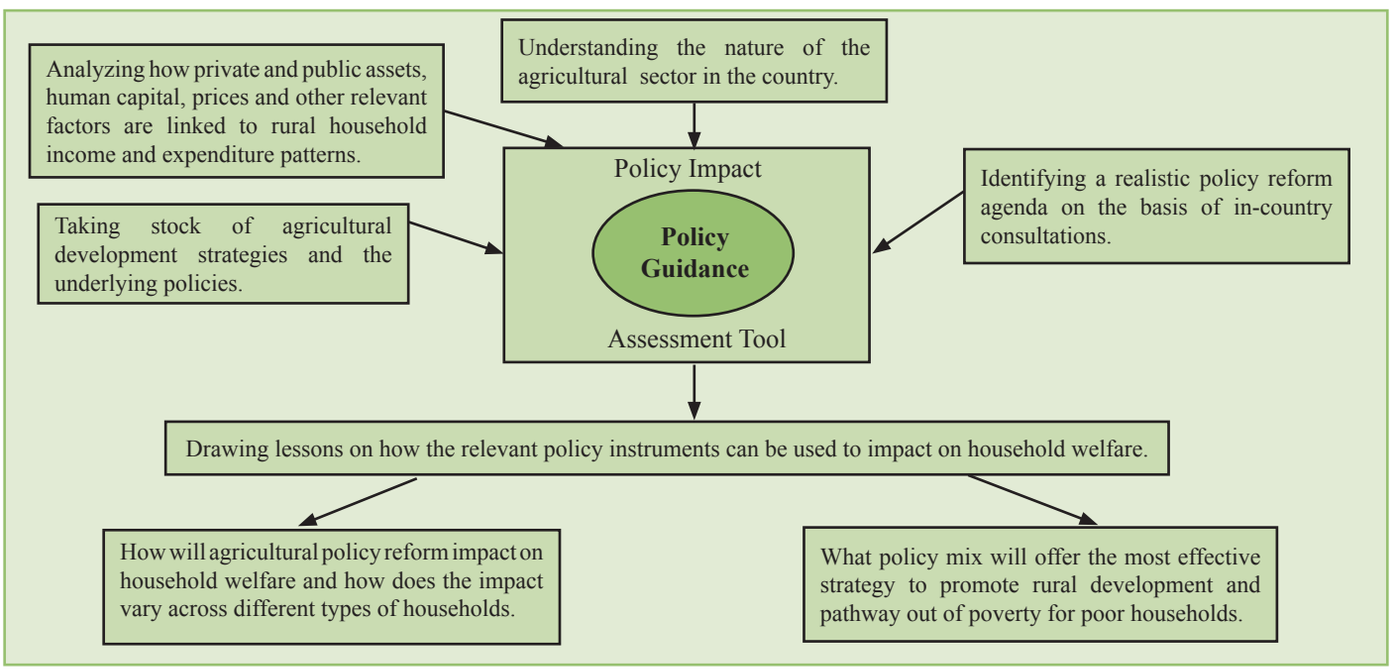
Supporting the design of pro-poor agricultural policies and the ROA Phase II approach

To provide insights into the links between agricultural policies and poverty alleviation and food security, we propose to study the role of agricultural policies by examining with the help of policy

[5]This section is based on Bresciani and Croppenstedt, 2007a, 2007b and 2007c

analysis tools (e.g. multi-market models) how they influence rural household incomes and expenditure, and in turn poverty and food security. To this end, the study combines both aggregate and household level analysis. The empirical approach is structured into three main steps, which are illustrated in Figure 4 below.

Figure 4 Policy analysis leading to policy guidance embedded in the policy impact assessment tool



- ***Step 1***: Diagnostic and identification of key reform scenarios, based on: (i) an analysis of the structure of the agricultural sector and of rural markets; and (ii) identification and description of the potential agricultural policy reform scenarios to be analyzed.
- ***Step 2***: Making the agricultural policy impact assessment tool operational, developing an agricultural policy impact assessment tool which will allow simulation of policy changes and how they impact on prices and household income. Information on how poverty and food insecurity is impacted is generated directly by the tool and indirectly by combining simulation results with household survey data.
- ***Step 3***: Analysis and policy recommendations, based on the results from the use of the model developed in step 2 to simulate the impact of policy reforms on key social indicators and on the overall structure of agriculture. In addition, this step is intended to produce information for improving policy coherence by showing strengthening coordination between agricultural policies and other anti-poverty policies, such as safety nets and other social protection policies.

Summary of policy case studies

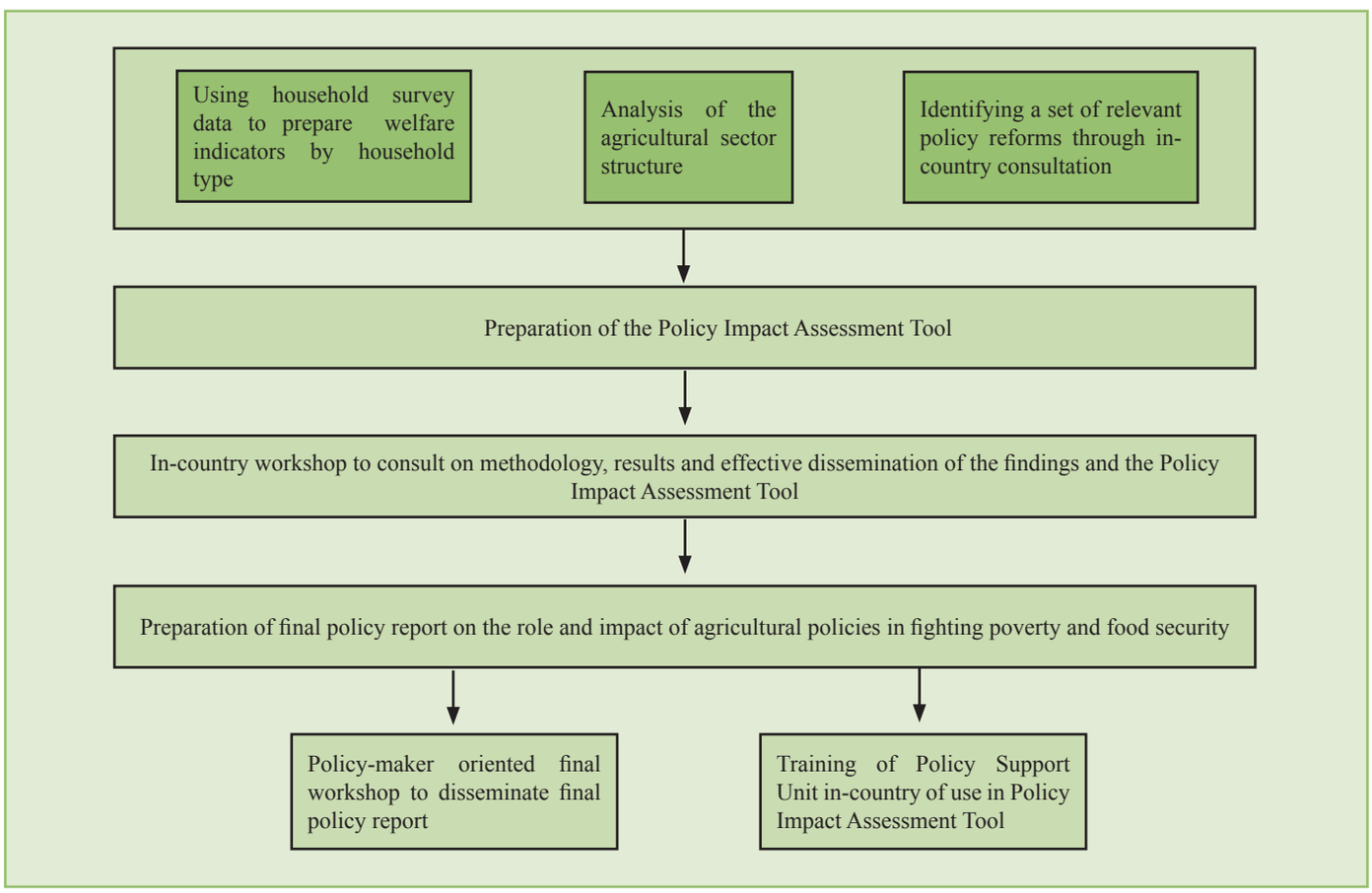
Implementation of the empirical strategy

Countries for the poverty alleviation and food security component of the ROA Phase II were selected on the basis of having participated in the ROA Phase I and/or on the basis of availability of relevant data. As a result of these criteria, besides Indonesia, also Paraguay and Egypt were selected, two countries that did not participate in the ROA Phase I. The selection of target countries also reflects the perceived likelihood of being able to insert the project's activities in the national debate on the role of agricultural policies in rural sustainable development. To that end, various activities have been considered and implemented:

- Engagement of relevant local policy makers from the outset of the project;
- Collaboration with and involvement of local centers of excellence in research;
- Involving key FAO staff located in relevant regional offices and with local FAO Representatives;
- Local workshops, in coordination with FAO's Regional and Country offices;
- Dissemination of the project's outputs under various forms, including academic journals, seminars, books, and papers.

The country studies are all centered on a multi-market model which we consider the appropriate Policy Impact Assessment Tool for the analysis of agricultural sector policies. While the methodological approach to policy analysis is largely shared across the case studies, the exact content of each will change from country to country according to their specific realities. However, each country case study shares the processes outlined in Figure 5.

Figure 5 Preparation of policy analysis at the household level



The starting point in all country case studies has been extensive consultations with in-country experts who prepared papers on the current agricultural policy environment and policy reform scenarios that were topical. Based on this information, the focus has been narrowed on two to three policy reforms to analyze and, making extensive use of household survey data, the relevant markets to include were determined as well as the feasible level of aggregation.

Findings from Egypt Case Studies

Wheat is a key staple food crop in Egypt. For this reason and because Egypt is only 55 percent self-sufficient in wheat production, wheat policy is central to food security in Egypt. The primary driver of wheat policy at the national level reflects a concern that a high exposure to international markets implies an unacceptably high risk to the country's wheat supply. At the household level, the government's wheat subsidy system is a reflection of its efforts to promote social equity and political stability. Below we discuss the results of the various policy reform scenarios analyzed with the policy impact assessment tool.

Greater self-sufficiency in wheat

The ROA Egypt policy case study shows that raising self-sufficiency in wheat, from 55 to 65 percent, would reduce reliance on imports but would also adversely affect other sectors. On the one hand, such a policy would encourage rice cultivation which contradicts the Government of Egypt's policy towards rice which specifies a maximum area of 1 million feddan in its efforts to rationalize water consumption. On the other hand, it will reduce the area under berseem (clover) and the accompanying price increase of berseem would reduce livestock production. Considering that livestock production accounts for about 30 percent of the value added in agriculture and makes up a major part of farm household's incomes and rural employment, the social cost of increasing wheat self sufficiency would be high.

Complete liberalization of the wheat market

Policy reform that aims at the complete liberalization of the wheat market implies a very significant income loss to households. Such a policy reform must include targeted cash transfers to the poor. This implies that the subsidy could be extended to a larger number of

the poor than in the case of the in-kind subsidy system. A cash subsidy is not allocated to a specific commodity but rather distributed among commodities according to household preferences. Therefore, greater efficiency is realized on the consumption side under a cash subsidy system. Finally, results indicate that complete liberalization without the ability to shield the country from sudden and significant wheat price movements creates significant hardships to households. The order of income loss estimated is such that the creation of strategic stocks may be justified.

Increasing wheat yields with a concomitant reduction in marketing costs

As discussed under the first scenario covered above, we note that wheat self-sufficiency cannot be pursued without causing significant trade-offs in other markets, notably berseem and livestock. Policy simulations that model increased wheat yields and producer prices through higher government expenditure on research and development and investment in infrastructure shows that increasing self-sufficiency is better served through directly improving wheat yields and infrastructure. Support to research and development and wheat infrastructure is relatively neutral with regard to other markets. Such a policy can also dampen, slightly, the impact of removing the current wheat subsidy system.

Findings from Indonesia Case Studies

Indonesia experienced strong agricultural growth over the past decades which contributed significantly to employment growth and poverty reduction. However, productivity gains of most food crops have slowed down significantly. In terms of employment generation and income growth high value commodities, in particular smallholder tree/industrial crops, horticulture, fisheries, and livestock, are expected to have greater potential as they are forecast to make up 80 percent of growth in agricultural output in the future. However, rice remains the key staple and in general agricultural diversification in the four major rice-producing areas has not changed much over the 1996-2002 periods. Below we discuss the results of the various policy reform scenarios analyzed with the policy impact assessment tool.

Increasing self-sufficiency in rice

Policy reform aimed at increased rice self-sufficiency would lead to a drop in production of maize and a reduction in self-sufficiency in maize and soy beans. On the other hand, rice self-sufficiency increases strongly also because imports decline substantially. Overall, the consumption of food commodities increases although only marginally for rice. The latter result hinges fundamentally on the price effect that derives from the policy reform. This is also true for income effects which are largely positive for rural households and neutral for urban households. However, diversification falls for all household groups in all regions.

Reducing farm-level dependence on rice

A simulated policy reform of improved marketing infrastructure for maize, soybean, cassava and banana stimulates production in general but the effect is more pronounced for rice, soybean and cassava production. Consumption also rises for all commodities except for rice and is particularly pronounced for maize and cassava. Rice self-sufficiency also increases due to the fall in imports. Self-sufficiency in soybean production is also higher. Significantly such a policy would lead to higher diversification especially for the rural poor, but also for middle income households. On the other hand, upper income households would see a fall in diversification, although this fall is small relative to the increase experienced by the other two income groups. The results also show that such a policy reform would lead to income loss for urban households but would benefit the rural poor, especially in Java.

Findings from Paraguay Case Studies

Agriculture in Paraguay has been characterized traditionally by a substantial concentration of land ownership and is becoming increasingly less labor intensive. Over time, the share in total crop production of labor intensive crops that are relevant to the small farm sector has been consistently falling, while the share of crops produced on large mechanized farms intensive in the use of commercial inputs has increased. These structural changes have reduced the pro-poor role of agricultural growth and have contributed to the increase in poverty witnessed during the past decade. Below we discuss the results of the various policy reform scenarios analyzed with a policy impact assessment tool.

Coupling pro-poor growth with macro-economic stability: the role of farm productivity

The key questions for policy making are: (i) whether it would pay reverting the trend in the level and composition of public expenditure in agriculture; and (ii) which areas should receive priority in re-designing agricultural policy so as to strengthen the link between agricultural growth and poverty reduction. The results allow the following broad conclusions: (i) the 1989 reforms have reduced poverty and improved income distribution; (ii) poverty is reduced by a 50% reduction in tariffs, by a 10% exchange rate appreciation, a 5% across-the-board increase in TFP (total factor productivity), a 10% increase in TFP in the primary sector, a 10% export subsidy, and a 10% increase in external savings. The negative impact on poverty differs among each of these six scenarios, TFP growth in primary activities being the third least in terms of final impact. Yet, other factors need to be considered when comparing these scenarios: once the need to avoid increasing the government deficit (especially in view of the high tax evasion) and to maintain an external savings balance are taken into account, it emerges that the 10% TFP growth in primary activities is the only scenario

among the ones examined that reconciles poverty reduction with macro-economic stability.

Improving cotton marketing margins

The second scenario explored is an improvement in marketing margins for cotton producers which could emerge as a result of modernizing the cotton processing industry. The result focuses on a hypothetical scenario in which farm gate cotton prices increase by 10%. This increase could in principle reflect also an improvement in the quality of cotton brought about by an improved technical assistance service and/or improved quality of seeds distributed to farmers. The analysis shows that a 10% increase in the price of cotton would lead to an increase of 7.4% in the area cultivated with cotton in the short run and of 16% in the long-run. The expansion of land cultivated with cotton would not reduce the dualism affecting the agricultural sector as most of the increase in cotton land would be at the expense of land cultivated with cassava, maize, and sugarcane, three crops that are important to small farmers. In terms of poverty alleviation, the impact would be highest among small farms located primarily in the central and eastern areas of eastern Paraguay, which represent the large majority of the total area cultivated with cotton.

Policy implications and guidance for the design of pro-poor policies

Although limited in numbers, the case studies are helpful in identifying examples and issues that can shed light on two main themes discussed in the section 1: how can 'agricultural policies' contribute to poverty alleviation with the maximum efficiency? And what would be the most efficient 'policy mix' to promote rural development and alleviate poverty, in particular for poor households. The challenge that ministries of agriculture face is to redesign their policies and the relevant institutions so as to maximize their poverty alleviation and food security impact given their financial constraints. This requires: (i) incorporating poverty-reduction concerns in the design of an agricultural development strategy; and (ii) ensuring the coherence in policy design both between the various sectoral policies as well as between the overall agricultural policy and other policies such as social protection policies, which are explicitly targeted at the poor. The experience from the case studies suggests the following broad principles in facing the challenge of designing pro-poor and pro-growth agricultural policies:

Pro-poor targeting of agricultural policies requires appreciating farm household heterogeneity

Heterogeneity poses a problem to policy making when the goal is to allocate resources so as to maximize the positive impact on the poor for a given budget. Heterogeneity stems from a number of conditions: access to capital, location of nearby off-farm income opportunities, age and education of the household head, agro-ecological conditions, etc. Yet, many of these characteristics tend to correlate so that some degree of clustering can be achieved. Heterogeneity is important as it leads to the conclusion that across-the-board agricultural policies, such as input subsidies or policies that target a specific crop, can have a substantial leakage of income transfers to non-poor households, without mentioning the typical argument of efficiency losses that are associated with distortionary policies such as subsidies and taxes.

The relevance of farm income to total income is key to improve pro-poor policy targeting

The contribution of farm income in total income is also an important element to take into consideration when targeting agricultural policies. While a specific policy can have a relevant impact on farm income, farm income can have a small impact on total household income due to the role played by off-farm income opportunities. The previous two principles underscore the importance of carefully developing a farm typology on the basis of which different policy options can be assessed and prioritized in terms of their overall poverty alleviation impact.

Accounting for the public good and externality dimensions to improve cost-efficiency of pro-poor agricultural policies

Following on the discussion in the section 1, this principle has strong implications for the design and organization of the delivery of various types of goods and services. Technical assistance, which can deliver both private as well as public goods, is a key example (see Egypt and Paraguay case studies); yet other less evident cases include the environmental and food security impacts associated with changes in the structure of crop production at the household and territorial level (e.g. Indonesia).

Ensuring coherence in policy design

This principle is also based on the extent to which farm income contributes to total household income, but in this case it concerns the role that agricultural policy can have in improving the overall coherence of an anti-poverty strategy, which will include other policies, in primis safety nets and social protection programs. The case studies show the relevance that such principle has, in particular for what concerns the design of food policies and their coordination with agricultural policies.

Experience with the policy analysis tool: lessons from multi-market models

A priori knowledge of the impact of policy reforms is valuable in that it can inform public debate on such reforms and it helps guide policy makers in determining the trade-offs implied by one or more policy reforms. General equilibrium models can be fruitfully used to analyze how agricultural policies can have an impact on poverty vis-à-vis other policies.

Well structured and used in conjunction with household-level data, these models can help policy makers in predicting the relative merit of investing resources in agricultural and rural development from the point of view of poverty reduction.

Once this is achieved, other modeling approaches turn out to be useful to examine more in detail the implications of various types of agricultural policies for crop structure, food and crop prices, poverty, etc. In so far as the general equilibrium effects are small, and in the case of agriculture reforms this may hinge on its importance in wage formation and labor demand, a more limited model that incorporates only the affected commodity markets has significant merits. Compared to general equilibrium models, multi-market models are infinitely more manageable and can incorporate many more details: to capture important trade-offs implied by particular policy reforms such detail is essential.

Multi-market models, while complex in many aspects, are also much less complex than general equilibrium models in terms of data requirements and time and technical expertise needed to implement. At the same time, the information content is considerable and easily expandable in terms of household groups, regions, time and of course markets. Considerable amounts of information regarding prices, quantities and incomes can be readily derived. Particularly valuable from the point of view of designing pro-poor agricultural policies is information on production and consumption patterns for different household/income groups.

The key challenges faced when developing a multi-market model are: (i) determining the relevant markets starting from the policy reform to be analyzed; (ii) obtaining the parameters from relevant studies available in the literature or estimate them from available data; (iii) defining market-closure conditions for each good, identifying tradable and non-tradable commodities; (iv) assessing the sensitivity of the results of policy simulations, which typically depends on data quality and availability; (vi) inferring household-level impacts from market-level effects of policy changes.

Extensive expert knowledge of the agricultural sector is absolutely indispensable for building informative models. Much time must be spent on obtaining reliable data and this task increases in complexity the more detailed the model is made. Finally, linking the multi-market model to household level data requires a representative household survey that covers urban and rural households. Such a step is important if detailed guidance on targeting is required.

Conclusions and Way Forward

The ROA project has explored the latest frontiers of our knowledge of the indirect roles played by agriculture in the process of development. Over the past 7 years, a fusion of various activities has created many synergies. The activities pursued are not limited to analytical work whose results are outlined in this report. They also include the dissemination of findings through publications, the project web-site, presentations in seminars, and discussions with stakeholders in meetings held under the auspices of the Project including Phase I Expert Meeting in March 2001, Phase I Final Conference in October 2003, Phase II Mid-Term Expert Workshop in May/ June 2005 and Phase II Final Workshop in December 2006. The following are the overall findings learned from analytical work, major lessons drawn for policy makers and possible ways forward as a follow-up to the project.

Overall findings from the Project

Among the large number of findings from the entire Project over the past 7 years, the most significant and cross-cutting findings learned from the empirical and prescriptive analyses can be summarized into the following five points:

- Indirect roles of agriculture with externality characteristics do exist in developing countries and can be quantified when appropriate data and techniques are available. Their contributions to society are enormous: agricultural growth is the most effective source of poverty alleviation both in rural and urban areas, while agriculture provides various environmental benefits whose values are comparable to its production values.
- The indirect roles of agriculture appreciated by society are shaped by diverse economic, social and environmental factors in general and by the stage of development in particular. For example, poverty alleviation, food security and buffer roles are often prevalent in the earlier stage of development reflecting agriculture's large share in production and employment, while environmental services and socio-cultural roles are highly valued in its latter stage as per capita income rises.
- The limited awareness of and attention to these indirect roles stem mainly from the lack of sufficient data and information on their incidence, prevalence and magnitude. Furthermore, these indirect roles are under-supplied from a social point of view since farmers and other stakeholders do not face the right incentives to take their social benefits into consideration due to the combination of market, policy and institutional failures.
- Results of empirical analysis and policy guidance and tools generated by the project are a significant first step towards a deeper appreciation of the external roles played by agriculture and their reflection into the decision making process. The accomplishments of the ROA Project are not limited to the domain of research; a fusion of various activities is influencing policy responses generating new initiatives in ROA case study countries.
- It is evident, however, that more needs to be done towards full-fledged recognition and reflection of indirect roles of agriculture into policy formulation in the domain of both research and policy. Remaining gaps in our knowledge still exist, both in terms of the causes of insufficient provision of indirect roles (e.g. exact nature of market, policy and institutional failures) as well as the policy responses to them (e.g. appropriate policy mix).

Major lessons for policy makers

In light of the overall findings drawn from the project, the following lessons are identified as key messages to be delivered to policy makers in developing countries and to the development community:

- Policy makers and the development community should pay due attention to the existence and contributions of the indirect roles of agriculture and integrate these social values into their decision making. The rich insights on the identification and measurement of the indirect roles of agriculture drawn from the ROA Project are expected to act as a catalyst towards such a direction.
- Maximum efforts should be made to collect basic data and information on the incidence, prevalence and magnitude of the indirect roles of agriculture. Given the fundamental importance of data and formation for awareness raising and for sound and accountable decision-making, such endeavors are particularly encouraged in those countries which were not covered by the ROA Project by employing existing materials from the Project as a useful point of departure.
- Governments, communities, firms and households should invest more resources in the agriculture sector by reversing its declining trend in both public and private sectors. Given the externalities and public goods nature of the indirect contributions of agriculture in global, national, regional and local levels, the social rate of return on the investment in the agricultural sector is much higher if those external benefits are taken into consideration.

- Furthermore, market, policy and institutional failures hampering agriculture's potentials should be redressed so that decision makers of resource allocation face right incentives by incorporating its social benefits. Policy responses include the provision of economic incentives and public goods in the form of research, education and infrastructure to overcome market failures. Meanwhile, eliminating perverse incentives from improper interventions and establishing effective institutional mechanisms deserve equal attention.
- These policy responses should take due account of the changing roles of agriculture in the course of development. Given the varying degrees of resource availability and priorities attached to the roles of agriculture in different stages of development, there is no one-size-fits-all approach and an appropriate policy mix should be found. The pursuit of multiple market and non-market goals also poses trade-offs between different goals and policy makers should ensure consistency and coherence between different policy goals as well as instruments.

Way forward

The ROA Final Workshop in December 2006 provided an excellent opportunity to discuss the need and orientation of future work, building on the results from the project to date. Possible areas that deserve further work identified in the Workshop can be summarized as follows:

- The need of developing communication tools tailored to diverse audiences in general and senior policy makers in particular was emphasized. The materials to meet such needs include: (i) last two editions of 'ROA Newsletters' (2 page summary of two research components in the ROA Phase II), (ii) a new edition of 'ROA Policy Brief' (8 page summary of overall project), (iii) 'ROA Phase II Summary Report' (this publication), and (iv) 'The ROA Story' (a book being prepared for general audiences by an assigned journalist).
- The necessity of disseminating findings and lessons from the Project through various channels and formats was also underlined. The efforts to this end are: (i) presentations of the results from the Project in national, regional and international seminars, (ii) publications based on the ROA work, including the special chapter of 'State of Food and Agriculture 2007' focusing on environmental service payments, and (iii) other journal articles and working paper (See Annex 2 for the list of publications).
- The overall results from the project, normative in nature, need to be translated into operational actions in the field. To this end, the importance of sharing the ROA results and promoting future cooperation with other technical units in FAO was highlighted. In the same vein, improved information sharing and strengthened collaboration with such relevant international organizations as OECD, World Bank and UNEP were also recommended.
- Finally, as a first step for exploring the possible avenue of additional analytical work, the need of identifying the remaining knowledge gaps in light of thorough assessment of the findings and lessons leaned from the entire ROA project was stressed. In this respect, reports from an external evaluation team lead by Dr Eirik Romstad (Norwegian University of Life Science) and the peer-review panel assessing the evaluation report should serve as key documents for reference.

Annexes

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Annex 2 ROA Phase II Publication List

The following synthesis reports, dissemination materials, working papers and project documents can be downloaded from the ROA Project Website (http://www.fao.org/es/ESA/Roa/).

Overall Project

Synthesis reports

Sakuyama, T., Bresciani F., Croppenstedt, A. and Viatte, G. 2007. *The Roles of Agriculture in Development: The Policy Implications and Guidance*, Research Programme Summary Report 2007, Rome.

Dissemination materials

Sakuyama, T. 2006a. 'The roles of agriculture in economic and social development: Project approach and emerging lessons to date', *ROA Project Brief*, No. 1, June 2006, Rome.

Stringer, R. and Sakuyama, T. 2005. 'Can agriculture enhance environmental outcomes while contributing to economic and social development?', *ROA Newsletter*, No. 1, September 2005, Rome.

Stringer, R. 2005. 'Lessons emerging from the Roles of Agriculture Project', *ROA Newsletter*, No. 2, October 2005, Rome.

Environmental Service Incentive Component

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Sakuyama, T. 2007a. *Environmental service incentives component: Analytical framework for policy case studies*, Roles of Agriculture Project, Rome.

Sakuyama, T. 2007b. *Environmental service incentives component: Summary of policy case studies*, Roles of Agriculture Project, Rome.

Sakuyama, T. 2007c. *Environmental service incentives component: Policy implications and guidance*, Roles of Agriculture Project, Rome.

Books

Zilberman, D., Sakuyama, T. and Stringer, R. (forthcoming). *Agriculture and Environmental Services: Policies, Projects and Incentives for Poverty Reduction in Developing Countries*. FAO and Springer Press (in preparation).

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Poverty Alleviation and Food Security Component

Synthesis reports

Bresciani F. and Croppenstedt, A. 2007a. *Poverty Alleviation and Food Security Component: Analytical framework for policy case studies*, Roles of Agriculture Project, Rome.
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