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Managing Natural Resources for Sustainable Production Systems: A Research Agenda at the Crossroads?

Standing Panel on Impact Assessment (SPIA)

May 2018

Brief Number 68

BACKGROUND

In 2016, to fill a gap in the evidence base around impacts of CGIAR investment in natural resource management research (see Figure 1), SPIA commissioned¹ a set of studies to document adoption of several on-farm natural resource management (NRM) practices—conservation agriculture, fertilizer trees, alternate wetting and drying (AWD), integrated soil fertility management (ISFM), and micro-dosing of fertilizer. Adoption rates were expected to be high because the studies were based on prior claims of success, but the [results generally showed low uptake](#). Observed rates for full adoption of a package of practices ranged from less than 1% (conservation agriculture in Malawi and Zambia) to 29% (integrated soil fertility management in Kenya). Partial adoption rates, where applicable, fell within the range of 3% to 18% (Vlek and Stevenson, 2018 forthcoming).

To reflect on the implications of these findings for CGIAR research and impact assessment agendas, SPIA organized a workshop on ‘Assessing the Impact of Research on Managing Natural Resources for Sustainable Production

Systems’ with 40 social and biophysical researchers and research managers from within and outside the CGIAR. Hosted by the International Food Policy Research Institute (IFPRI) and CGIAR Research Program on Policies, Institutions and Markets (PIM), the workshop comprised short presentations followed by working groups where participants collectively grappled with the issues, and identified and prioritized follow-up actions in three main areas: how on-farm NRM innovations are developed and tested, how they are promoted and scaled, and how their diffusion and impact are assessed. Workshop outcomes were presented to a wider audience at an IFPRI/PIM [policy seminar](#).

This brief summarizes the outcomes of the workshop and the proposed next steps. Key messages include:

- Broad acknowledgement of—and little resistance to—the findings that adoption rates for these practices in the target countries in Africa and Asia are generally low outside of project contexts.
- Strong challenge on the “adoption of NRM technologies and practices” paradigm—many felt that it is an inappropriate paradigm through which to under-

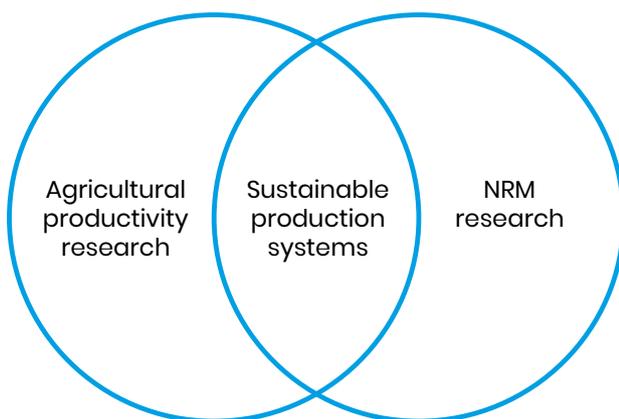
¹ This work was supported by Bill & Melinda Gates Foundation, the UK’s Department for International Development (DFID) (via Window 1), and core donors to the CGIAR through the Strengthening Impact Assessment in the CGIAR (SIAC) program of SPIA 2013-17.

stand, and to track uptake and influence of, CGIAR research on on-farm NRM.

- Strong support for continued methodological innovation in impact assessments of NRM research, along the lines of tools applied in the SPIA studies and the advances being made outside of the CGIAR.
- Recognition of the lack of a clear and compelling vision for this research area, and NRM research as a whole, even as the motivation to positively influence both social and environmental outcomes is apparent.

While the need to clarify the NRM research strategy—including but not limited to sustainable production systems—at CGIAR System level was the main message of the workshop, the participants also identified some concrete steps for improving how research and impact assessments are done, in the context of ongoing programs and projects.

Figure 1. Sustainable production systems research in CGIAR (illustrative purposes only, not to scale or comprehensive of all CGIAR research).



BEYOND TECHNOLOGY ADOPTION

In general, participants took ownership but also qualified the findings from the SPIA-commissioned studies. In terms of adoption rates, a clear message was that, given the agro-ecological and socio-economic heterogeneity of smallholder farms and farmers, the kinds of practices that were studied might only ever be beneficial to a subset of farmers. **Accurately identifying and targeting those farmers**—in research and in development interventions—would improve the effective adoption rate through a combination of increasing the numerator (actual adopters) and decreasing the denominator (potential adopters rather than all farmers). Implicit in this recommendation is the view that the current research and development process is not setup to test and inform differential targeting strategies of national agricultural research and extension

systems (NARES) and other development partners. Innovative mechanisms based on revealed preferences, and allowing for dynamic, sequential learning processes and two-way feedback through participatory trials will need to be explored and enhanced.

The appropriateness of the technology adoption paradigm—so fundamental to CGIAR’s germplasm work—for on-farm NRM research was challenged. Given the heterogeneity of farmer conditions, CGIAR research increasingly focuses on **discovering principles as well as developing practices**. These principles can help farmers select and adapt the combinations of practices that can assist them in achieving their multiple objectives—improvements in yields, income, soil quality, food security, etc.—given the particular constraints they face. CGIAR is also increasingly seen by development partners as a **source of highly specific information about NRM technologies, practices and principles**—what works, where, and for whom—rather than just a generator of the technologies. CGIAR’s role as an information rather than technology provider implies different types of research outputs and impact pathways than the traditional, linear technology development and dissemination model that might work well in other contexts. Partners such as national extension systems, private sector, farmer-based organizations, and non-governmental organizations (NGOs) will still be a critical interface between CGIAR and farmers, but the way that CGIAR collaborates with these entities, and the capacities needed on both sides for this collaboration to work, are likely to be different (and to an extent, already are).

So, while it is unquestionably important to observe changes in practices on farmers’ fields—and some of the methods tested and validated in the SPIA studies such as remote sensing will make it easier to do that at scale—if we want to understand the implications of those changes for development outcomes and document CGIAR’s contribution, we need a different approach.

A UNIFIED CGIAR STRATEGY ON NATURAL RESOURCE MANAGEMENT AND SUSTAINABLE PRODUCTION SYSTEMS IS NEEDED

It was widely agreed that **CGIAR is lacking a coherent NRM vision and strategy in this research area** that spans traditional agronomy (farm management), governance and management of natural resources, institutions and policies, and capacity development. Despite the fact that research investment is significant and there is some alignment on social and environmental targets, the work

comes across as fragmented. Some participants frequently reminded the group that the former CGIAR Research Programs (CRPs), HumidTropics, Dryland Systems, and Aquatic Agricultural Systems, represented an attempt to build a coherent framework and agenda in this area, and that their closure has left a gap.

[CGIAR's 2016-2030 Strategy and Results Framework \(SRF\)](#) defines a set of natural resource and environment-related outcomes (System Level Outcome [SLO] 3) to which CRPs map their activities. However, the impacts of on-farm NRM practices on environmental outcomes are rarely measured/reported. **Yield and productivity-related goals have dominated** what is measured, in part, because they are assumed to be what farmers most care about and what policy makers prioritize. Efforts are underway to better define and measure [sustainable intensification \(SI\)](#)—recognizing human, social, economic and environmental dimensions that underlie productivity—and to integrate these concepts into agronomic research and recommendations. However, this is still a work in progress.

Given the inherent context-specificity of sustainable intensification and the mandate to produce international public goods (IPGs), CGIAR is increasingly generating **knowledge principles, guidelines, and other decision support tools (DSTs)** as well as agricultural technologies. The users are development practitioners (extension agencies, National Agricultural Research Systems [NARS], NGOs) as well as farmers. This has implications for the **composition of the research teams**—including a broader range of disciplines as well as capacity to work across disciplines and thematic areas—and **for partnerships**—outside and inside CGIAR. Impact pathways will increasingly be through **informing policies and programs**, focusing on influencing knowledge and attitudes, leading to shifts in discourses, institutions, and power structures, changes in program design and implementation, and ultimately to changes in natural resource conservation, management and use. [Policy and program impact pathways are increasingly important for the CGIAR](#) and developing and implementing appropriate, rigorous methods for assessing influence and impact is an active area of research.

The workshop recognized that **clarifying the research strategy in this area should be a collective effort** and it was suggested that a **task force** be created. The group felt that the task force should address the question of sustainable production systems research in the context of broader NRM agenda since the two are clearly linked. Since these are not new challenges—the [ISPC NRM Stripe review in 2012](#) raised similar questions, as did the [external](#)

[evaluations of the Systems CRPs](#)—it would be important to reconsider barriers to implementation of recommendations made.

Landscape level analysis is essential to capture impacts of NRM research, but thus far little evidence has been generated on the impacts of landscape approaches. While the [arguments for a landscape approach are very compelling](#) and clearly need to be part of the vision for this research, questions remain about what such an approach is—[it is more easily characterized than defined](#). Credible impact evaluation evidence on landscape approaches is scant, even as such approaches have moved to the forefront of the research and development agenda. In considering CGIAR's role in furthering conceptualization and development of landscape approaches, the question of its comparative advantage is important to address.

IMPLICATIONS FOR RESEARCH AND IMPACT ASSESSMENT

While important issues still need to be resolved at the level of research strategy, some concrete steps were identified that can enhance the potential and actual uptake and impact of NRM research.

Clarify the theories of change (TOCs) underlying research programs and projects, in particular the natural resource management implications, as a first step in developing TOCs which address multiple SLOs. Specifically, these implications should be reflected in the research outputs, intended users (including, but not limited to farmers), expected outcomes and impacts, and key assumptions (e.g., motivations of farmers, capacity). CRPs have TOCs at CRP and flagship level but it was recognized that they are often too generic to 'use' in identifying research questions, appropriate measures and metrics for outcomes along the causal chain, or impact assessment designs (theory based as well as experimental). Improving how TOCs are used is an area where cross-CRP/Center collaboration would be useful since some have particular expertise in this area.

Pursue better analysis of the full range of benefits of promising innovations. Research and impact assessment design needs to reflect a more complete understanding of which innovations and combinations of innovations are beneficial to which farmers, under what conditions. The workshop featured examples of how [researchers can work with larger numbers of farmers](#), and [how collaboration between biophysical researchers and impact assessment specialists can improve design of trials to go beyond yields and test plots and consider farmer preferences explicitly](#).

We also need better quantification of public (environmental) benefits, and to incorporate a good understanding of both private and public benefits into the design of institutional infrastructure to support dissemination.

Give more consideration to dynamic processes and trajectories. There is a need to build impact assessment research designs around the expected long-term trajectories related to diffusion of NRM practices, and documenting dynamic adoption and dis-adoption is key to understand potential long-term impacts. This calls for high-quality panel surveys and long-term follow-up surveys as well as deployment of innovative tools, such as remotely-sensed or drone imagery.

Explore better scaling-up strategies. The impact pathway for NRM research innovations is non-linear, and this requires impact assessments to focus on various parts of the causal chain, from the development and testing to the diffusion stages, as such complementing ex post adoption and impact studies. Strategic alliances with development organizations could help build research into development. We saw many actual and potential opportunities ([e.g., with World Bank](#)) for this where CGIAR could further both the research and the impact assessment agendas. Some centers do a lot of work with NGOs on pilots, so moving towards collaboration in the context of larger programs implemented by governments would be desirable. There are [lessons from behavioral economics](#) about what influences uptake, and opportunities for collaboration with IA specialists outside CGIAR. There are important opportunities for learning across experiences, but this requires planning in advance to set up the right portfolio and collect comparable data.

Find mechanisms to increase collaboration across Centers/CRPs and scales. While the workshop focused on farm-level NRM practices, it was recognized that NRM issues span scales and are inherently multi-sectoral and multi-institutional. The call for work at landscape scale responds to this reality. Researchers were interested in cross-Center/CRP collaboration in common locations, and in some cases have already committed to working together. The site integration/country coordination work is also seen as a possible mechanism. While experience has been variable, some countries are committed to the process

and are moving forward. These would be good candidates for piloting new approaches, in the context of a cross-scale systems research framework to facilitate learning.

Explore the potential value in leveraging secondary datasets to assess CGIAR contribution to changes in how resources are managed and how that influences environmental outcomes. In the context of ex post impact assessments, a convincing case has been made—both through [external work](#) as well as [SPIA studies](#)—for the use of secondary datasets (household surveys, remote sensed imagery). It is also the case that many datasets generated in the CGIAR via projects are underutilized for many reasons, some of which may be easily rectifiable. The potential future utility of CGIAR and national partners' datasets could be improved through improvement in survey design or developing partnerships with agencies (European Space Agency [ESA] National Aeronautics and Space Administration [NASA]) that inform their earth observation programs. Linking data across scales is likely to be critical for landscape approaches to sustainable development and to impact assessment. There was significant interest in establishing baselines against which future impact could be assessed, and figuring out how best to leverage secondary data and link it to primary data will be a key part of achieving this at scale cost-effectively.

SOME FOLLOW-UP ACTIONS

- SPIA Chair (Karen Macours) [presented the results from the workshop](#) at [ISPC17 in Rome](#), and the Council and other participants discussed implications for CGIAR NRM and sustainable production systems research agenda.
- SPIA's [proposed future program of work](#) includes several of the elements identified for in-depth work—support to theories of change, improve how impacts of production systems / NRM research are measured and estimated, institutionalize data collection across scales in priority countries where multiple CGIAR Centers and CRPs are working.
- Organize a workshop on assessing the impacts of NRM research across scales in Stellenbosch in October in association with [ISPC's Science Forum 2018](#).

