GIAHS : Towards analyzing the drivers of changes in farming systems

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The GIAHS project has the objective of documenting and fostering the viability and permanence of farming systems that are particularly remarquable due to the positive externalities that they generate and that benefit the environment and society at large. It will shed light on the positive roles that these systems perform and that do benefit not only the developing countries agriculture, but the global society as a whole, through the various environmental, social, economic and cultural services that they provide to their surrounding society. However, its primary purpose is to pave the way for ensuring a permanence of the existence of such systems.

The policies that drive the transformation of agriculture and agricultural systems are many, and their interactions constitute a complex web in which the impacts of one or another policy are hard to individualize. The purpose of this paper is to share some lessons deriving from various approaches – mainly but not exclusively that of the RoA project – that could help realizing some rapid diagnostics of the major drivers of change that are acting on the farming systems targeted by the GIAHS project.

Policies and incentives frameworks

The policies that have a direct and indirect incidence on the evolution of farming systems are many, their interactions are complex and thus their individual impacts are difficult to elucidate. The way policies do affect the transformation of the farming systems selected by the GIAHS project is thus rather complex to analyse.

Macro policies are important drivers of change, and they often determine the threats and the opportunities that the farmers of a given farming system are facing. Exchange rates, trade liberalization, interest rates, fiscal policies, prices stability, structural adjustment policies can in fact determine the likeliness for a given a farming system to continue being perceived as a viable

one, based on its current features in terms of demography, average income, major and secondary agricultural products and natural resources base.

Agricultural sectoral policies are of course also of primary importance for the viability of farming systems: the share of agriculture in public expenses and its composition (e.g. share of irrigation, the share of subsidies for small farmers or given commodities, and their regional distribution), agricultural domestic market liberalization, land tenure policies, credit policies, international agricultural trade, agricultural income taxation, research and training, subsectoral policies and programmes, sectoral reduction of subsidies and public services do have a direct impact on the viability and sustainability of individual farming systems; these policies induce changes in pressures on natural resources and changes in local incomes that do affect the viability of given systems or practices while benefitting possibly others. Finally, a number of policies are not targeting specifically the agricultural sector (and can thus be called *non agricultural sectoral* policies), but they are of primary importance in determining the changes that affect farming systems and their sustainability. Some policies of this type are particularly close to agriculture : they include environmental protection and the implementation of all the international agreements on the environment since the Rio Earth Summit, strategies and programmes aiming at poverty reduction and food security enhancement at national level, infrastructures, rural development (more specifically: rural non-agricultural development). Finally, of course, the policies concerning the manufacturing and services sectors are also policies that must be mentioned here : they affect the terms of trade between these sectors and agriculture. They are of primary importance, also, in determining the "push and pull" factors that may induce for example an increasingly important income gap between rural and urban areas and a strong rural-urban out migration, or an excessive pressure on the natural resources base of an agricultural system.

All these policies do one way or another have an impact on the environmental conditions and the level of production and its composition of any farming system. They impact on the economic viability of individual farms within given farming systems, on the incidence of poverty and the level of food insecurity in the area, and finally on the level of out migration (or inwards migration) characterizing the system.

Policy reforms observed during the 1990s in the developing word were often dramatic. Most changes were in the direction of liberalization of trade policies, domestic market deregulation, privatization and decentralization, within a context of continuing structural adjustment programs. In

many countries, a number of essential macroeconomic policy changes were more determinant and stronger engines of change for agricultural systems than were sectoral policy changes. Agricultural transformation tends often to be more influenced by external trade and exchange rates than by rural and agricultural development policies themselves. However, rural and agricultural sectoral policies remain very important in determining the magnitude and direction of the changes induced by the macro policies; and in many instances, for specific farming systems and depending on the macro reforms within the country, they may remain a mjor if not the principle driver of changes.

The socio-economic effects of reforms and their complexity and variations require a differentiated analysis. In countries where important reforms have induced a strong agricultural growth, highly positive poverty reduction outcomes are observed most of the time. However policy, institutional and market failures, and other factors (e.g. international trade distortions, or climatic hazards) may hamper the full realization of the potential for such poverty and hunger reduction benefits. Furthermore, encouraging agricultural growth in the form of increases in productivity often marginalizes vulnerable farm households or traditional farming systems that do not have access to the technologies or other productive assets required for productivity increases, or whose system features (natural resources, or socio-economic or cultural characteristics) are not readily compatible with the changes that the adoption of new technologies could induce. This may generate a deepening of the income gaps that exist among the producers of a given system vis-à-vis other systems, or vis-à-vis urban dwellers, and a further marginalization and impoverishment of the poorest farmers and systems. Significant social transition costs may arise from lowered incomes and increased food insecurity (e.g. urbanisation costs deriving from a poorly planned rural-urban population balance).

The effects of the macro-economic and sectoral reforms are contrasting from one country to another, but some generalization can be attempted. Overall, reductions in the taxation of agriculture, the promotion of market based incentives, and improvements in marketing systems and processing of export commodities are found to have positive effects for agricultural growth, but they can affect the *status quo* and the viability of specific farming systems and family farms and induce their marginalization. The reduction in subsidies and other public expenses supporting the sector may have either positive socio-economic and environmental effects effects (more efficient use of inputs, more environment-friendly practices) or negative ones (more pressure on natural resources such as soil fertility, reduction in investments, in agricultural extension and research and infrastructure development – some advocate that this reduction may lead to better targeting). Finally, as a whole,

the effects of environmental polices seem to be mixed depending on incentives, time horizons, and the sub sectors and farming systems involved.

Three major drivers for change: trade, environmental agreements and poverty

A major lesson learned from the country case studies of the RoA project is that the impact of a given policy on the evolution (viability, sustainability) of a given farming system seems to depend primarily on three key characteristics of the system :

a) *The trade environment*. This dimension includes international trade, and the opportunities and threats that are attached to more liberalized markets : how export markets develop, especially when they are directed towards industrialized countries where the demand for sustainable agricultural practices and safe food is increasing; it also includes domestic trade, and the liberalization of domestic markets down to the local level; finally, it includes the differentiation of market segments and the emergence of new markets and market niches, as well as the specialisation of a given region (and the systems that are included into it) in given commodities for which it has a comparative advantage;

b) The *international environmental agreements*. This refers to the extent to which domestic regulations and international environmental agreement commitments are enforced at national level and down to the local level; this dimension includes, with respect to an individual farming system, the extent to which its natural resources base is under an extracting or depleting pressure, or rather being maintained and protected by the local practices; and finally

c)*The incidence of poverty in the system*. The degree to which the population of a given farming system is affected by poverty and is attracted towards other sites of residence and other livelihoods will be determinant for the local demographic trends and the transformation of the local agricultural systems, and of the related productions and practices.

A major pressure on farming systems is the domestic and international liberalisation of agricultural trade. Trade liberalization encourages the expression of comparative advantage and induces a geographic re-distribution of production at the national and cross international level. It influences agricultural export supply chains by forcing producers to conform and adapt to the demand and requirements of international markets and to food safety and processing standards. Finally, it exposes staple food traditional production systems to competing imports, inducing changes in the domestic production structure, and the gradual abandoning of certain commodities and practices,

thus modifying (positively or negatively) environmental impacts. In many countries, examples of trade liberalization can be found which positively affected the local environment due to the evolution of exports towards higher incomes countries. For example, eco label programmes and « green certification » allow producers to access consumers in industrialized countries who are willing to pay high premiums for safe foods while contributing to the public good of an enhanced environment quality.

Almost all developing countries subscribe to a range of multilateral environmental agreements and are members of various institutions that generate codes of conduct and standards concerning good practices. As these are gradually implemented, they induce changes in policies and legislations, and state and local regulations. The extent to which these regulations and codes of conduct are implemented is a major determinant of the evolution of farming systems.

A third major pressure pressure for change is rural poverty. Most rural poor live and work in ecologically fragile areas that are often environmentally degraded and economically marginal. These rural poor tend to make use of practices that exhaust the resource base on which their agricultural production depends, thereby threatening both the environment and their food security. Moreover, policies aimed at reducing poverty of these smallholders often have negative side effects that further degrade the environment, such as subsidies for fertilizers or pesticides, and equipment for using ground water to irrigate in areas where the water table is already critically low. The continued degradation of the resource base contributes to a higher frequency of poor harvests which intensifies poverty and possibly out migration. (Such poverty increase/environmental degradation synergies are present at local levels for example in rain fed cereal cultivation in semi arid areas called « *bour défavorable* » in Morocco, the loess plateau of the Western Provinces of China, or the agricultural frontier areas of tropical forests where deforestation is caused by slash and burn practices for the production of staple foods).

Steps for a diagnosis of the major drivers of change in a given farming systems

A useful approach to understand better the conditions of sustainability of a GIAHS system and its dynamics of evolution could be to carry out a rapid analysis of the major drivers of change that do concretely affect its transformation.

Such a diagnosis could include first a brief historical review of the natural resources base and land use of the system (over the past 30 years), of its demography, agricultural production (in physical and monetary terms), technology (identifying major innovations that have entailed important socio-economic and environmental changes) and off farm labour opportunities (rural non agricultural economy). A classical rapid approach of the type "Dynamique des systèmes agraires" (of the Mazoyer school of thoughts style) could be used. This would provide some trends concerning these various aspects, and would be based on literature and statistics reviews carried out by systems analysis experts knowledgeable of the region concerned and the systems being studied.

A second step could be a rapid review of trade environment and its recent changes (local marketing, national, regional and global trade agreements and commtiments, and their consequences in terms of income and relative prices for the producers of the farming system) concluding with the identification of specific trends attached to given products, with the view of understanding the threats and opportunities concerning given types of commodities, farming practices, family farms and the related incomes. This step requires a trade economist and an agro-economist with systemic background who are able to jointly identify trends and opportunities. Foor the latter, a field rapid appraisal of the situation is required.

A third step could be to analyse how international environmental agreements have been, are currently and are likely in the near future going to alter farming practices, induce higher incomes in relation to given practices and products, or on the contrary will threat specific practices and products and thus the production units that do implement them if they do not find alternative opportunities: this review should include the examination of both the legal framework, the by-laws and other enforcement mechanisms and their effectiveness in the area. An environmental economist knowledgeable of the national environmental commitments is required. He/she should work at field level with local experts and informants.

The fourth step would be the review of the poverty trends in the area of the farming systems, based wherever available on the reliable existing "poverty surveys" (WB type). This analysis would include that of poverty as a whole in the region, the understanding of the poverty differences within the system itself, as well as the analysis of the local labour markets and demographic movements. Depending on resources, it could include the re-processing of the survey questionnaires generated by the farming systems households. This work requires the assistance of an agricultural economist with good statistical skills.

Finally, a rapid but relatively comprehensive review of the various macro and sectoral policies affecting the system's evolution, its market opportunities, its natural resources and environment, its income (and poverty) characteristics (and its demographics) should be able to highlight the policies (macro and sectoral) that affect more particularly the system and its transformation, both in positive and negative terms. This involves the assistance of a policy analyst, and the preparation of a matrix of policies and impacts.

Such a diagnosis could allow then for the concrete identification of specific threats and opportunities for the sustainability of the system: on which type of producers, which types of commodities, which type of resources, which types of markets specific action should be taken within the framework of the GIAHS project to encourage a "dynamic conservation" of the system and of its most remarquable attributes and contributions to society. Such a diagnostic could then shed light on the blend of market based and public action based actions that might be most suitable for enhancing the sustainability of the system. Such actions should stimulate the valuation and payment for the environmental, social and cultural services provided by the system not only to the dwellers of the area, but to the wider society.