

ROA **Roles of Agriculture Project** **Project Brief**



Number 2, March 2007

The Roles of Agriculture Project is funded by the Japanese Ministry of Agriculture, Forestry and Fisheries and managed by the Agricultural Development Economics Division of the Food and Agriculture Organization of the United Nations.

The Roles of Agriculture in Development: Findings, Lessons and Policy Implications from A FAO Project

By Takumi Sakuyama

This Project Brief provides key findings, lessons and policy implications drawn from the research programme entitled 'Socio-Economic Analysis and Policy Implications of the Roles of Agriculture in Developing Countries' (ROA Project) implemented by the Food and Agriculture Organization of the United Nations from 2000 to 2006.

Motivation 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 hamper 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

crisis 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 can 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 significantly higher potential for contributing to solve these problems, this potential does not fully materialize owing to a combination of market, policy and institutional failures. This potential should correctly be seen as an externality whose values 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 these 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 by 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 by 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.

Conceptual foundation of ROA

There are numerous terms describing these 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 policy to take advantage of such indirect contributions (Box 1).

Box 1 Comparison between FAO’s role 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.

	Role 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	<ul style="list-style-type: none"> • indirect linkages • externalities 	<ul style="list-style-type: none"> • joint production • externalities • public goods

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 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 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 a sense that, although they are neither direct nor visible as food production, their contributions are still rewarded in a market economy (Sphere B).

Table 1 Classification of roles of agriculture

	provision of private goods and services	provision of goods and service with externalities
Direct impacts	Sphere A <ul style="list-style-type: none"> • food production • income generation • employment opportunity 	Sphere C <ul style="list-style-type: none"> • poverty alleviation (within household) • food security (within household)
Indirect impacts	Sphere B <ul style="list-style-type: none"> • surplus labor provision • saving for investment • market for industrial goods • export earnings • materials for agro-processing industries 	Sphere D <ul style="list-style-type: none"> • poverty alleviation (spill-over) • food security (spill-over) • environmental externalities • out-migration control • buffer in times of economic shock • culture formation

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 generates to a 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

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 is confirmed to 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 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 to disregard 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.

From empirical to prescriptive analysis

The Roles of Agriculture Project is composed of two distinct, but closely related, phases. 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 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 a right sequence in 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.

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)	<ul style="list-style-type: none"> poverty alleviation household food security environmental externalities out-migration control buffer in times of economic shock culture formation 	<ul style="list-style-type: none"> poverty alleviation and food security (PAFS) environmental services (ES)
activities	country case studies on above 6 modules in 11 developing countries	<ul style="list-style-type: none"> 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

The main challenge facing 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. An important consideration in Phase I to this end is 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 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 (Figure 2). As such, the analytical approach in ROA Phase I was characterized by ‘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.

Figure 1 Roles of agriculture in development

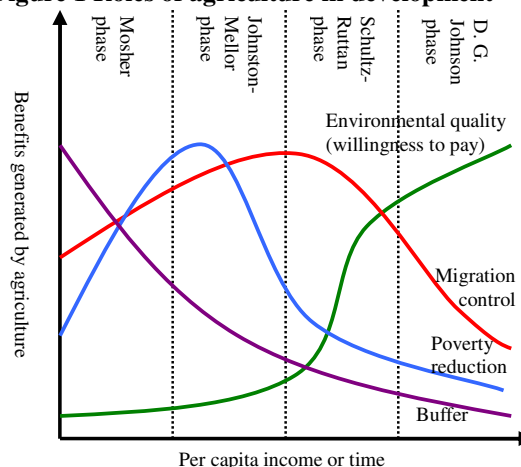
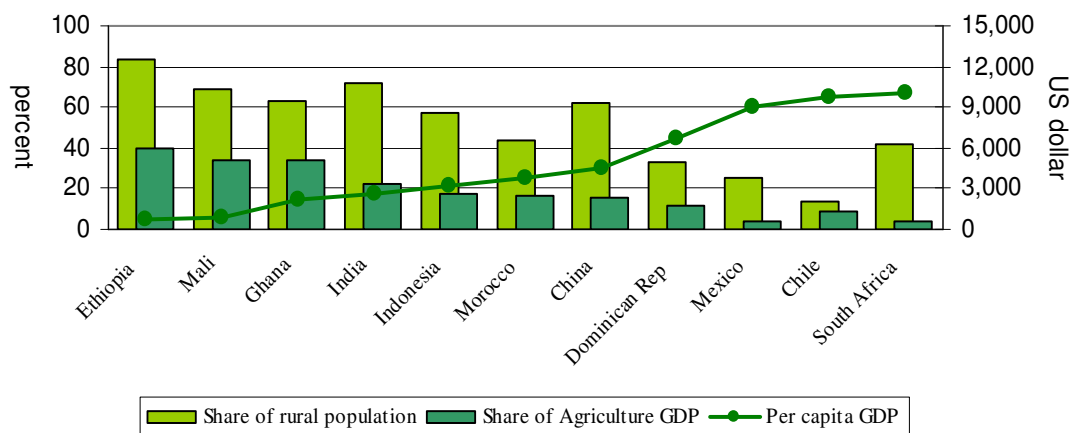


Figure 2 Share of the agricultural sector in empirical case study countries (2002)



Having confirmed the existence of diverse indirect roles of agriculture with externality characteristics and quantified them through various techniques, the main challenge faced in Phase II 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, 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 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 Food and Agriculture Organization 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 advantage 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

Environmental services incentives in conformity with poverty alleviation

Initiatives for addressing environmental externalities and public goods can be broadly classified based on who is the main actor of an initiative and on who bears the costs for the provision of environmental services. Table 3 presents the taxonomy of such initiatives based on these two criteria together with specific examples, and the scope of ESIs to be examined in the ROA Project is represented in the shaded area. In this research component, ‘environmental service incentives’ (ESI) 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	<ul style="list-style-type: none"> • customary rules • land care groups 	provider
	<ul style="list-style-type: none"> • taxes and charges • regulation (e.g. protected areas) 	
public	<ul style="list-style-type: none"> • direct payments 	taxpayer
	<ul style="list-style-type: none"> • direct payments • eco-tourism • conservation trusts • entrance fees 	beneficiary (of environmental service)
market	<ul style="list-style-type: none"> • market price premiums • labeling, standards and certification • community supported agriculture 	consumer (of product)

There is a growing expectation in development circles that ESIs can also contribute to poverty alleviation by providing additional incomes to the poor to manage their resource base in a sustainable manner. However, ESIs cannot necessarily address poverty given the heterogeneity and site-specificity of the incidence of both environmental services and poverty. Thus, the real issue to be clarified is how to design, implement and enforce ESIs so as to enhance their positive impacts or avoid negative impacts on poverty alleviation. This is the exact reason why practical policy guidance for pro-poor ESIs is urgently needed and to be delivered through the ROA Project.

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 the agricultural sector in particular necessitate original policy case studies in the context of the ROA project. These case studies aim at either examining the effectiveness of existing incentive measures in practice or proposing alternative incentive measures to improve environmental outcomes in a targeted area. Countries and specific case study sites are selected so as to enable to draw broad policy lessons by covering a wide range of factors and attributes in shaping ESIs (Table 4).

Table 4 Policy case studies in ESIs module

Country	Environmental service	Instrument
Bhutan	wildlife habitat in crop and livestock farming	direct payment
Kenya	wildlife habitat in pastoral farming	hotel fee
Mexico	water supply from forest	direct payment
Morocco	scenic landscape in mountain farming	agro-tourism
Panama	water supply and soil erosion prevention	toll in the Canal
Philippines	genetic diversity in rice farming	direct payment
Uganda	water supply in wetlands	direct payment

Policy guidance is structured based on the programme cycle of ESIs composed of ‘design, implementation and enforcement’. The overarching guidance for pro-poor ESIs can be summarized as follows:

- design of ESIs should address the issues of defining targeting criteria for eligible areas, determining contract types and payment levels, establishing compliance requirements in exchange for incentives, finding sustainable financing sources and reducing transaction costs for collecting information on scheme design.
- main challenges for pro-poor ESIs are to overcome such impediments in the implementation stage as insecure land tenure, initial investment requirements, technical capacity constraints and transaction costs for arranging and implementing a contract through various devices outlined in the guidance.
- credible enforcement mechanisms and devices to reduce transaction costs for them should be built in ESIs to maximize their effectiveness
- proper appraisal, monitoring and evaluation must be an integral part to make ESIs efficient, effective and accountable.

Linking agricultural policies to poverty alleviation and food security

The PAFS module further explores quantitatively the roles that various channels play in mediating the impact of agricultural policy reforms on poverty and food security at the household and sub-national level. It pursues a more detailed assessment of how policies, institutions, household assets and human capital, and infrastructure impact on household income, poverty and food security. Its ultimate goal 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.

The approach followed by the PAFS module 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.

Countries for the PAFS component 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 reflects also 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. 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.

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 (Table 5).

Table 5 Policy case studies in PAFS module

Country	Policy scenario
Egypt	<ul style="list-style-type: none"> • Greater self-sufficiency in wheat • Complete liberalization of the wheat market • Increasing wheat yields with a concomitant reduction in marketing costs
Indonesia	<ul style="list-style-type: none"> • Increasing self-sufficiency in rice • Reducing farm-level dependence on rice
Paraguay	<ul style="list-style-type: none"> • Coupling pro-poor growth with macro-economic stability: the role of farm productivity • Improving cotton marketing margins

Although limited in number, the case studies are helpful in identifying examples and issues that can shed light on the two main themes. 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's heterogeneity.
- the relevance of farm income to total income is the key to improve pro-poor policy targeting.
- accounting for the public good and externality dimensions to improve cost-efficiency of pro-poor agricultural policies.
- Ensuring coherence in policy design between agricultural policy and other policies such as safety nets and social protection programmes.

Key conclusions

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

- 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 the social point of view since farmers and other stakeholders do not face 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 decision making process.
- 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.

In light of these overall findings drawn from the project, the following lessons are identified as key message 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.
- 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 more resources 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 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-side-fits-all approach and appropriate policy mix should be found.

Annex: Main Publications from the Project

Empirical analysis in Phase I (2000-2003)

Summary reports

FAO. 2001. *Expert Meeting Summary Report*, ROA Project Publication No.1.

FAO. 2001. *Expert Meeting Proceedings*, ROA Project Publication No.2.

FAO. 2002. *Analytical Framework (Version 2), Methodological Notes and Theoretical Notes*, ROA Publication No.3.

FAO. 2004. *Socio-Economic Analysis and Policy Implications of the Roles of Agriculture in Developing Countries*, Research Programme Summary Report 2004.

Books and special journals

Stringer, R. and Pingali, P. (eds.) 2004. 'Special edition on agriculture's contributions to economic and social development', *electronic Journal of Agricultural and Development Economics*, Vol. 1, No. 1, pp.1-153.

Valdés, A. and Foster, W. (eds.) 2005. *Externalidades de la Agricultura Chilena*, Ediciones Universidad Católica de Chile. (in Spanish)

Bresciani F. and Valdés, A. (eds.) 2007. *Beyond Food Production: The Role of Agriculture in Poverty Reduction*, Edward Elger.

Journal articles and book chapters

Bresciani, F. Dévé, F. and Stringer, R. 2004. 'The multiple roles of agriculture in developing countries', In Brouwer, F. (ed.) *Sustainable Agricultural and the Rural Development*, Cheltenham: Edward Elger.

Module cross-country synthesis reports

Allali, K. Lizardo, M. and Stringer, R. 2003. *Environment Module Cross-Country Report*, FAO.

Bresciani, F. 2003. *Poverty Reduction Module Cross-Country Report*, FAO.

Croppenstedt, A. 2003. *Food Security Module Cross-Country Report*, FAO.

Bresciani, F. 2003. *Buffer Module Cross-Country Report*, FAO.

Vercueil, J. 2003. *Social Viability Module Cross-Country Report*, FAO.

Warren, P. 2003. *Culture Module Cross-Country Report*, FAO.

Prescriptive analysis in Phase II (2004-2006)

Summary reports

FAO. 2007. *The Roles of Agriculture in Development: The Policy Implications and Guidance*, Research Programme Summary Report 2007.

Books and special journals

Molinas, J. R., Ibarra, J. and Bresciani, F. 2006. *El Rol de la Agricultura en Paraguay: Desafíos Actuales y Perspectivas Futuras*, Instituto Desarrollo and FAO. (in Spanish)

Sakuyama, T. (ed.) 2007. *Roles of Agriculture in Developing Countries: Lessons from a FAO Project*, FAO and JAICAF. (in Japanese)

Zilberman, D. and Bulte, E. H. (eds.) (forthcoming). 'Special issue on paying for ecosystem services and poverty alleviation', *Environment and Development Economics*.

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)

Journal articles and book chapters

Sakuyama, T. 2006. 'Direct payments for environmental services from mountain agriculture in Japan: evaluating its effectiveness and drawing lessons for developing countries', *electronic Journal of Agricultural and Development Economics*, Vol.3, No.1, pp.27-57.

Module synthesis reports

Sakuyama, T. 2007. *Environmental service incentives: Analytical framework for policy case studies*, FAO.

Sakuyama, T. 2007. *Environmental service incentives: Summary of policy case studies*, FAO.

Sakuyama, T. 2007. *Environmental service incentives: Policy implications and guidance*, FAO.

Bresciani F. and Croppenstedt, A. 2007. *Poverty Alleviation and Food Security: Analytical framework for policy case studies*, FAO.

Bresciani F. Croppenstedt, A. and Viatte, G. 2007. *Poverty Alleviation and Food Security: summary of policy case studies*, FAO.

Bresciani F. and Croppenstedt, A. 2007. *Poverty Alleviation and Food Security: Policy implications and guidance*, FAO.



Roles of Agriculture Project

c/o ESAC/FAO
Viale delle Terme di Caracalla, 00100,
Rome, Italy
Tel: +39 06 5705 2103
Fax: +39 06 5705 5128
E-mail: ROA-Project@fao.org
Web-site: <http://www.fao.org/es/esa/roa/>

ROA Project Core Staff

Supervisor
Prabhu Pingali, Director/ESA
Environmental Service Module Team Leader
Takumi Sakuyama, Economist/ESAC
Poverty Alleviation Module Team Leaders
Fabrizio Bresciani, Economist/ESAC
André Croppenstedt, Economist/ESAC