# What Kind of Social Science Does the CGIAR, and the World, Need?

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## Agricultural Development and Social Science

Following the great recession of military colonialism after the middle of the 20th century, there was much optimism about the potential for modern technology transfer to transform traditionally based agriculture in the newly independent countries of the Third World, with the green revolution the most salient example. The CGIAR Centers in Mexico (CIMMYT) and the Philippines (IRRI) spearheaded the green revolution, and the Centers have continued to play a prominent and influential role in agricultural research and development in the South, out of proportion with the relatively small size of their programs.

The persistence of hunger and the continuing degradation of the natural resource base for agricultural production dampened the early enthusiasm. It eventually led to the conclusion in most industrial nations and international agricultural development organizations, including the CGIAR, that social and cultural factors, not only technical factors, are important determinants of the outcome of technology transfer and the future of Third World agriculture.

The CGIAR appears to continue to accept social science as important, as in its 2000 "New Vision" publication: "The CGIAR's enhanced mandate and strategic focus on poverty reduction will entail an increased role of socioeconomic research within the CGIAR Centers" (quoted in Cernea 2005:73). However, Cernea has documented an increased institutional and intellectual marginalization of social science in the CGIAR in recent years, which he sees as "dysfunctional to the system's operations and performance" because of "the strategic relevance of social research to CGIAR's overall research for food security and poverty reduction" (Cernea 2005:73). If the people making policy in the CGIAR system really believed such statements, then they would be irrational to reduce social science at the Centers. Assuming rationality, we have to ask why they don't believe their own statements, and what they think should be the role of social science in agricultural development.

## What are CGIAR's Goals for Agricultural Development?

Like most agricultural development organizations, the CGIAR has embraced the concept of sustainable agriculture as a goal in its economic sense (profitable enterprises), social sense (decreased poverty, increased gender equity), and environmental sense (natural resource conservation). For example, in its 2004 Charter, the CGIAR states that its vision "contributes to sustainable and poverty reducing development through productivity gains, improved policies and institutions, and ecological responsibility" (CGIAR 2004:vi). The recent CGIAR report on research priorities for 2005–2015 states, "The overall goal of the research carried out by the CGIAR and its partners is to improve the livelihood of low-income people in developing countries through reduced poverty, food insecurity and malnutrition, and to foster better institutions, policies, and sustainable management of natural resources" (CGIAR 2006:1).

Achieving sustainable agriculture, like all agricultural development, is about changing the way agriculture looks in the future. It is a goal (i.e., a statement about the way agriculture *should* be). Like all such statements, it is necessarily based on values that cannot

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be empirically tested in the biophysical world (Costanza 2001). Therefore, in order to answer the question "What should the role of social science in agricultural development be?" we first have to answer the question "What definition of sustainable agriculture is being used?" These definitions in turn define the roles for farmers and social and natural scientists (Cleveland and Soleri 2006). Indicators can be used to objectively (to the extent possible) measure the way things "are," that is, how sustainable a particular agricultural system is under a given definition. One of the biggest challenges in increasing the sustainability of agriculture is agreeing on its definition and how to measure and promote it, and this requires an open discussion of the assumptions different definitions are based on.

In the following two sections I examine the role of these assumptions in the green revolution and the current biotechnology revolution in order to explore what the CGIAR's working definition of "sustainable agricultural development" might be, and how this could be related to the demise of social science Cernea has documented.

## The Green Revolution

Crop improvement has been at the core of CGIAR research since its inception, and it resulted in what came to be known as the green revolution. Globally, the green revolution was a major factor in the growth in grain production keeping pace with superexponentially increasing human population (Evans 1993). However, there were major social and environmental costs (NRC 2002), and many small-scale farmers in more marginal growing environments with limited production resources did not benefit directly. In Mexico, the home of the green revolution, CIMMYT has been working on maize (and wheat) improvement since its creation in the 1960s. Maize is the staple of most Mexican diets with over 12.7 million tons, equivalent to 125 kg/person, consumed directly as food in 2002 (FAOSTAT Data 2005), maize occupies more area than any other crop in that country (8.0 million ha) (Aquino et al. 2001), and most is grown by small-scale farmers. Among the assumptions underlying the green revolution in Mexico was that growth in production by focusing on larger-scale farmers in more optimal growing environments was more important than helping the majority of small-scale maize farmers in more marginal environments (Jennings 1988; Wellhausen 1970). The standard economic assumption has been that these farms will disappear, replaced by more efficient, large-scale industrial agriculture. This assumption continues to play a major role in agricultural development policy, not only in the CGIAR but also, for example, in the creation of NAFTA (Nadal 2000).

However, even though small-scale maize farmers have not benefited directly from maize improvement at CIMMYT or other programs, they have persisted, constituting between 27 and 76 percent of Mexican maize farmers (Nadal 2000:42) and producing approximately 50 percent of Mexican maize (Nadal 2000). Today maize yields remain low, and farmers' traditional varieties (FVs) of maize, not modern varieties (MVs), account for 79 percent of maize area, with very low yields (2.4 MT/h) compared with industrial countries like the United States (8.3 MT/h) (Aquino et al. 2001). In more marginal areas adoption of MVs is even lower, as in the southern Mexican state of Oaxaca where about 90 percent of maize area harvested is in FVs (Aragón Cuevas et al. 2005), with yields of 0.8 MT/h (Aragón Cuevas 1995). This is not because MVs are not available—the public sector released 222 maize MVs between 1966 and 1997, and 155 private sector MVs were available in 1997 (Morris and López Pereira 1999).

Of more direct relevance than yield to limited-resource farmers in marginal environments is yield stability. And this may be one of the main reasons for the low adoption rates of MVs by these farmers. MVs often have steep regression response curves, that is, are highly responsive to marginal environments, as well as optimal ones, and often have lower yields than FVs in marginal environments (Ceccarelli 1997; Evans 1993). For a minority of plant breeders in the CGIAR Centers, this means that selection for improved performance in farmers' environments needs to take place in those environments in collaboration with farmers, and it requires rethinking some of the assumptions of conventional plant breeding (Ceccarelli and Grando 2002). However, many plant breeders, especially those with little experience with farmers' growing environments, continue to believe that selection should be done in optimal environments because there are "spillover" effects to marginal environments (Cleveland 2001; Rajaram and Ceccarelli 1998). While there is a participatory plant breeding (PPB) program within the CGIAR that encourages plant breeders and small-scale farmers working together (PRGA 2004), it receives relatively very little support in comparison with the latest revolution in crop improvement—biotechnology, especially genetically engineered (GE) crops.

## The Biotechnology Revolution

With the biotechnology revolution in agriculture, GE crop varieties have become an important focus of many agricultural development organizations (e.g., FAO 2004), including the CGIAR. Unlike the green revolution, the biotechnology revolution is controlled by the private sector, and thus the CGIAR is forced to collaborate with biotechnology corporations if it wants to pursue this strategy. "The CGIAR has a major strategic opportunity to involve the private sector in the pursuit of the System's global goals through the application of private sector biotechnologies in germplasm enhancement" (CGIAR 2006:10).

The CGIAR's research priorities feature biotechnology prominently (along with increasing commercialization), while PPB and other alternatives to GE crops are not mentioned (CGIAR 2006:6). So, it seems, the same assumptions dominate the biotechnology revolution as dominated the green revolution. Research, including by social scientists, on GE crop varieties and their potential impact on the rural poor is lacking, and benefit-cost analyses comparing GE crops with alternatives, including PPB with conventional breeding, have not been carried out (Cleveland and Soleri 2005). Our own interviews with farmers in Cuba, Guatemala, and Mexico suggest that the situation is complex, both in terms of farmers' knowledge and values regarding GE crops and in terms of the economic consequences of their use (Soleri et al. 2005). Given the mixed results of the green revolution, it seems critical that a comparative analysis be made, as has been suggested by the U.S. National Academy of Science report on GE plants (NRC 2002). As the well-known plant breeder Norman Simmonds commented about MVs and the green revolution, special care is warranted to ensure that "other possibilities which might accord better with social needs" are not neglected (Simmonds and Smartt 1999:352).

## Why the Demise of Social Science in the CGIAR?

This brief sketch of two major innovations in crop improvement suggests possible roles for social science in the CGIAR and possible explanations for its perennial low status and the current demise documented by Cernea.

First, social science can play its traditional role of serving the dominant goals of the CGIAR set by natural scientists, economists, and policy makers. Cernea sees a major role for social scientists as supplying information for the transformation of agriculture: "State agricultural policies that aim at agricultural development vitally need [social science] knowledge as their stepping stone, because without it they cannot leap from what exists." Social science serves as an "impact multiplier to the tremendous scientific effort deployed by the CGIAR system for the cause of a food-secure world and poverty reduction. . . . How to foster and continuously perfect such high-yielding human systems is the ultimate challenge" (Cernea 2005:75).

Thus, it may not be "paradoxical" (Cernea 2005:73) that social science is neglected—social science research will be funded to the extent it serves the primary goal of increasing production; otherwise there is no reason to support it. One of the goals of conventional agricultural development is to eliminate the very objects of much social science research—small-scale, limited-resource farmers. For example, a former Rockefeller Foundation president sees GE crops as a way for farmers to get enough resources to get out of farming (Conway 2003). If understanding these farmers is not necessary for eliminating them, then social science is not required, except in formal statements to appease popular and donor sentiment. The history of agricultural development shows that major transformations have taken place (e.g., the spread of green revolution crop varieties in more favorable environments) without the need for social science research. The spread of GE varieties in the Third World is often seen as a market-driven process in which farmers make rational economic decisions (James 2005) without the need for social science research. All it takes is for the scientists to get the biology right and for the economists to get the prices right.

Second, social science can play the role of questioning the assumptions underlying the CGIAR's definitions of sustainable agricultural development. Social science could study the society and culture not only of those people who are the recipients of development efforts but also of the natural scientists, economists, and policy makers in the CGIAR and agricultural development bureaucracy in general (DeWalt 1988). This is not likely to be a role for social science that is supported by the CGIAR either.

Thus, whether social scientists are carrying out research to further the CGIAR's version of sustainable agricultural development or research that challenges the assumptions on which the CGIAR's version is based, the prospects for more social science in the CGIAR are not bright.

## Conclusion

However, there are hints that things could change. The CGIAR itself even senses that its version of sustainable agricultural development may be exacerbating problems. For example, there is growing evidence to support the proposition that traditional agricultural systems are essential for meeting the food needs of the future (Heisey and Edmeades 1999), even while the current wave of economic globalization and "free" trade regimes make it increasingly difficult for them to exist (Nadal and Wise 2004). Some of this research is even from a CGIAR Center (Narayanan and Gulati 2002). The recent CGIAR report on research priorities for 2005–15 states that

> [u]rbanization and globalization are becoming pervasive, private sector involvement in agricultural research has been increasing rapidly around the world, and global concerns about the sustainable management of resources have been rising. . . . Trade liberalization and increased competition facing small farmers mean that the global food security challenge has over time become increasingly multidimensional, and without targeted research to help develop new opportunities, the poor may be affected adversely by the liberalization of global markets. [CGIAR 2006:3]

My own experiences in agricultural development leads me to believe the most important role of social science in agriculture development is in provoking and enabling the process of debating and agreeing on definitions of "sustainable agricultural development." This means analyzing the assumptions that different definitions are based on and encouraging open discussion of the underlying assumptions—discussions that include small-scale farmers in a meaningful way. In the short run this is unlikely to garner much support from within the CGIAR, but in the long-run it might help to promote agricultural development with longer-lasting positive effects for small-scale farmers and increase the role of science, including social science, in the CGIAR.

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## Appendix

### Acronyms

CGIAR—Consultative Group for International Agricultural Research
CIMMYT—Centro Internacional de Mejoramiento de Maiz y Trigo (International Maize and Wheat Improvement Center)
FVs—farmer crop varieties
GE—genetically engineered
IRRI—International Rice Research Institute
MT—metric tons
MVs—modern crop varieties
PPB—participatory plant breeding