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**Reducing Poverty through Cutting-edge Science**

**Integrated Natural Resources Management (INRM) -  
The Bilderberg Consensus**

Attached is a draft summary report of the INRM workshop held at Bilderberg, The Netherlands, 3-5 September 1999. The report has been prepared by the CDC and is for discussion under Agenda item 4(a)(iii), *CDC Proposal on INRM*.

# **INTEGRATED NATURAL RESOURCES MANAGEMENT**

## **THE BILDERBERG CONSENSUS**

**Summary Report of the INRM Workshop  
held at Bilderberg, The Netherlands, 3-5 September 1999**

17 September 1999

# INTEGRATED NATURAL RESOURCES MANAGEMENT

## THE BILDERBERG CONSENSUS

From 3<sup>rd</sup> to 5<sup>th</sup> September 1999, specialists in integrated natural resources management (INRM) met at the Bilderberg Hotel in Oosterbeek, the Netherlands, to discuss future directions for INRM research in the CGIAR. The participants represented most of the 16 Centres of the CGIAR; national research systems (NARS) in eight developing countries; the CGIAR's Technical Advisory Committee, NGO Committee and its Impact Assessment and Evaluation Group; non-CGIAR international research institutes; advanced research organisations; and funding agencies. The workshop was organised by the CGIAR Centre Directors Committee.

The invitation of NARS to the meeting reflects the recognition that development and dissemination of INRM and other technologies requires partnership so that NARS participate at all stages, from conception to delivery of research results. In this report, references to the CGIAR centres should be read as implying this partnership context.

The following is a summary record of discussions. Important details that emerged from working groups will be disseminated through the Web site designed for the INRM meeting and follow-up.

### THE CHALLENGES:

There is wide agreement that the CGIAR's goals of eradicating poverty, attaining food security and conserving the environment are highly inter-dependent. If measures to improve yields of food crops and livestock are not based on adequate understanding of the needs and options of the poor and do not take into account the ecology, economic and institutional context of the systems being addressed, poverty will not be eradicated.

The 1998 External Review of the CGIAR reinforced the conclusions of earlier internal CGIAR studies that research on commodity crops needs to be set in a broader context of integrated research that encompasses the social and environmental dimensions of agro-ecological systems. Furthermore, there has been a recognition within the CGIAR since the early 1990s that to help the poor, agricultural research must go beyond the traditional paradigms to deal more broadly with how the rural environment in general can better contribute to poverty eradication, food security and environmental sustainability. It was with this in mind that the CGIAR brought into the System new centres with a natural resources focus.

Although no universally accepted definition of INRM exists, proponents generally perceive the term to mean responsible and broad-based management of the land, water, forest and biological resources base (including genes) needed to sustain agricultural productivity and avert degradation of potential productivity. It is now well accepted that CGIAR research should be more integrated to achieve holistic understanding of agro-ecological systems, rather than focusing narrowly on increasing and maintaining the productivity of commodities. However, progress in achieving this objective has been slow. The CGIAR has made major advances in the move toward INRM by embracing non-commodity centres into its fold and incorporating fields such as integrated pest management and farming systems research, despite inadequate rigour in the latter. Nonetheless, in many areas the CGIAR has persisted in dealing with issues outside their social and environmental contexts and has not drawn adequately on advances in INRM science.

Participants in the Bilderberg meeting agreed that a number of emerging issues are making the need for INRM contribution to poverty eradication even more urgent:

- Market-driven biotechnological developments tend to be associated with more intensive and specialised agriculture. Large numbers of the world's poorest people are likely to be bypassed by these developments, because many of them will continue to live in areas of low "institutional density" (with poor infrastructure, for example) and on lands too marginal for intensive agriculture. They will continue to depend on a diverse mix of products, both cultivated and gathered from forests and aquatic systems. This subset of the world's poor will not benefit from private-sector innovations, and deserves to be a more directly targeted beneficiary of the public goods research of the CGIAR.
- Globalisation of trade may further marginalise poor people, especially those on poorly productive lands and in areas of low "institutional density".
- Water is becoming an increasingly scarce and valuable commodity. Difficult choices will have to be made in allocating water to different production systems. In some areas, managing land as watersheds for water quantity and quality will become more important than dedicating them for conventional uses such as forests and production of crops and livestock. Trade-offs will emerge over competing uses of land, heightening the need for multiple-use approaches to management of agricultural, aquatic and forest resources.
- Climates are changing and will become more variable and unpredictable in relation to agricultural production. For the poor, unpredictable and extreme climatic events may have more significant impacts than long-term warming trends. Climate-related uncertainty reinforces the need for understanding the diversity and adaptability of the systems on which the poor depend.

Measures to mitigate climate change or adapt production systems in response to it could yield benefits to the poor.

- Changing patterns of land use, conflicts between local needs and global environmental services, population movements and changes in the urban-rural balance will all have considerable impacts on the poor in marginal areas. Diverse, multi-crop, multi-function systems will minimise risks to the poor.
- As pressures on all lands increase, the need for effective management of pests, soil nutrients and organic matter will grow. INRM could provide solutions that avoid complete dependence on high-cost manufactured fertiliser and pesticide inputs.

The Bilderberg participants were convinced that integrated approaches should be developed to address these issues. To this end, the workshop established principles, followed by criteria, on the role and application of INRM methods. These principles and criteria can guide screening of CGIAR projects to determine how well they support the need to fully integrate the scientific, social and ecological dimensions of INRM.

#### THE PRINCIPLES:

INRM research and development activities within the CGIAR should provide a basis for the sustainable development of agriculture and other renewable natural resources. INRM approaches will be the best way of solving many problems, but they also have a role in providing the context within which component research (such as in biotechnology and policy) can have an optimum impact. INRM approaches will often be characterised by support for more flexible, diverse, careful and intensified management, rather than for intensification of production in the simple sense. Ideally, INRM aims for increased output without resulting in greater deterioration and riskier livelihoods (it achieves the latter by diversifying options available to the poor).

#### All CGIAR projects should satisfy the following minimum set of GENERAL CRITERIA:

- Be defined in a collaborative and equitable manner, with all relevant stakeholders and partners represented, and incorporate the inputs of all of them and the perspectives of diverse relevant disciplines, both scientific and social;
- Produce measurable, positive, long-term impacts with respect to the CGIAR's goals of poverty eradication, food security and environmental enhancement;
- Generate new knowledge based on both indigenous knowledge and modern science by drawing on existing information and research;
- Given the "international public goods" requirement of CGIAR research, should focus on the root causes of problems and on the processes and

knowledge derived from comparative analysis that permit extrapolation of results and methods beyond specific sites and countries;

- Work at all appropriate points along the research-development continuum;
- Effectively communicate and disseminate results and conclusions to all stakeholders; and
- Reform and strengthen institutions from local to policy levels to ensure future capacity for local research and effective mechanisms for adaptation and adoption of the results of research.

Beyond the above, the INRM research and development program of the CGIAR should meet the following SPECIFIC CRITERIA, the relative importance of which will vary for each project being considered:

- Identify problem-oriented research that addresses the links between natural resource degradation and its root causes, such as poverty, inappropriate policies and environmental externalities;
- Respect and strengthen the rights of the poor to natural resources and knowledge, whether in a common or private property context;
- Diagnose and characterise problems in terms of ecosystem functions and services across a range of spatial and temporal scales, from local to global and from short-term to long-term, taking on-site and off-site effects into account;
- Clarify the biophysical properties and socio-economic processes that determine ecosystem function and integrity and help to bring this understanding to the attention of decision-makers, resource users and managers;
- Strive to strengthen the generalisability of results, so that they may be extrapolated beyond specific sites and conditions to meet the international public goods requirement for CGIAR research;
- Utilise interdisciplinary and participatory research approaches that: (a) draw on the methodology of the integrative sciences; (b) enhance communication among scientists, farmers and other stakeholders so as to benefit from indigenous knowledge and experience as well as modern science; and (c) utilise expertise as needed from the appropriate range of institutional sources (such as IARCs, NARS and NGOs);
- Develop management practices that integrate productive human action and environmental functions at ecosystem and landscape scales, through the appropriate use of biological, human and manufactured inputs; and
- Assist in the development of economically and socially beneficial systems that simultaneously provide goods and environmental services while leading to solutions for problems that have been identified.

## APPLICABILITY OF CRITERIA IN THE PRINCIPAL ECOREGIONS OF CONCERN TO THE CGIAR

A set of eight examples of INRM problems was identified to test how the specific principles and criteria for INRM research and development might be applied. The problem sets were chosen from five ecoregions:

Dry lands and deserts  
Range lands and savannahs  
Humid tropical lowlands  
Aquatic systems  
Mountains and uplands

The problem sets represented a wide range of input availability and institutional capacities; they varied in scope from broad land-use allocation and optimisation at the forest margins of the humid tropics to the improvement of soil quality, organic matter and nutrient status in semi-arid to sub-humid areas. It was found that use of the INRM principles and criteria provided an excellent approach for arriving at a balanced program design and framework for addressing natural resource and poverty issues in complex settings and in a uniform fashion. It was felt that this approach could be of significant help in strengthening the ongoing eco-regional and problem-based INRM challenges identified by the workshop.

## SCIENTIFIC OPPORTUNITIES AND BREAKTHROUGHS

Advances in several scientific areas were seen as having the potential to improve INRM, but also to pose new challenges. A problem the CGIAR needs to be particularly sensitive to is the difficulty that small farmers face in acquiring access without external assistance to the benefits of advanced technologies, such as biotechnology, remote sensing and spatial modelling, and computer-based information. The main areas of innovation identified were as follows:

- **Biotechnology.** With proper institutional arrangements, innovations in this area were seen as having great potential to improve the circumstances of all farmers. However, the CGIAR needs to be aware of the difficulties faced by small farmers in accessing the benefits of this advanced technology, which increase the possibility of their being marginalised relative to larger commercial producers. The potential of biotechnology to produce plant varieties that meet the needs of marginal farmers, such as improvements in nutrient-use efficiency and in stress-adapted germplasm for resistance or tolerance to disease and drought, should encourage the CGIAR to target small farmers, who have a particular need for greater resilience in their agriculture. Improvements in understanding multi-genetic controls of

product and the service functions of crops, better genetic characterisation of land-races and the capacity for better molecular exploitation of the soil genome were all seen as potentially significant breakthroughs.

- **Remote sensing and spatial modelling.** Rapid innovation in capabilities and availability of remote sensing data and improved capacities for digital analysis and manipulation were seen as providing powerful tools for INRM. Global and system-scale simulation models linked to decision support systems will become more widely available and more user friendly in the near future. Such models will have increased capacity to integrate social and bio-economic information. Models will help unravel the complexities of issues such as soil carbon, risk management and scaling.
- **Social organisation and social capital.** The past 15 years have led to a better understanding by outsiders of community processes of management. It is only recently, however, that researchers have gained confidence that devolved management systems for forests, water and rangeland have lessons to offer and that indigenous knowledge can complement scientific approaches.
- **New research approaches.** Wider adoption and improved methodologies for more problem-oriented, interdisciplinary, participatory research will yield major improvements in the “integration” of INRM. The capacity to integrate diverse sources of knowledge (both “local” and “scientific”) and to match science to farming reality will be essential. A better understanding of farmers’ risk-management strategies and the diversity of their income and livelihood sources will enhance the relevance and impacts of research and also provide a basis for more adaptive management.
- **Knowledge management.** Improvements will occur in the integration of knowledge across sectors and between farmers and scientists. Better multi-media techniques for delivering and exchanging knowledge and for keeping information available and collated for longer periods are now available. There are challenges in raising public awareness in ways that avoid media distortions of priorities and in minimising the impact of the “digital divide” — the knowledge gap that will occur between those who have access to the Internet and those that do not.
- **Analysis tools.** The complexity, chaotic nature and lack of bounding in NRM systems pose special challenges for science. Breakthroughs will occur in the application of fuzzy logic, Bayesian statistics, scaling/fractals and evolutionary approaches to INRM problems.
- **Performance indicators.** Development of indicators for “system performance” will be critical in achieving improved INRM. These will be applicable both at the level of priority setting for research and as essential tools for adaptive management. Performance indicators are already widely used in assessing impacts of health care, forest and fisheries management and broadly at the national development level (the UNDP’s Human Development Index). Such social and environmental indicators may

supersede yield improvements as appropriate measures of the impact of CGIAR research.

## ECOREGIONAL AND SYSTEM WIDE PROGRAMS

It was generally agreed that eco-regional and system-wide programs have potential as vehicles for the implementation of CGIAR-initiated INRM activities. Several such programs are already in place in the CGIAR, with collaborative partnerships well developed and scientific and geographic areas defined. There have been encouraging results, even though many require sharpening of management, more visible stakeholder expression, a clearer problem focus and more integrated NRM approaches. Furthermore, the CGIAR has for some time had natural resource centres that are doing some of their program work in an integrated manner. The considerations described above convinced most participants that an INRM framework could work well within several of the ongoing programs.

The feeling at the meeting was not that more eco-regional or system-wide programs are needed at this time, but that consolidation of experiences and mechanisms of collaboration among centres should occur. There was agreement that better arrangements for data sharing are needed, and that these could work both within eco-regional programmes as well as across problem-driven, cross-cutting research activities.

## OBSTACLES TO THE ADOPTION OF INRM APPROACHES

The overall conclusion of the workshop was that the need for INRM research exists and much is known about ways in which it should be pursued. It was further recognised that CGIAR Centres have made major advances in the application of the principles of INRM in certain areas and in response to certain problems. However, participants concluded that the performance of the CGIAR as a whole in this area is variable and that the practical application of INRM research has fallen short of aspirations.

Several attributes of the CGIAR were identified as having been inimical to the full exploitation of the potential of INRM. It was recognised that to make progress, the CGIAR does not have the option of maintaining the status quo; it needs to make some changes (including structural and managerial institutional changes) at System and Centre levels, for which the following issues help to suggest areas for improvement:

- Past CGIAR successes have been in commodity crop research focused on raising productivity, particularly through genetic improvement. Senior management and governance structures have retained a strong "commodity"

culture. CGIAR “heroes” are mainly commodity scientists. The leadership of the System has only recently embraced the goal of INRM.

- The priority-setting mechanisms of the CGIAR rely primarily on ex ante analysis of potential productivity gains. It is possible to measure impacts on productivity but equivalent measures of performance and sustainability at the level of agro-ecological systems do not exist. Under present arrangements, it is easier to justify research on commodities than on “systems”, particularly when productivity gains are assessed on-station rather than on farmers’ fields. INRM research could, in theory, attract high priority within the CGIAR on the basis of its potential impact on crop yields without the risks of potential negative social or environmental impacts being factored in.
- Professional recognition in the CGIAR, as reflected in awards and prizes in the system, have usually been given for contributions to yield increases, with the notable exception of awards for integrated pest management.
- Contributions to INRM and the personal and scientific attributes desirable for the conduct of INRM research have only recently received explicit recognition in systems used by Centres to appraise the performance of their scientists.
- The skills mix of the senior scientists of most centres is still biased toward the sciences related to yield enhancement. Ecologists, anthropologists and specialists in the “integrative sciences” (agro-ecology, ecological economics, production ecology etc) are underrepresented.
- Centres are only slowly moving from discipline-based organisational structures to multidisciplinary teams.
- The move from “on-station” research to Participatory Action Research in farmer’s fields has been late and uneven.
- Centres have done too much research themselves and have not yet moved far enough in forming strategic alliances with partner organisations with complementary skills and resources, including private sector and NGO institutions. For instance, NGO partners can serve as cost-effective intermediaries between high-cost centres and large numbers of dispersed poor farmers. Alliances can enable centres to tap pools of specialist expertise not available amongst their staff.
- Attempts to achieve synergies through inter-centre collaboration have yielded valuable results but have also been beset with problems of high transactions costs, inter-centre competition for funds and tensions over the “ownership” and governance of programs. The potential role of outside institutions in helping to assemble effective and efficient INRM consortia are worth considering.

## THE NEXT STEPS:

The results of this meeting will be communicated to TAC in September 1999 and subsequently, through the CDC, to ICW '99 in Washington. Meanwhile, the CDC will be requested to endorse a proposal for and to organise a scientific meeting on INRM in the year 2000 for scientists, research managers and other stakeholders. The meeting and other fora would aim to bring together INRM work from across the CG and from outside. The following *ad hoc* task force was proposed to prepare this meeting:

- Chairman of the CDC Committee on Sustainability and the Environment (at present Jeff Sayer, CIFOR).
- A donor representative (Paul Eggar, Switzerland)
- A NARS representative (Florencia Montagnini, CATIE, Costa Rica)
- A TAC representative (Richard Harwood)
- A CGIAR partner institution representative (Michael Swift, TSBF)

Suggestions for NGO and other participation, such as by current INRM practitioners, should continue to be considered as preparations proceed. The meeting should ideally take place in a developing country and focus on cross-cutting issues common to CGIAR priority eco-regions.

In addition, it was decided that:

- The immediate recommendations of the CGIAR External Review in regard to issues such as the establishment of a new network and the retooling of the Centres should be revisited in the light of this report.
- The Web site established for the Bilderberg meeting will be maintained and improved to facilitate the exchange of information and experience among INRM scientists in the CGIAR and its partners. CIFOR will manage the site for the time being.
- The dialogue initiated at Bilderberg will be maintained as opportunities arise from other CGIAR events.