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Charting the CGIAR's Future – Change Design and Management

Report from SPIA

The Chair of SPIA, Dr. Hans Gregersen, will present results from SPIA's studies and outline work in progress.

Category: This item is for Information… Discussion….**x** Decision…

Proposed Action: Indication of the Group's response to SPIA's activities and plans.

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CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

Report from
TAC's Standing Panel on Impact Assessment (SPIA)
to MTM 2001

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

April 2001

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TAC STANDING PANEL ON IMPACT ASSESSMENT (SPIA)

Report to MTM 2001

1. Mandate and Composition of SPIA

The TAC Standing Panel on Impact Assessment (SPIA) was established early 2000 following the decision of the CGIAR at ICW'99 to integrate the IAEG and TAC. The mandate of SPIA is to

- provide Members with timely, objective and credible information on the impacts at the System level of past CGIAR outputs in terms of the CGIAR goals;
- provide support to and complement the centres in their ex post impact assessment activities;
- to provide feedback to CGIAR priority setting, and create synergies by developing links to ex ante assessment and overall planning and evaluation functions in the CGIAR.

The Chair is Dr. Hans Gregersen (US) who also serves as an ex officio member of TAC. Members of SPIA are Drs. Cristina David (Philippines), Frans Leeuw (Netherlands), Alain de Janvry (ex officio as Chair of TAC/SCOPAS) and Lucia Vaccaro (ex officio as Chair of TAC/SCOER). The terms of Drs. David and Leeuw are expiring at the end of June 2001. The Cosponsors have selected Drs. Ruben Echeverria (Peru) and Herman Waibel (Germany) as new members of SPIA pending confirmation by the Group.

2. Current Status of SPIA Assessments

2.1. Germplasm Improvement Impact

The IAEG commissioned a study of the impact of CGIAR germplasm improvement, conducted by Professor Robert Evenson of Yale University in collaboration with the centres. Its provisional results were reported and discussed at ICW99 (Document No. ICW/99/08/b) and at MTM00 (Document No. SDR/TAC:IAR/00/17). Drawing upon a wealth of data the study's preliminary conclusions are, *inter alia*, that the direct contribution of IARC programmes to varietal production has been impressive, with annual varietal improvement total factor productivity gains ranging from one to two percent per year. An overview of some key summary results is presented in Table 1.

A draft report that will be published in book form by CABI is currently being peer reviewed. The outline of the book is as follows:

Title: Crop Genetic Improvement and Agricultural Development

I. INTRODUCTION
1. Study design and scope
2. Overview

II. CROP STUDIES
3. Objectives and Methodology
4. Wheat
5. Rice: IRRI
6. Rice: WARDA
7. Maize: CIMMYT
8. Maize: IITA
9. Sorghum
10. Pearl Millet
11. Barley
12. Beans
13. Lentils
14. Groundnut
15. Potatoes
16. Cassava

III. COUNTRY STUDIES
17. Objectives and Methodology
18. China
19. India
20. Brazil

IV. SYNTHESIS
21. Germplasm Effects
22. Production Effects
23. Implications for Hunger and Poverty

The book will be available in the second half of 2001. A paper synthesizing the results of this study has been submitted for publication to "Science" and distributed at MTM (Doc. No. SDR/TAC:IAR/01/12). SPIA is currently considering the implications of this report for impact assessment methodology and for strategic planning. Follow-up studies are also planned.

2.2 Impact of the CGIAR on Poverty Alleviation

At present, the CGIAR System does impact assessments that are focused almost entirely on showing the extent of adoption of new technologies and their impacts on farm productivity. What is now needed is an in-house capacity within CGIAR Centres and NARS (trained staff, methods, cultural acceptance, etc.) to undertake the more difficult task of assessing poverty impacts on a continuing basis. These assessments must (a) lead to better targeting of research priorities to the changing needs of the poor, and (b) demonstrate poverty impact and hence the relevance of CGIAR investments.

The primary objective of this impact assessment activity, which is being implemented by IFPRI on behalf of SPIA, is to initiate capacity for such poverty assessments. It is a first step in a continuing process of improvement and adaptation of poverty impact assessment and priority setting within the CGIAR System and its key NARS partners. The project will also provide assessment of some of the more recent post-green revolution work of the CGIAR Centres. The specific objectives of the project are:

1. To assess the impact on the poor of a representative set of recent and ongoing CGIAR research activities, including commodity improvement work, NRM, and policy research.

2. To identify and test best practice methods for quantitatively assessing the impact of CGIAR research on the poor.
3. To develop and test appropriate methods of social and institutional analysis to examine the context in which new technologies are released and adopted to better understand how agricultural research impacts on broader definitions of poverty and social outcomes (including empowerment, sustainable rural livelihoods, etc), and how research might be better targeted or integrated within the broader context of social development for sustainable rural livelihoods.
4. To strengthen the capacity of CGIAR Centres and NARS to undertake poverty impact assessments and to internalize poverty impact assessment culture for the future. Such capacity must be responsive to the changing needs of the poor over time.

The study is organized in two phases. Phase I was undertaken between November 1998 and August 1999. The main published output was a review and synthesis of the literature on the links between agricultural research and poverty undertaken by John Kerr and Shashi Kolavalli (consultants). It provides an update of the Lipton and Longhurst (1989) review undertaken for the 1985 CGIAR Impact study. The review by Kerr and Kolavalli has been published as an IFPRI/IAEG working paper. The review confirms that agricultural research can have very favorable impacts on the poor, but that this is not an inevitable outcome and depends on the presence of sufficient enabling conditions. For green revolution type technologies, these conditions include an equitable distribution of land, secure ownership and tenancy rights, efficient input and output markets that serve all types of farmers, research and extension systems that are not biased towards large farms, and scale neutral technologies. The review also highlights the shortcomings of many past impact assessment studies, particularly their failure to establish adequate counterfactual situations for comparative purposes, or to adequately control for many confounding factors that impacted on the outcomes.

Phase II consists of a series of case studies documenting the impact on poverty alleviation of a representative sample of CGIAR research activities carried out in a broad range of countries, thereby contributing to a better understanding of the CGIAR's impact on the poor at regional and global levels. The studies will use an integrated social and economic analysis, address the different channels through which agricultural research can impact the livelihoods of the poor, including changes in vulnerability, intra-household effects, on-farm production effects, labour market effects, and indirect growth, non-farm and food price effects. The studies will also contribute to improved understanding of the conditioning economic and social factors that determine whether and how agricultural research benefits the poor, and will provide guidelines on appropriate policies that may be needed to complement technological change to enhance favourable impacts on the poor. It is anticipated that the research methodologies developed and tested in the course of Phase II will contribute to identifying best practice impact assessment methods for future use by the CGIAR and its NARS partners. The case studies will be conducted in two waves. The first is ongoing and will be completed in December 2002. Initial results of some of the case studies will be available at MTM'01. A synthesis paper based on the first wave of case studies will be completed by August 2002 and presented at ICW2002. The second wave will begin by the end of 2000 and be completed by June 2003, leading to a second synthesis paper by

August 2003. This paper will be presented at ICW 2003. A final project report will be completed by December 2003.

2.3 Impact of the CGIAR on the Environment

Phase I of this assessment was completed for ICW99. Phase II started subsequently and a progress report on the work was presented at ICW'00, while the final report has been submitted to MTM'01 (Doc. No. SDR/TAC:IAR/01/11). The same Panel composed of Michael Nelson and Mywish Maredia that undertook Phase I carried out Phase II.

The conclusions of the Panel relate to the nature and the magnitude of both the potential positive and negative impacts on the environment through application of the technologies developed by the CGIAR and its partners.

The Panel concludes that environmental impacts cannot be attributed or linked directly to research or outreach activities of the CGIAR. Rather, impacts have to be deduced by implication based on "what if" scenarios (considering different counterfactuals) and by interpretation based on correlations. Since environmental impacts generally occur or are identified some time after application of CGIAR technologies in existing agricultural production systems, it is difficult, given the present state of the art in conventional environmental impact assessment (EIA), to separate out the CGIAR component from the multiple factors which contribute to impacts attributable to agricultural change in general.

Below, we briefly outline the main conclusions from this TAC/SPIA study.

Positive Environmental Impacts

- The Panel concludes that the main positive environmental benefits associated with improved agriculture based on CGIAR research is less land *in aggregate* having to be converted from its natural state to agricultural uses in order to produce a given output of agricultural crops. Such land savings can result from both yield increases and from making agriculture more sustainable on existing farms, thus increasing the time that a given area can be cropped or grazed. Reduced conversion from natural land cover can result in global benefits such as biodiversity protection and carbon storage benefits. Depending on location, slope and condition of the lands, it also can result in watershed protection benefits such as reduced flooding, more stable water supplies, reduced erosion leading to reduced unwanted siltation downstream and better water quality.
- Based on a series of assumptions, the Panel concludes that a conservative, realistic estimate of land savings associated with application of the various technologies developed by the CGIAR in its seven primary mandated crops, is between 230 and 340 million ha. The Panel is careful to qualify the foregoing estimate as representing the amount of additional land that would have been required to meet production levels in the 1990s, assuming that 50% of the actual change in yields of these crops over 30 years would not have been realized in absence of research by the CGIAR centres.
- The Panel points out that there is a wide range of other estimates of land savings in the literature. Evenson et al (2000), estimate land savings associated *only with CGIAR crop germplasm*

improvement (CGI) research on seven of the System´s mandated crops, at 30-40 million ha. I.M. Golkany and, separately, R.M. Avery, (both 1999), estimate that land savings associated with all agricultural research are in the order of 2,500 – 3,500 million ha. Of this area, about 800 million ha would be in crops, of which 50% (400 million ha) would be accounted for by the seven key CGIAR mandated commodities. This figure compares with the estimate made by the CGIAR Working Group on Climate Change that "Green Revolution" research on all commodities saved over 400 million ha of forest and grasslands from conversion to annual crops. These latter two estimates are about one and a half times larger than the estimates produced by the SPIA Panel.

- The Panel notes that the differences between these various estimates is explained mainly by (a) what is included in the analysis in terms of types of research, (b) the extent to which the impacts of the CGIAR are isolated from those of its partners and other research institutions, and (c) what assumptions are made with regard to the counterfactual situation, in the absence of the CGIAR research input.
- The Panel concludes that: *At this point the case should be rested – the CGIAR has been a major player on the world research scene, particularly in the seven key mandated crops, and it can take due credit for significant positive environmental impacts deriving from overall land savings which could have exceeded 200 million ha.*

Negative Environmental Impacts[1]

The Panel looked at the evidence on negative environmental impacts and aggregate data obtained from FAO, OECD, World Bank and other sources. Based on a review of this material, the Panel concluded that:

- It is not possible to develop aggregate quantitative estimates of negative environmental impacts. The compounding factors accounting for the linkages between research and environmental impacts are too complex and intertwined to sort out, given present analytical methods and available data.
- Over the past three decades, mostly anecdotal evidence has been assembled to demonstrate degradation of natural resources as a result of intensification and expansion of agriculture. Degradation takes the form of loss of biodiversity due to monoculture and change in land use; contamination of air, soil and water due to accelerated use of agro-chemicals; erosion with consequent sedimentation and fertility loss (desertification) due to mismanagement of soil and water, and change in land use; and, salinization and waterlogging in irrigated areas due to mismanagement of soil and water.
- In the case of rice and wheat, environmental problems associated with HYVs have been identified, e.g. pesticides (rice) and fertilizer/irrigation problems (wheat). However, there is little evidence of environmental damage resulting from other CGIAR mandated commodities.
- Without doubt, some of the Green Revolution technologies set in train some of the negative environmental impacts that are manifest today. However, these are also associated with other

[1] A separate, more detailed and comprehensive paper is being published by SPIA on "environmental impacts of productivity-enhancing crop research: a critical review" (Doc. No. SDR/TAC:IAR/01/14). This paper was prepared by Prabhu Pingali and Mywish Maredia and reviews, among other things, the past critical literature on environmental impacts of "Green Revolution" technologies.

causes, such as institutional or policy failure and population pressure. Thus one needs to balance any discussion of potential negative impacts with the CGIAR´s response to evidence of renewable natural resource (RNR) degradation: research on environmentally friendly agricultural technologies and natural resource management (NRM) which, coupled with land savings associated with improved productivity, imply a strong likelihood that the System and its partners resulted in significant net positive impacts on the natural resource base when judged against what would have happened without the research.

- The Panel concludes that: after review of the myths and realities surrounding assertations of negative environmental impacts of the Green Revolution, the evidence is sufficient to lay the debate to rest. Given the state of data and analysis, there is little point in attempting to quantify: a global estimate of biophysical damage caused by agriculture; the percentage of research-induced damage attributable to the CGIAR; and the potential cost to long-run social welfare associated with that fraction of the damage.

The Panel ends its report with: (i) an overall conclusion that no further effort is justified to quantify more precisely the aggregate extent of unintended negative and positive changes in "state" of renewable and non renewable natural resources attributable specifically to research by the CGIAR and its partners; even less justified would be an effort to develop credible scenarios of the long-run socio-economic consequences of such changes; and (ii) some other major questions are equally important regarding how to move ahead in the assessment of the System's impact on the environment. These questions arise when research and its specification of adoption domains are seen as part of a dynamic research/development continuum in which assessment of process is equally important as assessment of end effect. Among these, three are seen as critical:

- how to factor in the contextual issues which are likely to be wholly outside the control of the research, and which lend a high degree of specificity to any given benchmark site;
- how to determine the appropriate level of effort to be put into specification and validation of models, and the estimation of impacts at milestones set in project design – monitoring and evaluation is seen as critical in understanding the impact pathway;
- whether and how the CGIAR should get involved in developing and systematically updating landscape models and GIS at a level of precision to be operational for scaling up.

Assessment of environmental impacts associated with research is still in its infancy in the System and in general. Many centres have been developing monitoring systems using various indicators of environmental impacts associated with new agricultural technologies. However, few actually have attempted to evaluate these impacts in an analytical, quantitative fashion. Most centres have focused on the development impacts of their work. There is a greater interest in systematically addressing environmental impacts, but in the broader contexts of identifying "win-win" situations and in assessing the tradeoffs between environmental benefits/harms and the benefits from agricultural modernization, in an inter-active regional context, to meet the food, fibre, and biomass fuel needs of growing populations in developing countries.

TAC/SPIA believes that the Nelson/Maredia Panel has contributed to the overall effort of the CGIAR System to be environmentally sensitive within the context of its main objective of contributing to sustainable poverty alleviation. TAC/SPIA would welcome comments and suggestions on how to move forward in a continuing effort to better understand the ways in which the CGIAR impacts on the environment – both positively and negatively – and the ways in which the System can contribute more to enhancement of the environment and agricultural sustainability.

2.4 Impact of the CGIAR on Capacity Building

There is widespread opinion among NARS representatives and CGIAR members that the CGIAR activities in training and capacity strengthening have provided significant contributions over the years to the growth and sustainability of national agricultural research systems. Thus, SPIA is commencing an assessment of the impacts of the CGIAR's activities on scientific capacity strengthening of NARS. This assessment, which will initially focus on training, will be conducted in close collaboration with SCOER.

As an initial step, the SPIA developed and updated data on the accomplishments of the CGIAR in training activities since the 1984 TAC training study. The desk study provides an overview of current centre activities in the area of training and human resource development. It provides aggregate information on centre achievements with respect to number of trainees, type of courses, and so on. SPIA has now completed this "Synthesis Report on Training Activities at CGIAR Centres" (copies available from the TAC Secretariat on request). A SPIA consultant, Dr. S. Husain, undertook a review of methodology. Further, the theme, needs and potentials were discussed at the May workshop in Rome (see above). Based on these three items – the review of on-going training activities, the review of methodology, and the discussion at the workshop – SPIA decided to move ahead with the assessment in stages. The focus of future SPIA activity in this area will be on: (1) documenting and evaluating, to the extent possible, the changes in institutional capacities, motivation and research environments (achievements) that can be associated with CGIAR capacity strengthening activities; and then (2) assessing alternative scenarios of how those changes might be associated with impacts in terms of CGIAR goals. A specific proposal on how to move forward with the first phase on training has been prepared in close collaboration with SCOER. It was discussed at TAC 80 and a final proposal is now under preparation.

2.5 Impact Milestones Paper

It is quite widely accepted that the CGIAR has had, over its lifetime, a significant sustainable impact on poor people by helping to develop the technologies and agricultural management tools that have permitted increased food security and dramatic lowering of the cost of producing the major food crops of the world. This, in turn, has benefited both poor producers and consumers. A recent SPIA study has documented and confirmed this conclusion at the System level (Evenson and Gollin (Eds), forthcoming).

What is not so well known is the significant contributions that CGIAR scientists have made in terms of advancing the theory and methods of impact assessment which have been used to identify and estimate the people related impacts of agricultural research. For the first time, this "other" role of the CGIAR has been systematically documented through the accompanying study of "milestones" in CGIAR impact assessment research. The author, Dr. Prabhu Pingali, Director of the Economics Programme at CIMMYT, has been intimately involved in this work over the past decades. Thus, he is an appropriate person to document CGIAR contributions. An early revision of the paper was prepared for a May, 2000 workshop sponsored by SPIA on "the future of impact assessment in the CGIAR: Needs, constraints and options" (TAC/SPIA forthcoming).

Dr. Pingali carries out the study in an objective fashion by identifying "milestones" in impact assessment research carried out within the CGIAR centres. Milestones are defined as research contributions that identify and analyse new areas of impact assessment research, whether they be theoretical or methodological. A key characteristic of milestones is that they are quickly followed by other, similar studies within and outside the CGIAR that verify the findings of the milestone research. In all cases, the milestones are published in refereed publications. Given these characteristics of "milestone" research, it is possible to develop an objective picture of the importance of CGIAR contributions in the dynamic evolving world of impact assessment research.

The study traces the evolution of this research in the CGIAR, concluding that there is a logical evolution from the relatively narrow focus in the seventies and eighties on assessment of impacts of germplasm adoption and crop management research and on to formal rate of return and benefit distribution studies, starting in the eighties. The next major broadening in the eighties was to work on spillover and intersectoral impacts. Finally, the activity has in the nineties broadened further into gender and environmental impact assessment research.

The role of the CGIAR scientists in this evolution and broadening of scope has been important. In addition to contributions made by CGIAR scientists while working with the CGIAR, it should be noted that many of these have moved on to become leaders in impact assessment research in universities and research centres where they still build on and benefit from their early impact assessment research in the CGIAR. Thus, the indirect contributions of the CGIAR are widespread. At the same time, as Dr. Pingali emphasizes, the CGIAR has benefited greatly from the work of others and the interactions that have been possible with scientists in both developing and developed countries.

By tracing in detail through the milestone impact assessment research of the CGIAR, Dr. Pingali has painted a broad, yet in-depth picture of how activities within the CGIAR system have contributed to this growing and dynamic field. At the same time, as he points out, the milestone research and use of its methodological results in more routine impact assessments of CGIAR research has produced a picture of solid accomplishments and impacts of CGIAR research in terms of the main goals of the System, namely, to have agricultural research results applied in such a way that there are sustainable impacts on poverty, food insecurity and the condition of the environmental resources on which all agricultural production depends. He provides some insights on the road ahead and the gaps that remain to be filled by future generations of CGIAR impact assessment researchers.

SPIA commends Dr. Pingali for this study – one that itself will be a milestone in synthesis of past activity in the CGIAR in the area of impact assessment research. The paper is a joint SPIA/CIMMYT publication and has been circulated at MTM'01. It can also be requested from the TAC Secretariat or CIMMYT.

2.6 State-of-the-Art Paper on Impact Assessment

SPIA presented a paper on the "State of the Art" in agricultural research evaluation at an ASARECA/ECART/CTA workshop on impact assessment of agricultural research in eastern and central Africa, which was held in Entebbe, Uganda, from 15-19 November 1999. SPIA also helped to organise this workshop. The proceedings of this workshop have been published by CTA/GTZ in September 2000. Copies of the SPIA paper are available from the TAC Secretariat.

2.7 Conference on Impacts of Agricultural Research and Development: Why Has Impact Assessment Research Not Made More of a Difference?

SPIA/TAC and CIMMYT are jointly organizing an International Conference on Impacts of Agricultural Research and Development, which will take place from 5-7 February 2002 in San José, Costa Rica. The conference will bring together impact assessment professionals with an interest in documenting and measuring the impact of international agricultural research. A major emphasis will be put on methodological aspects, drawing on experiences gained in the SPIA study on the impact of the CGIAR in germplasm improvement led by Prof. Robert Evenson. The conference will highlight experiences and case studies of impact measurement in the following areas: impact on agricultural productivity; impact on equity, poverty, social health, and nutrition; impact on the environment; and impact on institutions and human capital. Participants will also describe novel approaches to hard-to-measure impacts in such areas as training, networks, participatory research and policy research

Interested individuals are invited to send abstracts of contributed papers for the conference by 15 August 2001. Further details are available on the CIMMYT conference website at www.cimmyt.org/research/economics/impacts.

SPIA has prepared proceedings of the Conference it organized at FAO, Rome during 2000 (SPIA/TAC-CGIAR. 2001. The Future of Impact Assessment in the CGIAR: Needs, Constraints and Options. Proceedings of a workshop of TAC/SPIA, 3-5 May 2001, TAC Secretariat, FAO, Rome).

3. Future Activities

SPIA met on 9-10 May at the CGIAR Secretariat in Washington DC. The agenda of the meeting included the following:

1. Final draft of the report on the impact of germplasm improvement research in the CGIAR, which was led by Prof. Evenson and of the results of the peer review. Discussion of the implications for methodology and future work.
2. A proposal to study the impact of the CGIAR through its training activities and to assess the impact of the CGIAR Slash-and-Burn Programme.
3. Initial results of the SPIA/IFPRI poverty impact study and a proposal for a second wave of case studies.
4. The CGIAR Environment Impact Study.
5. Paper on "Impact of Agricultural Research Conducted by the CGIAR and its Partners in Sub-Saharan Africa".
6. SPIA's future work agenda.

A report on the outcome of this meeting is available separately.

Table 1: Contributions from Crop Genetic Improvement to Yield Growth by Regions

						CONTRIBUTION SHARES			
						Adoption (1998)		Varieties (1965-2000)	
REGION	**1960s**	**1970s**	**1980s**	**1990s**	**1960-98**	**IX**	**IA**	**IX**	**IA**
Latin America	.312	.600	.781	.751	.658	.28	.30	.39	.18
Asia (including China)	.452	.932	1.030	.890	.884	.30	.37	.18	.39
Middle East-North Africa	.141	.270	.681	1.228	.688	.51	.31	.62	.28
Sub-Saharan Africa	.017	.142	.358	.497	.280	.44	.27	.45	.28
All Regions	.321	.676	.832	.823	.718	.35	.34	.36	.19

IX: Varietal cross made in IARC programme
IA: Varietal cross in NARS programme with IARC assistance

Source: Evenson and Gollin (Eds), 2001.