Managing the CCAFS Theme by Region matrix for international public goods and development outcomes

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I would also like to acknowledge the assistance provided by Pramod Aggarwal in organizing face to face interviews in Delhi. Mark Howden, Neil Lazarow and Christian Roth made time in a busy schedule of meetings in Delhi to conduct these interviews.

Finally, I would like to thank everyone who participated in the series of interviews as these insights provided a solid basis for the findings and recommendations in this review.
Executive Summary and Recommendations

This review was commissioned to undertake an evaluation of how the Climate Change, Agriculture and Food Security (CCAFS) Theme by Region matrix is being managed to deliver on International Public Goods (IPGs) and development outcomes.

The CGIAR is going through a significant reform process with CGIAR Research Programs (CRPs) now the main organizational mechanism for research outputs and outcomes. This has involved establishment of a matrix management structure requiring close interaction between CRPs and CGIAR Centers.

It was evident from this review that CCAFS has embraced this reform process in structure, function and the necessary behaviours and leadership to make it effective. The overall CCAFS goal and the Themes and their outcomes are all well aligned to the CGIAR System Level Outcomes.

CCAFS has an added dimension to the matrix in the form of Regions, originally established to provide a facilitation role between Themes and delivery of activities by Centers in the focus regions for CCAFS. However, as CCAFS has evolved the role of this regional dimension of the matrix has strengthened. The regional function now plays an important role in on-ground delivery of activities, in implementing participatory action research and in setting priorities for research and outcome delivery. Within the regions, Climate Smart Villages have become an important mechanism for delivery and integration. This growing role of the regional function and Regional Program Leaders needs greater support to ensure its ongoing effectiveness.

Centers are pivotal to the delivery of activities, IPGs and outcomes. CCAFS has involvement from all 15 Centers further demonstrating the leading role CCAFS is playing in the reform process. However, the engagement by Centers in CCAFS has been slow to develop and needs to accelerate. There is good evidence that is occurring in South Asia, particularly through Climate Smart Villages and the central and influential role of the Regional Program Leader. While leadership is critical to effectiveness of the matrix, stronger processes of resourcing and accountability between Themes and Centers is required to achieve desired outputs and outcomes, including adequate investment in engagement processes and incentives to strengthen cross-Center collaboration.

Leadership is central to an effective matrix and it was evident from this review that CCAFS has a highly effective leadership team that makes decisions in a transparent way. This approach to leadership is supported by effective governance, management and reporting systems that make it possible to efficiently monitor the progress to achieving milestones and outcomes.

Theme Leaders work effectively and collaboratively, but there was, apart from gender research activities and some of the other Theme 4 cross-cutting activities, not strong evidence of cross-Theme synergies. The demands on Themes to deliver on their milestones, and work in different regions and with a large number of Centers leaves little time for effective strategic engagement. Mechanisms to foster more strategic cross-Theme engagement are required.
This review focused on the South Asia region so there was little opportunity for cross-region comparison. However, it is clear that the regions differ significantly in both the key drivers and the research approach required. There is a good appreciation that a top-down “one-size fits all” from Themes to regions is not appropriate though some concepts can be applied universally e.g. Climate Smart Villages.

There is a good balance of activities at local, national, regional and global scales. There are recognised challenges in working across these various scales e.g. how to scale out work at village scale to achieve wider impact yet maintain the rigour and long-term monitoring at a range of key sites; how to better integrate policy work at a national scale with lessons and insights from village scale on-ground activities; achieving better contextualization of global models at local scales to increase relevance to decision-makers. Amongst these challenges, successful initiatives are emerging such as climate analogues, which are assisting not just in providing a way of exploring new options, but also as a mechanism for cross-region integration.

The final area the review examined related to Outcomes and International Public Goods. An analysis of Annual Outcomes across CCAFS shows that 19% are relevant to the local scale, 22% at the national/regional scale, 44% are cross-regional, and 14% global. About two-thirds of the Annual Outcomes have good linkages to Theme level Outcomes and System Level Outcomes. An assessment of Theme Level Outcomes suggests about two-thirds are on track to achievement in 2015/16 but about one-third need more effort to bring them back on-track.

CCAFS invests considerable effort in a range of International Public Goods that fall into three broad groups of: Data and Tools; Reports, Working Papers and Policy Briefs; and scientific publications. A new website was launched in July 2013 and it provides a highly effective and open platform for accessing outputs from CCAFS.

Cross-cutting policy briefs and synthesis reports attract a lot of interest, as measured by downloads, and opportunities exist to build on this success through synthesis of a wider range of research activities. Journal publications produced by CCAFS are of a high quality and are collaborative, with on average 5.5 authors per paper. The papers are published in journals with a high impact factor for agriculture (average 3.0). However, the numbers of journal publications are quite low relative to other CRPs and to one international benchmark (CSIRO). This may be related to the relatively new area of research, particularly for Centers. Effort needs to be spent on lifting publications rates from Centers but in a way that doesn’t compromise the efforts on achieving outcomes and impacts.

In conclusion, CCAFS has put together an impressive research program that effectively embraces the matrix organization, with the Theme x Region dimension of the broader matrix being critical to its success. An effective and functional leadership team underpins CCAFS. There are a number of areas that could be strengthened in relation to involvement of Centers, cross-Theme synergies, outcomes and outputs, and these are detailed in the following recommendations.

**Recommendation 1:**

Recognise the growing importance and role of Regions in the Theme x Region x Center matrix by:
(a) Elevating of the role of Regions and regional needs in the framing of both science and outcomes as CCAFS moves into Phase 2 and as the CGIAR moves to Intermediate Development Outcomes

(b) Continue to strengthen and grow activities such as Climate Smart Villages as a means of achieving full integration of Themes and Centers at a regional scale

(c) Develop ways of more explicitly communicating and reporting achievements and outcomes at a Regional scale, such as annual reports.

**Recommendation 2:**
Increased effort should be invested by the CCAFS management team in developing increased Window 3/Bilateral investment in CCAFS by working closely with Centers and donors. This will require developing a strong value proposition as to the long term benefits of investment in adaptation and mitigation.

**Recommendation 3:**
(a) Develop a clear process for resourcing and accountability of activities between Centers (and other non-Center partners) and the CCAFS management team but in a way that fosters joint ownership and collaboration rather than it becoming a transactional purchaser/provider model.

(b) Provide adequate resources to Themes and Regional Program Leaders to nurture the collaboration and engagement between Centers and the CCAFS management team.

**Recommendation 4:**
Put in place a set of targeted incentives and capacity building initiatives to achieve increased cross-Center involvement in CCAFS activities.

**Recommendation 5:**
Establish a monitoring and evaluation activity to capture longitudinally the depth and breadth of external partnerships, how they evolve through time, and the influence on decision-making in CCAFS and the external partners.

**Recommendation 6:**
(a) Provide opportunities at PMC meetings, or if required dedicated meetings, to engage in more strategic discussions on cross-Theme synergies and for these to be reflected in cross-Theme activities.

(b) Include overt reporting of cross-Theme synergies, outputs and incipient outcomes in Annual Reports and Milestones.

**Recommendation 7:**
Develop clear plans with associated implementation strategies for undertaking participatory research at local scales in the future that offer the rigour associated with focused effort at a manageable number of sites but builds in approaches for scale out to achieve wider impact.

**Recommendation 8:**
Clearly articulate the role, if any, for working with vulnerable commercial scale farmers and have this strategy visible in business plans.

**Recommendation 9:**
Develop approaches to more explicitly link outcomes from local scale research activities to national scale policies.

**Recommendation 10:**
For effective application of global models at local scales, increased effort should be placed on activities that connect the down-scaled climate models, crop models and their application to local scale farming systems and their social and economic dynamics.

**Recommendation 11:**
Increased effort should be invested in developing a coherent structure that links Milestones, Annual Outcomes and higher level, longer term outcomes (IDO). A key aspect of this should be development of an approach to Impact Pathways that is consistent across Themes and Regions. This Impact Pathways approach should be developed in a way that facilitates close integration between Annual and Intermediate Development Outcomes.

**Recommendation 12:**
Increased effort should be directed to the Theme Outcome areas that are currently progressing slowly and at risk of not achieving their planned outcomes by 2015-16. In particular, areas relevant to the System Level Outcome on food security, with an emphasis on wider system aspects of food security, should receive some focus.

**Recommendation 13:**
Invest more effort in producing cross-cutting, synthesis reports and policy briefs given the strong external interest in these products. This will require identifying research activities that lend themselves to these synthesis publications and may provide additional benefit as a stimulant for cross-Theme interactions.

**Recommendation 14:**
CCAFS should develop a plan to lift publication rates in ISI journals. This will require a mix of measures ranging from performance indicators to short term incentives to longer term capacity building in Centers and done in a way that doesn’t compromise a focus on achieving outcomes.

**Recommendation 15:**
CCAFS should maintain its investment in a diversity of IPGs as a means of influencing decision-making and achieving desired outcomes and impacts.
1. Introduction

1.1 Background

In 2012 the first external evaluation of the Climate Change, Agriculture and Food Security (CCAFS) Research Program was conducted by the European Commission (EC) which focused on how CCAFS was performing in relation to the Consultative Group on International Agricultural Research (CGIAR) reform process. A review of the CCAFS governance and management functions commissioned by the CIAT Board of Trustees (BoT) was carried out in the first half of 2013 in line with the CCAFS Program Plan.

At its 3rd meeting in October 2012 the CCAFS Independent Science Panel (ISP) decided that CCAFS should undertake at least one programmatic external review per year commissioned by the ISP in addition to possible annual reviews on administrative, legal and/or financial issues commissioned by the CIAT BoT. These external reviews should be designed so that they can be inputs into the major evaluation that is expected to happen in Year 5, commissioned by the Internal Evaluation Arrangement (IEA).

The ISP decided that the first programmatic review would take place in late 2013, and would evaluate CCAFS’ interim outcomes and science products, based on two years of implementation. The focus would be on how the CCAFS Theme by Region matrix is being managed to deliver outcomes and international public goods. The review would also examine efforts to ensure integration across themes, and how CCAFS achieves an appropriate mix of local, national, regional and global activities.

1.2 Review Objective

To undertake an evaluation of how the CCAFS Theme by Region matrix is being managed to deliver on International Public Goods (IPGs: publications, databases and other knowledge products) and development outcomes.

1.3 Review Terms of Reference

1. How successful is the matrix management in CCAFS?
2. Is sufficient attention paid to ensuring synergies are achieved across themes, and is there sufficient evidence of synthesis in the IPGs?
3. Is there a sufficient level of comparability across regions, and is this reflected in the IPGs?
4. How well is the local-to-global set of activities managed, in terms of having an appropriate mix of activities at different scales and managing the cross-scale connections?
5. Are the initial outcomes or incipient outcomes being reported by CCAFS of sufficient scale for a program of this size, and do they reflect an integrated program?
2. Approach and Methods

By design, this review was intended to be largely desk-top, supplemented by telephone/skype interviews and if practical, some face to face interviews in country. A wide range of materials was made available by CCAFS for the review, from various plans and reports to minutes of meetings of the Independent Science Panel and the Program Management Committee. While not stated in the Terms of Reference, there was a request to provide some focus of the review on the South Asia region, to limit the need for face-to-face interviews in multiple regions. This was achieved by concentrating the interview component of the Review in South Asia while the assessment of documents, plans and reports encompassed all of CCAFS.

The Review document has been structured around the Terms of Reference. However, detailed Evaluation Criteria were provided (Annex 1) and these have been addressed within the Terms of Reference as set out below.

1. How successful is the matrix management in CCAFS? Evaluation Criteria: 1,2,3,4,5,9,10
2. Is sufficient attention paid to ensuring synergies are achieved across themes, and is there sufficient evidence of synthesis in the IPGs? Evaluation Criteria: 6
3. Is there a sufficient level of comparability across regions, and is this reflected in the IPGs? Evaluation Criteria: 7
4. How well is the local-to-global set of activities managed, in terms of having an appropriate mix of activities at different scales and managing the cross-scale connections? Evaluation Criteria: 8
5. Are the initial outcomes or incipient outcomes being reported by CCAFS of sufficient scale for a program of this size, and do they reflect an integrated program? Evaluation Criteria: 11,12,13,14,15,16

The methodological approach to the Review was:

(i) Review of material provided which includes: CCAFS strategic planning documents; CCAFS operational planning and management processes e.g. annual Business Plans, Minutes of PMC and ISP meetings; Outputs e.g. IPGs; and Performance and Outcomes e.g. Annual Reports, previous external assessments of outcomes (Annex 2). An evidence-based approach was taken to the review of this material and where possible quantitative analyses were undertaken. This assessment was made using the evaluation matrix as a guiding framework.

(ii) Face to face interviews in Delhi. Two senior level CSIRO scientists familiar with CCAFS and South Asia agriculture (Dr Mark Howden and Dr Christian Roth) travelled to Delhi for a workshop in early November and while in Delhi they conducted interviews with the Regional Program Leader, a Center partner, and two external partners of CCAFS. A structured list of questions was used to guide the interviews.

(iii) Telephone/Skype interviews with the CCAFS Director, three Theme Leaders, Regional Program Leaders in East and West Africa, two ISP members, two Center participants in South Asia, and the Communications function within the CCAFS Coordinating Unit (see Annex 3 for full list of interviewees) and other external partners of CCAFS.
(iv) The analysis of written materials and information and insights gained from the interviews were then synthesised in the review report to address the Terms of Reference taking into account the evaluation criteria. Where appropriate, specific recommendations were provided.

(v) Timeframes

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<td>Inception Report</td>
<td>October 29, 2013</td>
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<tr>
<td>Face to face interviews in Delhi</td>
<td>November 4-7, 2013</td>
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<tr>
<td>Telephone interviews</td>
<td>November 4-30, 2013</td>
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<tr>
<td>Review and analysis of written materials</td>
<td>November 4-December 14, 2013</td>
</tr>
<tr>
<td>Final Evaluation Report submitted (provided timely feedback on draft received)</td>
<td>March 12, 2014</td>
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</table>
3. Findings and Recommendations

3.1 How successful is the matrix management in CCAFS?

(*Evaluation Criteria 1,2,3,4,5,9,10*)

3.1.1 Context and Opportunity

The CGIAR has in recent years embarked on a reform process to more effectively deal with the world’s pressing issues relating to food security, climate, the environment and poverty. Its vision for addressing these challenges is embodied in its four System Level Outcomes: to reduce poverty and hunger, improve human health and nutrition, and enhance ecosystem resilience.

To achieve this vision, a fundamental change in strategy was adopted which sees CGIAR Research Programs (CRPs) as the main organizational mechanism of CGIAR research. This research is undertaken by the fifteen CGIAR Centers in what is a matrix management structure.

Climate Change, Agriculture and Food Security (CCAFS) is one of the CRPs. CCAFS is not only a new organizational structure - it is also a new area of research having first emerged as a CGIAR Challenge Program in 2009. This increased emphasis on climate change, agriculture and food security has been recognized by the CGIAR as a new area of competency that needs to be developed and strengthened:

“understanding the impact of climate change on agriculture and devising strategies for adaptation and mitigation that will benefit the poor” (CGIAR Strategy and Results Framework 2011).

Commencing a new program of research in a relatively new area of scientific endeavour coupled with a new organizational design process still in its formative stages provides some significant challenges. However, it also provides opportunities for innovation both in research and research management as this new area of research is not shackled by the history of past structures and embedded processes, culture and behaviours. With the right strategy and the right leadership (essential in every organization but especially so in matrix organizations) there is an opportunity for a new program like CCAFS to be leading the way for the organization.

3.1.2 CCAFS alignment to CGIAR reform process and System Level Outcomes

It is evident from the CCAFS Research Program Plan (2011) that CCAFS has embraced the reform process both in alignment of objectives and outcomes to System Level Outcomes (SLOs), in drawing on relevant skills from across the Centers in the CGIAR, and in leadership.

The overall goal of CCAFS, which is to: “promote a food secure world through the provision of science-based efforts that support sustainable agriculture and enhance livelihoods while adapting to climate change and conserving natural resources and environmental services”, closely links to the SLOs.
At a lower scale, the twelve Theme Outcomes also align well with the SLOs. At finer scales of organization such as Annual Outcomes there is less obvious alignment with SLOs e.g. about two-thirds of Annual Outcomes have good alignment with SLOs. A detailed analysis of Outcomes can be found in 3.5.4 and their alignment to SLOs is covered more fully in that section.

3.1.3 Matrix effectiveness - Theme by Region

Implementing a matrix management system in a complex and geographically dispersed organization like the CGIAR is challenging. Based on experience in other organizations full and effective implementation of matrix organizational design can take up to a decade. CGIAR is a few years into this process so it would not be expected to yet have in place a matrix that is fully effective.

CGIAR have introduced the matrix with the CRPs as the main organizational mechanism for research with Centers providing the capability to undertake the research in a way that facilitates the CGIAR system to achieve its System Level Outcomes.

While the focus of the CGIAR reform process has been on getting effective CRP-Center and cross-Center interactions, CCAFS implementation of this two-dimensional matrix is interesting in that a third axis in the matrix in the form of Regions was introduced from the outset. There is a view amongst management consultants that building matrix organizations with three axes runs the risk of increasing management complexity, leading to poor decision-making and increasing overhead costs. In contrast there are real world examples of where multi-axis matrix organizations have been successful e.g. Proctor & Gamble.

Based on various interviews with CCAFS senior leaders and with Centers it has become clear that the Region dimension of the matrix provides a significant value add in effectiveness and clarity rather than contributing complexity and confusion. However, to reach this point has taken some learning and evolution.

At the outset of CCAFS, Themes were viewed as providing the science leadership and directions to CCAFS with the aim of drawing in Centers to deliver on the goals and outcomes of CCAFS. The regions were always designed to play an important role but in the early stages this was viewed as a facilitation role - effectively providing the glue between Themes, Centers, partners and stakeholders at national and regional scales.

CCAFS made the decision to initially focus in three regions (East Africa, West Africa and South Asia) though that has now expanded to five regions with South-East Asia and Latin America now actively engaged.

It became evident during this review process that the importance of the Regional function has grown since the inception of CCAFS. It plays an important role not just in facilitation but in ensuring on-ground delivery of activities is achieved and in implementing participatory action research. This is essential given the increasing emphasis being placed within CGIAR on outcomes and impact because it is likely that most of CCAFS outcomes will be expressed via the regionally based activities. More critically, it was made clear by a number of interviewees across Regional Program Leaders and Themes Leaders that the Regions are increasingly providing an important role in setting the priorities for science and outcome
delivery for Themes rather than a more top-down driven process that characterized earlier
design and implementation.

This is leading to more overt expression of research needs from a regional perspective. For
eexample, the East Africa Region has produced a needs document to contribute to ongoing
discussions about research priorities (Developing a Climate Change, Agriculture and Food

Another important dimension of the design of the Theme by Region matrix in CCAFS is the
use of core sites and Climate Smart Villages across the various regions. The establishment of
these sites and associated baseline surveys and technology interventions provide a consistent
research approach that will permit integration and scaling up of outcomes from local to global
scales. These sites are also designed to be a focal point for cross-Theme and cross-Center
activities within regions.

While there are issues with achieving good cross-Center involvement in Climate Smart
Villages (see Center discussion below in 3.1.4) and regional activities more generally it was
clear from the discussions with Centers in South Asia that there is relatively good interaction
across the three dimensions of Theme x Region x Center in NW and NE India. Much of the
success in this implementation of the Theme by Region matrix and involvement of Centers in
South Asia can be attributed to the leadership of the Regional Program Leader. Broader
aspects and importance of leadership in effective implementation of the matrix are discussed
in more detail in 3.1.5.

There was less of a sense of genuine cross-Theme interaction within these on-ground
activities in Climate Smart Villages within South Asia. While the Themes are working co-
operatively at these local scales there were not clear examples of cross-Theme synergies
adding value over and above the individual Theme activities, which appeared to be
proceeding very positively. Broader aspects of cross-Theme synergies are explicitly
addressed in Section 3.2.

In establishing a Theme by Region matrix, it would be logical to try to develop research
approaches at a Thematic level that can be applied consistently across different regions. It
was suggested by Regional Program Leaders that care must be exercised in taking this
approach that the individual context, issues and priorities of different regions are taken into
account. An expression of this sentiment was “the five regions are not five replicates”.

Given the growing importance of regions it would be useful to see greater expression of the
outcomes in a regional context in both the strategy and in reporting e.g. CCAFS Annual
Report. It was difficult in this review process to more explicitly get an integrated view of the
activities and milestones at a regional scale because the way they are reported is at the level
of Center and Regional led activities. Some consideration should be given to ways of being
able to demonstrate achievements and outcomes at this regional scale.

**Recommendation 1:**

*Recognise the growing importance and role of Regions in the Theme x Region x Center
matrix by:*

(a) **Elevating the role of Regions and regional needs in the framing of both science and
outcomes as CCAFS moves into Phase 2 and as the CGIAR moves to Intermediate
Development Outcomes**
(b) **Continue to strengthen and grow activities such as Climate Smart Villages as a means of achieving full integration of Themes and Centers at a regional scale**

(c) **Develop ways of more explicitly communicating and reporting achievements and outcomes at a Regional scale, such as annual reports.**

### 3.1.4 Matrix effectiveness - involvement of Centers

A clear goal of the CGIAR reform process is to harness the skills, experience and geographic spread of activities from across the Centers to deliver the goals and outcomes of the CGIAR Research Programs.

It is clear from the spread of activities across Centers in CCAFS that CCAFS has embraced the reform process. All 15 Centers have activities in CCAFS and in addition to this reflecting CCAFS leadership in the reform process it also highlights that climate change will affect all aspects of agriculture and food security. Table 1 shows the distribution of research activities across Centers based on the 218 Activities in CCAFS in 2012.

This table highlights a good spread of activities across most Centers. With the exception of CIFOR (one Theme Objective), all other Centers are involved in at least three Theme Objectives with 13 of the 15 Centers being involved in at least four Theme Objectives.

However, allocation of resources to Centers and activities does not on its own necessarily represent effective buy-in and engagement by Centers into CCAFS. There was a general view expressed by the ISP, Director, Theme Leaders and Regional Program Leaders that the genuine engagement from Centers has been slow to develop, as reflected by involvement in activities, and needs to accelerate. In particular, the core sites were designed to draw in the Centers to be working together on common sites, thereby achieving not only effective CCAFS-Center engagement but also deeper cross-Center collaboration. This ambition has not yet been fully realized with Centers still focusing much of their efforts in long established sites and relationships which limits room for cross-Centre engagement. There is also a concern within CCAFS that the activities being undertaken by the Centers do not always have a strong alignment with the Theme and Region objectives and outcomes and within Regions the ability or willingness of Centers to fully embrace participatory action research approaches has been slow to develop.

There is, however, evidence of where that engagement is starting to work effectively. In South Asia, there are close interactions between the key Centers and the Regional Program Leader and the development of Climate Smart Villages has seen good engagement from Centers with Centers like CIMMYT and Bioversity taking the lead on various activities across Climate Smart Villages, e.g. CIMMYT in NW India. In the policy domain IFPRI has been closely engaged with CCAFS in South Asia. Centers were very clear in stating their intent to further develop the working relationship with CCAFS in South Asia. Indeed all the Centers interviewed in South Asia were very positive about their engagement with CCAFS. While this in part can be attributed to the intent of CCAFS to embrace the reform process, the role of key individuals and relationships can’t be under-estimated. In this regard there was a clear message from all Centers about the important and influential role the Regional Program Leader is playing in South Asia. This reinforces earlier comments about the importance of Regions in the effective operation of the matrix between Themes and Centers.
The current organizational design model that empowers and encourages Centers to attain Window 3/Bilateral funding that may or may not have strong alignment to the strategies of
Table 1. Analysis of activities by Theme objective and Region/Center. The blue dots within each cell of the matrix illustrate the intensity of effort (numbers of activities) undertaken across CCAFS in 2012. Blank cells = no activities, smallest dot = 1 to 2 activities, medium dot = 3 to 5 activities, large dot = 6 to 9 activities, very large dot = >9 activities.

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CRPs may act as a disincentive to much closer alignment of Center activities and CRPs. This would appear to be a particular issue for CCAFS given its relatively small amount of Window 3/Bilateral funding compared with most other CRPs i.e. 24% Window3/Bilateral funding compared with a CGIAR average of 63% in 2012 (Annex 4). It is also clear that many donors prefer the bilateral funding approach as it better aligns to their own strategies and objectives so any incentives need to be designed with this reality in mind.

Given the reform process underway in the CGIAR system and the evolution of CRPs, it would in fact be more desirable in the medium to long term to have a greater proportion of funding available to CRPs via Window 1 and Window 2 funding. However, given the current realities of the high level of Window 3/Bilateral funding flowing directly to Centers it is essential for CCAFS to work closely with Centers and donors to achieve a greater investment in CCAFS. While it was not possible to explore it as part of this review it would be useful to understand the reasons for relatively low levels of Window 3/Bilateral investment in CCAFS. It is likely that there is in fact a greater level of activity underway that is closely connected to the goals of CCAFS but it is climate related work that is being mainstreamed into the work of other CRPs, particularly via Window 3/Bilateral funding. While ultimately, climate adaptation and mitigation does need to be mainstreamed into broader development objectives, there is a risk that premature or ill-informed mainstreaming may lead to ineffective adaptation and mitigation or even mal-adaptation. Close engagement with Centers and other CRPs is needed to avoid this risk.

**Recommendation 2:**
*Increased effort should be invested by the CCAFS management team in developing increased Window 3/Bilateral investment in CCAFS by working closely with Centers and donors. This will require developing a strong value proposition as to the long term benefits of investment in adaptation and mitigation.*

Achieving more effective engagement from Centers requires building relationships, confidence and trust, and ensuring expectations are and deliverables are clear. On this second point, the CCAFS Program Management Committee has instituted a system of appraisal of performance of Centers with the level of performance and alignment to CCAFS objectives influencing the level of funding in the following year. As CCAFS moves into Phase 2, the model of funding to Centers will move from one of allocation or grant to one based on bidding for activities based on the ability to deliver on what is needed by CCAFS.

It is also important that measures are put in place to continue to build the relationships between Regional Program Leaders and Centers and between Themes and Centers. CRPs have been established with relatively little supporting soft infrastructure to develop and nurture internal engagement and collaboration. Given the geographic spread of the activities of all Themes in CCAFS it has been difficult for Theme Leaders to reach out to Centers as effectively as they might given the significant nature of the reform process in CGIAR. There is clearly an important role for Regional Program Leaders in this area but given their growing roles, the issue of resources to support engagement and collaboration with participating Centers is of concern.

**Recommendation 3:**

(a) *Develop a clear process for resourcing and accountability of activities between Centers (and other non-Center partners) and the CCAFS management team but in a*
way that fosters joint ownership and collaboration rather than it becoming a transactional purchaser/provider model.

(b) Provide adequate resources to Themes and Regional Program Leaders to nurture the collaboration and engagement between Centers and the CCAFS management team.

Another key ambition of the reform process is through the establishment of CRPs to achieve much greater levels of cross-Center collaboration. As indicated above, the establishment of core sites within CCAFS provides a mechanism for fostering cross-Center collaboration.

The ISP Minutes from the meeting held in May 2013 indicate that cross-Center collaboration has reached an “optimum level” and that all Centers have acceptable cross-Center collaboration. However, Program Management Committee minutes and the 2012 Annual Report indicate the need to further strengthen cross-Center involvement in CCAFS. The 2013 Business Plan contains specific sections within each Theme to strengthen cross-Center activities so the issue is recognized and actions are being put in place to address this concern.

One measure of cross-Center collaboration is through publications. Table 2 summarises all the journal publications attributed to CCAFS in 2011 and 2012. It should be noted that papers published in 2011 and 2012 would for the most part be a result of work that was undertaken for some years prior. Given that Challenge program only commenced in 2009 and CCAFS as a CRP in 2011 as part of the CGIAR reform process, then it would not necessarily be expected that publications in 2011 and 2012 to yet reflect full cross-Center collaboration. However, the analysis provides a reasonable benchmark by which publications in the future can be judged.

The vast majority of journal papers (125) published in 2011 and 2012 were from a single Center (86%), with just 23 papers (14%) having authors from more than one Center. In contrast, there was quite a reasonable number and diversity of institutions involved in papers with a mean of 3.4 institutions per paper. Likewise there were 5.5 different authors per paper. So there is good evidence of external to CGIAR collaboration in papers produced by CCAFS but there is relatively little cross-Center collaboration.

Table 2. Analysis of journal publications in 2011 and 2012 in the context of cross-Center and cross-institutional involvement.

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<th>Centers involved</th>
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Recommendation 4:
Put in place a set of targeted incentives and capacity building initiatives to achieve increased cross-Center involvement in CCAFS activities.

Consideration should be given to incentives to encourage cross-Center authorship of papers. The foundation to achieving this is of course research activities involving multiple Centers. Clearly incentives for cross-Center collaboration can be provided through funding mechanisms but there should also be put in place some capacity building initiatives to stimulate this collaborative approach.
3.1.5 Matrix effectiveness - leadership

A critical factor in the success of a matrix organisation reform process is that of leadership. It is clear from various interviews with ISP members and senior leaders within CCAFS that CCAFS has embraced this reform process with a strategic and operational approach that is closely aligned to the reform agenda. This quality of leadership is not just evident from the structural aspects such as a wide level of Center engagement by CCAFS in the portfolio of activities but also in the culture, systems and processes put in place by CCAFS. In addition to the various interviews, a review of the Program Management Committee and ISP Minutes over the last year reveals a leadership team committed to both the reform process and the goals of CCAFS and the delivery of its outcomes.

A key element to emerge in the various interviews and the wide range of material that is publicly available is that of transparency. For matrix organizations to work effectively there needs to be a high level of trust and communication across the various axes. An essential element of building effective relationships, collaborations and trust is through processes, systems and decisions being transparent.

From interviews with a wide range of people across CCAFS and with partners it is apparent that CCAFS has built transparency across many elements of its operations. This ranges from research operations e.g. all data collected at core sites being publicly available, to the management systems that are in place to report on achievement of Activities and Milestones, to the way funding is allocated to centers based on well defined and communicated performance indicators. This “open access” approach being implemented by CCAFS has benefits that reach far beyond internal dimensions of a more effective matrix e.g. evidence of third parties using and analyzing the data available from baseline surveys of core sites. There are some valuable lessons that can be shared more widely across the CGIAR System based on the systems and processes in place in CCAFS. Reaching this conclusion is somewhat at odds with the CCAFS 2012 Annual Report to the Consortium, where a partnership survey suggested that transparency was an indicator in which CCAF performed least strongly. I have trouble reconciling these conclusions based on the interviews conducted with the ISP, Centers and external partners.

A critical factor in the success of the Regional dimension of the matrix is the leadership provided by the Regional Program Leaders and the Theme Leaders. The leadership required is not just across the Theme x Region dimensions of CCAFS but also across into Centers and with other research partners and key stakeholders. Through this review process it has become clear that there is generally a close working relationship between Theme Leaders and Regional Program Leaders across the three established regions in East Africa, West Africa and South Asia. Within South Asia, where this review had more focus, it was clear this effective leadership extended beyond CCAFS Theme Leader – Regional Program Leader relationships into interactions with Centers and external partners. In particular, the Regional Program Leader, and his leadership and engagement skills were seen as being particularly important to the growing success of CCAFS in South Asia.

3.1.6 Matrix efficiency and management systems

The governance structure of CCAFS is shown in Annex 5. Core elements of this governance structure for the effective and efficient operation of CCAFS are the Independent Science
Panel (strategy), the Program Director (strategy and operations), the Program Management Committee (strategy and operations), and the Coordinating Unit (operations).

The Program Management Committee (PMC) is the key entity for the successful implementation of CCAFS strategy and the successful operation of the matrix, not just between Themes and Regions and across-Themes but also in setting the culture and approaches to engaging with Centers. While the PMC’s formal membership (with voting rights) is the Director, four Theme Leaders and one Regional Program Leader (currently South Asia), in practice its participants include all Regional Theme Leaders and key staff from the Coordinating Unit. This more inclusive mode of the PMC is desirable for achieving effective within-CCAFS matrix and management operations.

Based on an investigation of the Minutes of the PMC meetings there would appear to be frank and constructive discussions at the PMC meetings which suggests a healthy culture which is essential for effective matrix operations in any organization. This view is reinforced by the external review of governance in CCAFS, conducted earlier in 2013. However, the minutes do reveal a strong focus on operational matters with little space for more strategic discussions on matrix effectiveness and efficiency and the processes, systems, and collaborative and cultural mechanisms needed to improve matrix effectiveness (see Recommendation 7).

One area of matrix efficiency that CCAFS would appear to be taking a lead on is in the area of formal systems for reporting of activities and milestones. It was quite easy as a reviewer to get a sense of accomplishment within Themes, Regions and Centers from the consistent and systemic approach to Technical Reports on Activities, Summary of outputs, Case studies and Publications. While there was some unevenness in the quality of the reporting across Themes, Regions and Centers, this reporting provides a high level of accountability. I have no doubt that the nature of the reporting structure would cause frustration for some individual scientists who would view it as an unnecessary administrative task but it does add value. Moving to a web-based system (in train) with some degree of pre-fill or rollover functionality would alleviate some of these concerns.

3.1.7 Matrix effectiveness - external partnerships and demand for research

A critical success factor in the Theme by Region matrix structure, and CCAFS more generally, is strong engagement with key partners and stakeholders who are intended beneficiaries of the research. Through the evidence provided in the 2012 Annual Reports (Report to the CGIAR and the external Annual Report – Unfolding results) it is clear that effective external partnerships are in place to deliver outcomes, particularly in the area of policy at regional and national levels. Some evidence of effective external engagement is provided at more local scales such as NGOs and agricultural advisory services though it was not as strong as the examples given for policy interactions.

To assess the effectiveness of external partnerships at the scale of the Theme x Region matrix, specific questions were asked of Theme Leaders and Regional Program Leaders. In addition, in South Asia two face to face interviews were conducted with external partners.

Based on the discussions with Theme Leaders and Regional Program Leaders, it was clear that the Regional Program Leaders take on a critical role of establishing relationships with key external partners within Regions and individual countries for Regional and Theme led...
activities. Theme Leaders engage more with external partners and donors operating at the regional to global scale and with research institutions external to the CG system, principally the five CCAFS partner universities, who have key roles in delivery of specific research outputs or in housing data platforms. This arrangement appears to be working reasonably effectively and it reinforces the importance of Regional Program Leaders in the matrix structure in terms of engaging key partners within regions.

Another area of significant external engagement with external partners within Regions is through the Centers via Window 3/Bilateral funding. This is likely to lead at times to multiple engagement of stakeholders via Regional Program Leaders and Centers leading to some potential for confusion. However, within South Asia this was not seen as a major concern but rather a reality of the CGIAR organizational design. At the very least there should be a good understanding and level of communication between Centers and Regional Program Leaders to ensure there is consistency in engagement with external stakeholders. There was a view expressed that a focus by CCAFS on external engagement was occurring at the expense of interactions with Centers. Coordinating with Centers in external engagement might overcome this concern and achieve the appropriate balance of attention to external engagement and Centers within regions.

The two external partners in South Asia who were interviewed were both very positive about their dealings with CCAFS and that the research engagements are highly relevant to their needs. Both commented that the engagement occurred early on in the research design process, allowing for good ownership of the research activities. They both indicated that a strong relationship with the Regional Program Leader was critical to successful engagement and one indicated that good interactions with key Centers was also important.

The research projects are still in their early stages so neither stakeholder could identify evidence as yet that the projects were influencing decision-making. Both believed that CCAFS could have a significant impact though one of the stakeholders indicated that the magnitude of the challenge was such that a program the size of CCAFS in South Asia could not hope to have country level impacts but rather the scale of impact is likely to be at local to sub-national scales within jurisdictions.

It would be valuable to capture in a comprehensive way through a formal monitoring and evaluation process the nature of these external engagements, how they evolve with time and the impact on decision-making.

**Recommendation 5:**

Establish a monitoring and evaluation activity to capture longitudinally the depth and breadth of external partnerships, how they evolve through time, and the influence on decision-making in CCAFS and the external partners.
3.2 Is sufficient attention paid to ensuring synergies are achieved across themes, and is there sufficient evidence of synthesis in the IPGs?  
*(Evaluation Criteria 6)*

In the design of CCAFS, it was the intention from the outset to have close linkages and synergies across the Themes, as depicted in Figure 1, reproduced from the CCAFS Program Plan 2011. In particular, Theme 4, is set up to play an integrating cross-cutting role with other Themes in delivery of climate scenarios, data, tools, policy analyses, and research in gender and social differentiation. While Theme 1 is focused on long term adaptation and Theme 3 on mitigation, the trade-offs and synergies between adaptation and mitigation are clearly an avenue for a coherent cross-Theme suite of activities. Similarly, Themes 1 and 2 should link closely at the intersection of climate variability and climate change, particularly at multi-year to decadal timescales.

A number of mechanisms have been put in place to facilitate these cross-Theme synergies such as: joint planning sessions based on a team approach to Theme planning; role of Regional program Leaders in bringing different Theme activities together in a regional, national, and local context; establishment of core sites and Climate Smart Villages to bring different Theme activities together; and ultimately integration of outputs and outcomes to achieve System Level Outcomes.

![Figure 1. Anticipated interactions between CCAFS Themes as originally envisaged in the CCAFS Program Plan 2011.](image)

It was clear from both the interviews and the Minutes of Program Committee meetings that there is a high level of trust and cooperation between Theme Leaders and a willingness to share. There is little or no evidence of “turf protection” or “empire building” amongst the Theme Leaders.

There is evidence of some cross-Theme activities e.g. Theme 1 hosting down-scaled climate data originating from Theme 4, household modeling work in Theme 2 working closely with Theme 4 in dynamic treatment of climate risk. There is also good evidence of cross-cutting gender activities in the Themes (see more detailed discussion below on gender integration).
However, with the exception of the gender activities, highly visible evidence of strong cross-Theme synergies in the conceptual thinking, design and implementation of research and in outputs is, on the whole, lacking. The 2012 Annual Report reports on individual Research Themes and it is not obvious in the synthesis reporting of Products/Tools, Significant Achievements and Outcomes the degree to which these were a result of cross-Theme work.

The specific issue of evidence of cross-Theme synergies in International Public Goods is addressed in Section 3.5.6.

A number of factors may be at play in this lack of visibility of cross-Theme activities and synergies:

- the hierarchical structure of the research in CCAFS i.e. Activities, Milestones, Theme Objectives, Theme Outcomes and the nature of the reporting structures for these entities tends to compartmentalize research into individual Themes and works against more overt expression of cross-Theme synergies
- the demands on Themes to work across a number of Regions and interact closely with a number of Centers to deliver on Activities are very significant, which leaves relatively little time to strategically and operationally invest in cross-Theme activities
- a view from a couple of CCAFS leaders was that the necessary operational aspects of PMC meeting agendas left little bandwidth for more strategic discussions on issues such as cross-Theme synergies.

If these factors are combined it is not surprising that cross-Theme synergies and outputs are not as evident as anticipated. The challenge is how to achieve greater cross-Theme engagement at the project activity level and reporting of those synergies without adding additional complexity and process to existing organizational design and management systems. It is clear that the Theme leaders engage and communicate well with each other so a hard system response to achieve greater synergies in activities across Themes is not preferred.

**Recommendation 6:**

(a) **Provide opportunities at PMC meetings, or if required dedicated meetings, to engage in more strategic discussions on cross-Theme synergies and for these to be reflected in cross-Theme activities.** For example, it would appear that increased activity in Themes 1 and 2 in integrating the adaptation responses to climate variability and climate change (especially where timescales merge) would be beneficial. Likewise more emphasis on adaptation-mitigation co-benefits and trade-offs (Themes 1 and 3) would be useful.

(b) **Include overt reporting of cross-Theme synergies, outputs and incipient outcomes in Annual Reports and Milestones.**

3.2.1 **Gender and Social Differentiation**

An important cross-Theme synergy for CCAFS is the work in gender and social differentiation. This work aims to integrate gender analysis in climate change, agriculture and food security research across the Themes and Regions. It is anticipated that this research will lead to more equitable inclusion of women in decision-making at levels of the household, village, and institutions through capacity development and organizational gender mainstreaming. This work is well coordinated at the whole of CCAFS level but the budgets are mainstreamed across, Themes, Regions and Center activities with targets of 15-20% of budgets allocated to gender work being realized. To further achieve institutional
mainstreaming of the gender research within CCAFS, staff have been recruited into the CCAFS core team who have gender research experience, Theme and Regional research leaders have gender-related objectives and Centers have been recruiting gender specialists. A community of practice is evolving within CCAFS and tools and approaches are being shared on the CCAFS website.

In the area of research activities, the baseline surveys have been designed to allow data on gender to be collected, analysed and disaggregated, which has included working closely with key Centers to develop shared standards and tools. A range of gender indicators and approaches to monitoring them have been developed in a bottom-up way with research partners and these indicators are being used to assess gender equity against targets.

Based on the available evidence it would appear CCAFS has fully embraced the CGIAR goal for gender equity to be embedded in CRPs as a cross-cutting priority and there is good evidence of synergies across Themes and Regions in the way the program is being implemented in CCAFS.
3.3 Is there a sufficient level of comparability across regions, and is this reflected in the IPGs?  
*(Evaluation Criteria 7)*

This review had a focus in South Asia and apart from talking with the East and West Africa Program Leaders there was little direct engagement with other Regions making it somewhat difficult to undertake cross-Region comparisons. However, information that could be disaggregated according to region has been assessed.

Budget breakdown by Region was not available for 2012 but the 2011 numbers (Annex 6) show that the budget was relatively even across the Regional Themes with West Africa receiving about $1.8M less in funding than the other two Regions (c. $10.5M each).

The three Regional Program Leaders interviewed stressed that the issues, research needs and external engagement differed significantly amongst Regions and a top-down, “one size fits all” research approach is not appropriate. Likewise, the individuality of regions means that comparisons must be made in the context of place-based drivers, technologies and tools differentially suited to different regions, diversity of institutions, capacity and partners. For example, better managing existing climate variability through better weather and climate information (climate services) is a high priority in East and West Africa while the rapid scale-out in South Asia of Climate Smart Villages that target specific farming system interventions is starting to have significant outcomes. The comments below therefore need to be interpreted within that context of considerable regional diversity.

The activities in Regions are made up of the Region’s own budget and initiatives, that of the Centers which makes up the majority of research undertaken, and to a lesser extent Theme Leader led activities. It is difficult to compare regions based on annual Activity Reports because it is not possible to disaggregate the Center Reports into regions. However, the Region led Activities can be assessed based on Technical Reports per Activity.

In West Africa and South Asia, completion of Activities was 75% and 64%, respectively, while in East Africa, only 30% of Activities were assessed to be fully completed (Table 3). All three Regions demonstrated significant integration of gender activities. East and West Africa each had three journal publications while South Asia had ten listed. The Regional Program Leader synthesis summaries all suggested good levels of engagement and pathways to impact, which is a little at odds with the assessment of Activity completion. It would be worth exploring this relatively low level of Activity completion in East Africa as it may reflect some inconsistency in achievement rankings based on the synthesis summaries which suggested similar levels of achievement across Regions.

<table>
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<th>Table 3. Analysis of Region led Activity Reports</th>
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<td>Activities</td>
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<tr>
<td>Publications</td>
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<td>Gender activities and integration</td>
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<td>Synthesis - path to impact, incipient outcomes</td>
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IPGs are dealt with in more detail in Section 3.5.6 but in terms of the different Regions there appears to be a good level of comparability in data and tools, such as baseline surveys (data, reports and atlas) in their consistency and quality. For tools such as future scenarios or climate services these will necessarily be different amongst and within regions but they are being used appropriately in different regions. Most other data and tools are global and more generic in nature e.g. downscaled climate projections, climate analogues, food security maps though they need to be applied with the appropriate context in different regions.
3.4 How well is the local-to-global set of activities managed, in terms of having an appropriate mix of activities at different scales and managing the cross-scale connections? 
(Evaluation Criteria 8)

At the establishment of CCAFS there was a clear strategy to undertake research activities that ranged from global to local in scale and to establish a network of stakeholders and partners also from the global to local scale. While it is not possible to determine the relative split across different scales of activities there is significant investment in modeling, policy relevant activities, technologies e.g. pre-breeding and testing of varieties more pre-disposed to a future climate, and participatory action research at household/village scale to test climate smart interventions.

The research at local scales has had three strong foci: the establishment of core sites and Climate Smart Villages, agricultural climate services, and gender related research activities. This scale of research work has also included activities relevant to but not necessarily restricted to CSVs e.g. index based insurance, use of ICT in disseminating weather and other value-adding market information, crop diversification.

The original plans in CCAFS were to place most emphasis at local scales within the cores sites/Climate Smart Villages, working with smallholders. A rich information base will be built up at these sites and through strong protocols on consistent data collection and reporting, an ability to synthesise and value add at national and regional and cross-regional scales is being created. Central to this local to regional model is the anticipated role of Centers in investing their allocated resources into these sites. While this is increasingly happening, there is still significant investment by Centers in a wider range of local sites due to history of activity and strength of local relationships. In addition, other research partners often have established local sites and to achieve both effective collaboration and impact it is proving desirable to work at these other local scale sites.

This throws up a number of challenges and questions of balance, including: how to achieve increasing investment in climate smart villages from Centers; how to scale out CSVs to achieve wider impact that is measurable at sub-national and national scales yet maintain the rigour and effort in existing CSVs; how to exploit new opportunities at local scale that don’t lend themselves to operating within the concept of CSVs.

Recommendation 7:
Develop clear plans with associated implementation strategies for undertaking participatory research at local scales in the future that offer the rigour associated with focused effort at a manageable number of sites but builds in approaches for scale out to achieve wider impact.

The discussion above is very much in the context of smallholder farmers. Not all vulnerable farmers are smallholders yet from the materials available for this review it was not evident that there is a substantive effort into more market–oriented farmers wishing to operate at commercial scales. This maybe a conscious decision by CCAFS to not invest too much effort at this more commercial scale or it is happening but the work is not as visible as the work with smallholders.

Recommendation 8:
Clearly articulate the role, if any, for working with vulnerable commercial scale farmers and have this strategy visible in business plans.

At national scales, much of the work occurs in a policy context, informing national policy in a diverse range of areas but with some emphasis in National Adaptation Plans (NAPs) and Nationally Appropriate Mitigation Actions (NAMAs) and in building capacity at the national scale to more effectively participate in global discussions such as the UNFCCC. It is not clear that there is much linkage between the national scale policy work and local scale participatory action research but there would appear to be good opportunities to be working with policy makers to have national scale policies that are informed by the local scale in the types of incentives and facilitation needed to support adaptation and mitigation.

**Recommendation 9:**

*Develop approaches to more explicitly link outcomes from local scale research activities to national scale policies.*

The climate analogues work provides a good example of work that is relevant to national, regional and cross-regional scales in that climate analogues of future climates in one region may only be found in the present in other regions. The nature of this approach is likely to encourage co-operation across regions (particularly South-South) as people within one region start to explore the farming systems of other climate analogue regions. The most visible component of the climate analogue work is the modeling work, which requires a reasonably strong understanding of the different Global Climate Models (GCMs) and associated emissions scenarios, dissimilarity analysis and weighting loadings, for the tool to be used effectively. A challenge remains in being able to then take the analogue climate and apply it locally and with the right socio-economic to explore different cropping and farming system options.

Likewise, a significant activity in CCAFS has been the tool development in down-scaled climate projections. This draws on efforts undertaken at global scales, through the IPCC process and the development and public access to a range of GCMs to build a portal that allows production of down-scale climate projections. This provides a basis for linking work undertaken at the global scale and producing relevant information for local scale analysis, scenario development, and testing of different intervention options and policies.

However, as with the climate analogue tool the down-scaled climate modeling approaches require a reasonably strong understanding of the different GCMs and the different emission scenarios for it to be used appropriately. It is not clear of the process for the intermediate step of taking these down-scaled climate projections and applying them to more local scale applications that are contextualized to not just the physical climate analogue but also the appropriate social and economic drivers.

**Recommendation 10:**

*For effective application of global models at local scales, increased effort should be placed on activities that connect the down-scaled climate models, crop models and their application to local scale farming systems and their social and economic dynamics.*

The other aspect of global scale activities is the work of CCAFS at the policy level via the IPCC, UNFCCC and WMO’s global framework for climate services. These activities are
important for CCAFS, not just in their own right, but for connection to more regionally based activities e.g. climate services in AGRHYMET.

3.5 Are the initial outcomes or incipient outcomes being reported by CCAFS of sufficient scale for a program of this size, and do they reflect an integrated program?  
(Evaluation Criteria 11,12,13,14,15,16)

3.5.1 Definition of outcomes

There can be quite a bit of confusion about what constitutes outputs, outcomes and impacts. For the purposes of this review, the following simple definitions have been adopted:

Output: products, tools or services produced by the research
Outcomes: use of the research to change policy or practice, usually in the short to medium timeframe and at a reasonable scale
Impact: longer term, deeper changes in people’s lives and livelihoods that have occurred as a result of the research.

The outcome definition is consistent with that adopted by CCAFS, namely: ‘An outcome is the use of the research by non-research partners to change policies and practices. In many cases the users of the research will be policy makers (or those influencing the policy process), national development agencies, service providers to farmers including non-governmental agencies, and sometimes farmers themselves.’

3.5.2 Approach and process for development of outcomes in CCAFS

In the strategic planning for CCAFS covering the period 2012-2015, a Log Frame approach was adopted. The Log Frame is quite standard in its implementation, consisting of a nested set of Milestones, Outputs, Outcomes and Objectives with each of the Milestones having a date for completion, narrative/description, performance indicator, means of verification, assumptions and partners.

For each of the CCFAFS Themes there are three Objectives each with an Outcome, giving a total of 12 Outcomes across CCAFS (Table 4). Although not explicitly stated in each of the 12 Outcome statements it is assumed these Outcomes are to be delivered by 2015.

Table 4. List of CCAFS Outcome statements as presented in Log Frame 2012-2015.

<table>
<thead>
<tr>
<th>Theme 1. Adaptation to Progressive Climate Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome 1.1: Agricultural and food security strategies that are adapted towards predicted conditions of climate change promoted and communicated by the key development and funding agencies (national and international), civil society organizations and private sector in at least 20 countries</td>
</tr>
<tr>
<td>Outcome 1.2: Strategies for addressing abiotic and biotic stresses induced by future climate change, variability and extremes, including novel climates mainstreamed among the majority of the international research agencies who engage with CCAFS, and by national agencies in at least 12 countries</td>
</tr>
<tr>
<td>Outcome 1.3: Improved adaptation policies from local to international level supporting farming communities, rural institutions and food system actors adapted to future climate conditions in at least</td>
</tr>
</tbody>
</table>
Theme 2. Adaptation through Managing Climate Risk

| Outcome 2.1: | Systematic technical and policy support by development agencies for farm- to community-level agricultural risk management strategies and actions that buffer against climate shocks and enhance livelihood resilience in at least 20 countries |
| Outcome 2.2: | Better climate-informed management by key international, regional and national agencies of food crisis response, post-crisis recovery, and food trade and delivery in at least 12 countries |
| Outcome 2.3 | Enhanced uptake and use of improved climate information products and services, and of information about agricultural production and biological threats, by resource-poor farmers, particularly vulnerable groups and women, in at least 12 countries |

Theme 3. Pro-Poor Climate Change Mitigation

| Outcome 3.1 | Enhanced knowledge and tools about agricultural development pathways that lead to better decisions for climate mitigation, poverty alleviation, food security and environmental health, used by national agencies in at least 20 countries |
| Outcome 3.2 | Improved knowledge about incentives and institutional arrangements for mitigation practices by resource-poor smallholders (including farmers’ organizations), project developers and policy makers in at least 10 countries |
| Outcome 3.3 | Key agencies dealing with climate mitigation in at least 10 countries promoting technically and economically feasible agricultural mitigation practices that have co-benefits for resource-poor farmers, particularly vulnerable groups and women |

Theme 4. Integration for Decision Making

| Outcome 4.1 | Appropriate adaptation and mitigation strategies mainstreamed into national policies in at least 20 countries, in the development plans of at least five economic areas (e.g. ECOWAS, EAC, South Asia) covering each of the target regions, and in the key global processes related to food security and climate change |
| Outcome 4.2 | Improved frameworks, databases and methods for planning responses to climate change used by national agencies in at least 20 countries and by at least 10 key international and regional agencies |
| Outcome 4.3 | New knowledge on how alternate policy and program options impact agriculture and food security under climate change incorporated into strategy development by national agencies in at least 20 countries and by at least 10 key international and regional agencies. |

The Outcome statements are fairly high level in their description and the key metric used in nearly all the Outcome statements is the number of countries in which the outcome will be achieved. This rather generic approach to the development of Outcomes creates some challenges for assessing whether they are of sufficient scale or in getting a feel for different emphases in the various regions in which CCAFS operates. Indeed the “Regions” dimension of the CCAFS matrix is almost lost within the whole Log Frame approach, which is strongly centered around Themes.

The inherent design of the Log Frame doesn’t allow for expression of more intermediate or incipient outcomes to judge whether the various activities are on track to achieving the overall 2015 Outcomes. It has to be assumed that the achievement of Milestones will ultimately lead to the achievement of the Theme Outcomes.

This structural/design shortcoming in being able to demonstrate incipient or intermediate outcomes appears to have been addressed to some degree by the inclusion of Outcome reports in the Annual Technical Reports for Themes, Regions and Centers. For 2012, there were 36 Outcomes reported.
Annual Outcomes are decided at the commencement of each year with an expectation that each of the Annual Outcomes will have a linkage through to one of the 12 Theme Outcomes. However, it doesn’t appear that there has been in place a formal process for linking these Annual Outcomes to the higher level Theme Outcomes.

This is dealt with to some extent through increased emphasis and effort on the development of Impact Pathways. Impact Pathway roadmaps are provided in the 2013 CCAFS Business Plan for two of the four Themes (Themes 1 and 4) and for the three established Regional Programs (East Africa, West Africa, South Asia). This is a positive and constructive initiative. However, it is clear that this process is still in its early stages of development as each Theme and Regional Program has adopted a different approach for developing Impact Pathways and the use of some terminology is a little confusing. For example, outcomes are listed in most Impact Pathways and while these are consistent with Theme Level Outcomes there is not a direct alignment and so a new set of outcome statements are introduced.

In addition, to these two approaches to Outcome reporting, the CGIAR has introduced a process of Intermediate Development Outcomes (IDOs). CCAFS has proposed five Intermediate Development Outcomes, focusing on behavioural changes at farmer, local, institutional, national and international levels, as well as one directed towards gender equity. IDOs will become the main mechanism for CCAFS to demonstrate its contribution towards the CGIAR System Level Outcomes.

This linkage between Activities, Milestones and Outcomes is illustrated in Figure 2.
It is clear from the interviews with various senior leaders in CCAFS that the process of developing outcomes and pathways to impact is a relatively new one, not just for CCAFS, but for the CGIAR more broadly. It is also evident from the interviews that CCAFS is embracing the need to move to a more outcomes and impacts focus and is leading the way within the CGIAR and this is to be commended.

As the whole process of outcomes and impacts develops consideration should be given to a more coherent and systematic linkage between milestones, annual outcomes and higher level outcomes (Theme Level Outcomes and IDOs as they in time replace Theme Level Outcomes) and the integration of impact pathways. The Annual Outcomes are a key building block to achieving longer term outcomes and impact. They also provide an opportunity to more overtly demonstrate outcomes at regional and local scales to demonstrate the linkages and achievements at global to local scales. At the moment they are largely determined in a bottom-up process. In contrast the Intermediate Development Outcomes are established in a broader top-down process. There is a risk of these two scales of outcomes not connecting effectively unless a more planned approach to their integration is taken.

**Recommendation 11:**
*Increased effort should be invested in developing a coherent structure that links Milestones, Annual Outcomes and higher level, longer term outcomes (IDOs). A key aspect of this should be development of an approach to Impact Pathways that is consistent across Themes and*
Regions. This Impact Pathways approach should be developed in a way that facilitates close integration between Annual and Intermediate Development Outcomes.

3.5.3 Assessment of outcomes – milestones

A precursor to achieving nearer term incipient outcomes and medium term Theme Outcomes is achievement of Milestones. Table 5 shows the degree to which 2012 milestones were accomplished. Across all Theme outputs, 67% of Milestones were accomplished with 33% partially accomplished and no milestones that were not accomplished. These assessments of Milestone accomplishment represent the views of Theme Leaders and Regional Program Leaders and would appear to be thoroughly assessed based on the explanations and evidence.

Table 5. Accomplishment of Milestones in CCAFS in 2012.

<table>
<thead>
<tr>
<th>Milestone Output</th>
<th>Milestones in 2012</th>
<th>Accomplished</th>
<th>Partially Accomplished</th>
<th>Not Accomplished</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1.2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1.3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2.1</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2.2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2.3</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3.1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3.2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3.3</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4.1</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4.2</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4.3</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>29</td>
<td>14</td>
<td>0</td>
</tr>
</tbody>
</table>

3.5.4 Assessment of outcomes - Annual Outcomes/Incipient Outcomes

In 2012 and 2013 there were two separate assessments of the Annual Outcomes in CCAFS. The first was an assessment from the Director of CCAFS of the Annual Outcomes for 2011 and 2012 and the second was an examination of the 2012 Annual Outcomes by an external consultant. Both of these assessments focused on whether the stated outcomes really fitted the definition of an outcome and whether there was sufficient evidence to support their achievement.

Both the Director and the external consultant found that over half of the reported outcomes were unacceptable. The vast majority of unacceptable outcomes related to them not being outcomes at all but rather outputs or achievements of activities. Some were rated as unacceptable because of the lack of evidence to support them.

This assessment reflects a learning process for CCAFS and CGIAR more broadly as the introduction of outcomes is relatively new to the CGIAR.

Rather than revisit these earlier assessments of 2012 Annual Outcomes, for this Review the focus has been on the key evaluation criteria relating to impact i.e. are the outcomes of sufficient scale for a program of CCAF’s scale, are the outcomes having much influence or
likely to have much influence, are the outcomes building blocks for the achievement of the Theme Outcomes and IDOs, and are the outcomes aligned well to the System Level Outcomes of CGIAR.

Rather than dismiss the greater than 50% of 2012 Outcomes which are deemed not to be acceptable because of poor fit with the acceptable definition of an outcome, a likely outcome was inferred based on the nature of the described outcome. Each of the 36 outcomes for 2012 were rated using the following criteria:

1. Level of influence: 1 = Low; 2 = Moderate; 3 = High, noting that influence is separate to scale or extent e.g. a high level of influence can be achieved at local scales
2. Extent of influence: 1 = Local; 2 = National/Regional; 3 = Across regions; 4 = Global
3. Building block for Theme Outcome: 1 = Little evidence of linkage; 2 = Good linkage
4. Relevance to System Level Outcome: 1 = Little/moderate relevance; 2 = Strong relevance

The results of this assessment are shown in Table 6. The intention is not to focus on individual assessments or comparisons as the relatively subjective nature of the assessment process means that there is only a medium level of confidence around any individual assessment. However, there is a greater level of confidence in the overall assessment.

The analysis suggests that:
- the current level of influence of the annual outcomes is moderate (mean = 2.1)
- the outcomes are occurring at a range of scales (19% local, 22% national/regional, 44% across regions, and 14% global
- 69% of the Annual Outcomes have good linkages to Theme Level Outcomes
- 67% of Annual Outcomes appear to be relevant to the CGIAR System Level Outcomes.
Table 6. Assessment of the 2012 Annual Outcomes in terms of likely influence, spatial scale, and alignment to Theme and System Level Outcomes.

<table>
<thead>
<tr>
<th>Center Region Theme</th>
<th>Outcome</th>
<th>Influence</th>
<th>Extent</th>
<th>Link to Theme Outcome</th>
<th>SLO relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioversity</td>
<td>Farmers’ field experimentation</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CIAT</td>
<td>Coffee systems</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CIAT</td>
<td>Crop wild relatives and pre-breeding</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CIFOR</td>
<td>GHG inventories</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>CIMMYT</td>
<td>Institutions and adaptive farming IGP</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CIMMYT</td>
<td>ICT and managing farmers’ risks</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>CIP</td>
<td>Greenhouses in the Andes</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ICARDA</td>
<td>Breeding and CC related traits</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ICRAF</td>
<td>Forests and local adaptation</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ICRAF</td>
<td>Forests and sequestration in China</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ICRAF</td>
<td>Vegetation and CC, Tibetan Plateau</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ICRAF</td>
<td>Philippines and Vietnam activities</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ICRAF</td>
<td>Capacity building nationally REDD</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>ICRAF</td>
<td>Soil carbon stocks</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ICRISAT</td>
<td>Seasonal climate forecasts in Kenya</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ICRISAT</td>
<td>Seasonal climate forecasts in Zimbabwe</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>IFPRI</td>
<td>Mitigation and market access</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>IITA</td>
<td>Climate-smart banana-coffee systems</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ILRI</td>
<td>Mitigation protocols for IPCC</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ILRI</td>
<td>East Africa Scenarios</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>IRRI</td>
<td>Rice water saving and GHG</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>IRRI</td>
<td>Improved rice varieties - Mekong</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>IWMI</td>
<td>Vulnerability mapping Sri Lanka</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>IWMI</td>
<td>Use of vulnerability assessment</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>WorldFish</td>
<td>Iligan Bay project buy-in</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Theme 1 led</td>
<td>Use of downscaled climate products</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Theme 1 led</td>
<td>Capacity building in Nepal</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Theme 2 led</td>
<td>Influence on investment priorities</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Theme 3 led</td>
<td>Linking agriculture and REDD+</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Theme 3 led</td>
<td>Govts and NGOs using CCAFS results</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Theme 4 led</td>
<td>CC impact on agricultural commodities</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Theme 4 led</td>
<td>Gender research at CCAFS sites</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>East Africa Region led</td>
<td>Agriculture included in UNFCC</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>East Africa Region led</td>
<td>Strengthened research agenda</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>West Africa Region led</td>
<td>Uptake of climate products</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>South Asia Region led</td>
<td>Participatory CSVs at benchmark sites</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
### 3.5.5 Assessment of outcomes – Theme level Outcomes

#### 3.5.5.1 Likely Achievement of Outcomes

Given the relatively early stage development of the CCAFS program and the implementation of the 2012-2015 Log Frame it would be unlikely that any of the planned Outcomes for 2015 would be close to being achieved. However, based on the Technical Reports for 2012, including the progress on Milestones and the 36 Outcome reports, as well as the synthesized 2012 annual report to the CGIAR, it is possible to at least determine whether progress is on track, slow, or whether there is inadequate evidence to make an assessment (Table 7).

<table>
<thead>
<tr>
<th>Theme Outcome</th>
<th>Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme 1: Adaptation to Progressive Climate Change</strong></td>
<td></td>
</tr>
<tr>
<td>Outcome 1.1: Agricultural and food security strategies that are adapted towards predicted conditions of climate change promoted and communicated by the key development and funding agencies (national and international), civil society organizations and private sector in at least 20 countries</td>
<td><em>On-track.</em> Nine annual outcomes (25%) for 2012 relate to this Theme outcome. National programs and strategies now being influenced by this research.</td>
</tr>
<tr>
<td>Outcome 1.2: Strategies for addressing abiotic and biotic stresses induced by future climate change, variability and extremes, including novel climates mainstreamed among the majority of the international research agencies who engage with CCAFS, and by national agencies in at least 12 countries</td>
<td><em>On-track.</em> Good outcome to date on $US50m wild relatives and pre-breeding program. Other evidence a little more patchy.</td>
</tr>
<tr>
<td>Outcome 1.3: Improved adaptation policies from local to international level supporting farming communities, rural institutions and food system actors adapted to future climate conditions in at least 20 countries.</td>
<td><em>On-track.</em> Good progress demonstrated through banana-coffee systems, capacity building in Nepal, scale out of Climate Smart Villages</td>
</tr>
</tbody>
</table>

| **Theme 2. Adaptation through Managing Climate Risk** | |
| Outcome 2.1: Systematic technical and policy support by development agencies for farm- to community-level agricultural risk management strategies and actions that buffer against climate shocks and enhance livelihood resilience in at least 20 countries | *On-track.* Evidence for impact through Outcome with CIMMYT and 6000 farmers and from insurance work in India |
| Outcome 2.2: Better climate-informed management by key international, regional and national agencies of food crisis response, post-crisis recovery, and food trade and delivery in at least 12 countries | *Slow.* There are no annual outcomes relevant to this Theme outcome and little other evidence to suggest much progress. |
| Outcome 2.3 Enhanced uptake and use of improved climate information products and services, and of information about agricultural production and biological threats, by resource-poor farmers, particularly vulnerable groups and women, in at least 12 countries | *On-track.* Good evidence of products relating to climate information being used and influencing other programs. Potentially significant outcome. |

| **Theme 3. Pro-Poor Climate Change Mitigation** | |
| Outcome 3.1: Enhanced knowledge and tools about agricultural development pathways that lead to better decisions for climate mitigation, poverty alleviation, food security and environmental health, used by national agencies in at least 20 countries | *Slow.* Good evidence of research outputs and links to national agencies but evidence of uptake is not clear. |
| Outcome 3.2: Improved knowledge about incentives and institutional arrangements for mitigation practices by resource-poor smallholders (including farmers’ organizations), project developers and policy makers in at least 10 countries | *Slow.* No annual outcomes relevant to this Theme outcome evident and little other material to suggest much progress. |
### Outcome 3.3: Key agencies dealing with climate mitigation in at least 10 countries promoting technically and economically feasible agricultural mitigation practices that have co-benefits for resource-poor farmers, particularly vulnerable groups and women

**On-track.** Good evidence that this outcome is progressing well, especially from IRRI rice work.

### Theme 4. Integration for Decision Making

<table>
<thead>
<tr>
<th>Outcome 4.1: Appropriate adaptation and mitigation strategies mainstreamed into national policies in at least 20 countries, in the development plans of at least five economic areas (e.g. ECOWAS, EAC, South Asia) covering each of the target regions, and in the key global processes related to food security and climate change</th>
<th><strong>On-track.</strong> Good evidence from east Africa scenarios work and vulnerability mapping in Sri Lanka that the research is being mainstreamed into national policies/strategies.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome 4.2 Improved frameworks, databases and methods for planning responses to climate change used by national agencies in at least 20 countries and by at least 10 key international and regional agencies</td>
<td><strong>On-track Evidence that outputs (GHG inventories, mitigation protocols, REDD) are influential but it is not clear whether the scale of outcomes (20 countries, 10 agencies) is achievable though there are a large number of activities underway.</strong></td>
</tr>
<tr>
<td>Outcome 4.3 New knowledge on how alternate policy and program options impact agriculture and food security under climate change incorporated into strategy development by national agencies in at least 20 countries and by at least 10 key international and regional agencies.</td>
<td><strong>Slow.</strong> Available evidence points to the IFPRI work as the only significant activity that relates to this outcome in terms of alternative policies.</td>
</tr>
</tbody>
</table>

Overall, the CCAFS program appears to be on-track to achieving most of the Theme Outcomes in 2015-16. However, based on the evidence available for this review, it would appear that about one-third of the Theme Outcomes are progressing too slowly at their current pace to be achieved by 2015-16. It may be possible that the Outcomes that appear to be struggling are actually on-track but the evidence to support that is not readily apparent. Some intervention may be necessary to get these outcomes on-track or alternatively if they are actually progressing reasonably well then much better evidence in the form of tangible annual outcomes (as opposed to outputs) needs to be developed.

Many of the Theme Outcomes have a prescribed number of countries in which the outcome will be achieved. A number of the Annual Outcomes give an indication of how many countries in which they are working and having an impact but it is not clear from the information provided or available whether the target number of countries will be achieved.

#### 3.5.5.2 Scale and Relevance of Outcomes

Based on the assessed relevance of the Annual Outcomes and the description of the Theme Outcomes there would appear to be an appropriate level of alignment and consistency with the four CGIAR System Level Outcomes (SLOs): less rural poverty, better food security, better nutrition and health, sustainably managed resources.

It is difficult to determine objectively whether the scale of the outcomes, both incipient and expected by 2015-16, is in proportion to the level of investment and expenditure in CCAFS. However, my assessment is that if the 12 Theme Level Outcomes can be substantively achieved then the CCAFS program would have done well given both the level of resourcing and the fact CCAFS is a relatively new research program, initiated from effectively a zero base in 2009.
The main risks in being able to achieve this scale of outcome relate to (a) the outcome areas that are currently progressing slowly not receiving the required effort to accelerate their progress and (b) not achieving the outcomes in the prescribed numbers of countries, which ranges from 10 to 20 countries.

An area of outcome performance that is not captured by the Theme Outcomes in listing numbers of countries in which activity is occurring, is the intensity of that activity. For example, in South Asia the Climate Smart Village concept, where a range of intervention strategies are introduced, is being taken up quite rapidly. For example, the State of Maharashtra is planning to implement >1000 CSVs and the World Bank is also looking to scale out the CSV concept to Nepal with proposed implementation in 1000 CSVs. At a sub-national scale, the outcomes from this level of scale-out are likely to be very significant.

Notwithstanding CCAFS involvement in the Commission on Sustainable Agriculture and Climate Change, the Theme Outcome areas that appear to be making slower progress have a stronger alignment with the System Level Outcome relating to broader aspects of food security, as opposed to local scale production elements of food security. Some additional effort may need to be directed to ensure that CCAFS is able to contribute well to this SLO. There is some evidence that this gap is recognized with the 2013 Business Plan indicating that a food security information expert has been acquired and a new scientist hired to work at the interface of climate services and food security.

**Recommendation 12:**
*Increased effort should be directed to the Theme Outcome areas that are currently progressing slowly and at risk of not achieving their planned outcomes by 2015-16. In particular, areas relevant to the System Level Outcome on food security, with an emphasis on wider system aspects of food security, should receive some focus.*

3.5.5.3 Do the outcomes reflect an integrated program of research?

It is difficult to assess whether the outcomes reflect an integrated program based simply on the Annual Outcomes and the Annual Report to CGIAR. To get a better understanding of how well integrated the program is in terms of likely outcomes the matrix analysis of Activities (Theme x Centre and Regional Program) was used (Table 1). This analysis indicates a program of activity that is quite well integrated. East Africa, West Africa and South Asia all have some activities that they lead across all four Themes. Focusing in on the South Asia region, it has a fairly even spread across Themes of activities it leads, participating in 8 of the 12 Theme objectives.

The analysis also reveals that the Theme objectives with the greatest amount of activity (1.1, 2.1, 3.3 and 4.2) also tend to have the greatest breadth across Regions and Centers.

While the two assessments were conducted independent of each other, there would appear to be a fairly close correlation between the assessment of progress in the 12 Theme Outcomes (Table 7) and the level of effort directed towards activities in each of the corresponding Theme objectives. Indeed the four Theme objectives with the lowest numbers of activities in 2012 were also the four Theme outcomes where progress was assessed to be slowest.
3.5.6 International Public Goods – scale, comprehensiveness and quality

Within CCAFS, International Public Goods take a number of forms including data, tools, policy briefs, working papers, technical reports, journal papers, conference proceedings and book chapters.

A new website was launched in July 2013 and it provides an easy to use interface to navigate all forms of IPGs. Published articles, policy briefs and reports are easily searchable and accessible and while accessing journal articles requires visiting the publishers’ websites, links are provided and it would appear open access has been arranged for all journal articles.

A particularly useful aspect of the accessibility of the IPGs on the website in the context of this Theme by Region review is the ability to easily get to Regional and Theme relevant information. The communication team is to be commended for the functionality and ease of use of the new website interface.

To understand the quality and impact of the IPGs it is useful to break them into three groups; Reports, Working Papers, Policy Briefs; Journal papers, Conference proceedings; and Data and Tools.

3.5.6.1 Reports, Working Papers, Policy Briefs

Download statistics provide some useful information on the value of this category of IPGs. The data for the top 20 downloaded publications in 2012 and the top 10 downloaded publications in 2013 (until October) are shown in Table 8.

The data reveals that the most downloaded publications are strongly dominated by those that synthesise CCAFS work across Themes and across Regions. These publications tend to be written for a general audience and with a focus on policy makers and key decision-makers. This assessment was supported by comments made by the Communication and Knowledge Manager, and is reflected in recent efforts at synthesis e.g. climate smart agriculture success stories, which was released in November 2013 and there were over 2000 downloads in a week. This suggests that in this class of publications most effort should be directed towards more cross-cutting, integrated reports, papers and policy briefs.

There were relatively few publications in the top 20/10 that clearly stood out as a combined effort of two or three Themes explicitly working together to develop the report or paper. They tended to be either single Theme or whole of CCAFS synthesis outputs.

In terms of individual Themes where the work was not cross-cutting, there was a much larger number of top 20/10 publications from Theme 3 than other Themes. It is not known whether this reflects higher output from this Theme or a high level of interest in specific mitigation opportunities. Given, a number of these Theme 3 publications were also in more specific regions it may suggest a more context specific and targeted interest in mitigation issues.

Recommendation 13:
Invest more effort in producing cross-cutting, synthesis reports and policy briefs given the strong external interest in these products. This will require identifying research activities that lend themselves to these synthesis publications and may provide additional benefit as a stimulant for cross-Theme interactions.
Table 8. Download statistics for top 20 publications in 2012 and top 10 in 2013 until October. “Synthesis” denotes across all Themes and “CCAFS” denotes where the publication is led by CCAFS as a whole rather than from a particular Theme. Asterisk numbers in 2013 reflect publications that were also in the top 20 in 2012.

<table>
<thead>
<tr>
<th>Publication title</th>
<th># downloads</th>
<th>Themes</th>
<th>Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2012</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Final Report from the Commission on Sustainable Agriculture and Climate Change</td>
<td>30,021</td>
<td>CCAFS - synthesis</td>
<td>All</td>
</tr>
<tr>
<td>2. Summary for policy makers from the Commission on Sustainable Agriculture and Climate Change</td>
<td>14,752</td>
<td>CCAFS - synthesis</td>
<td>All</td>
</tr>
<tr>
<td>3. Climate Change and Crop Production. Chapter 1: Adapting Crops to Climate Change: A Summary (Matthew P. Reynolds and Rodomiro Ortiz)</td>
<td>4,149</td>
<td>T1</td>
<td>All</td>
</tr>
<tr>
<td>4. Recalibrating Food Production in the Developing World: Global Warming Will Change More Than Just the Climate</td>
<td>3,500</td>
<td>T4 lead - synthesis</td>
<td>All</td>
</tr>
<tr>
<td>5. Farming's climate smart future</td>
<td>2,769</td>
<td>CCAFS - synthesis</td>
<td>All</td>
</tr>
<tr>
<td>6. Impacts of climate change on the agricultural and aquatic systems and natural resources within the CGIAR’s mandate #</td>
<td>2,601</td>
<td>T4 lead - synthesis</td>
<td>All</td>
</tr>
<tr>
<td>7. Actions needed to halt deforestation and promote climate-smart agriculture</td>
<td>2,431</td>
<td>CCAFS - synthesis</td>
<td>All</td>
</tr>
<tr>
<td>8. Climate Analogues</td>
<td>1,931</td>
<td>T1, T3</td>
<td>All</td>
</tr>
<tr>
<td>9. Mapping hotspots of climate change and food insecurity in the global tropics</td>
<td>1,895</td>
<td>T4 lead - synthesis</td>
<td>All</td>
</tr>
<tr>
<td>10. Testing Climate Models for Agricultural Impacts</td>
<td>1,763</td>
<td>T4 lead - synthesis</td>
<td>All</td>
</tr>
<tr>
<td>11. Mechanisms for agricultural climate change mitigation incentives for smallholders</td>
<td>1,717</td>
<td>T3</td>
<td>All</td>
</tr>
<tr>
<td>12. Institutional innovations in African smallholder carbon projects</td>
<td>1,641</td>
<td>T3</td>
<td>Africa</td>
</tr>
<tr>
<td>13. The State of Climate Information Services for Agriculture and Food Security in East African Countries</td>
<td>1,436</td>
<td>T2</td>
<td>East Africa</td>
</tr>
<tr>
<td>14. Towards policies for climate change mitigation: Incentives and benefits for smallholder farmers</td>
<td>1,317</td>
<td>T3</td>
<td>All</td>
</tr>
<tr>
<td>15. Baseline GHG emissions from the agricultural sector and mitigation potential in countries of East and West Africa</td>
<td>1,234</td>
<td>T3</td>
<td>Africa</td>
</tr>
<tr>
<td>16. Helping smallholder farmers mitigate climate change</td>
<td>1,191</td>
<td>T3</td>
<td>All</td>
</tr>
<tr>
<td>17. Changing climate adaptation strategies of Boran pastoralists in southern Ethiopia</td>
<td>1,151</td>
<td>T1, T2</td>
<td>East Africa</td>
</tr>
<tr>
<td>18. Corporate social responsibility and supply agreements in the private sector: Decreasing land and climate pressures</td>
<td>1,090</td>
<td>T3</td>
<td>All</td>
</tr>
<tr>
<td>19. Agro-climate tools for a new climate-smart agriculture</td>
<td>1,073</td>
<td>T2</td>
<td>All</td>
</tr>
<tr>
<td>20. Annual Report 2011</td>
<td>911</td>
<td>CCAFS</td>
<td>All</td>
</tr>
</tbody>
</table>

### 2013

1. Achieving food security in the face of climate change: Summary for policy makers from the Commission on Sustainable Agriculture and Climate Change 3200* CCAFS - synthesis All

2. Impacts of climate change on the agricultural and aquatic systems and natural resources within the CGIAR’s mandate 2500* T4 lead - synthesis All

3. Helping smallholder farmers mitigate climate change 2100* T3 All

4. Institutional innovations in African smallholder carbon projects 1500 T3 Africa

5. Climate change communication and social learning - Review and strategy development for CCAFS 810 CCAFS - synthesis All

6. Recalibrating Food Production in the Developing World: Global Warming Will Change More Than Just the Climate 800* T4 lead - synthesis All

7. Mapping hotspots of climate change and food insecurity in the global tropics 800* T4 lead - synthesis All

8. Methods for the quantification of emissions at the landscape level for developing countries in smallholder contexts 700 T3 All

9. Setting the agenda: Climate change adaptation and mitigation for food systems in the developing world 530 CCAFS - synthesis All

10. How can small-scale farmers benefit from carbon markets? 520 T3 All

### 3.5.6.2 Journal papers

Some of the analysis relating to journal publications has already been discussed in Section 3.1.4 in the context of cross-Center collaboration. It was not possible to assign individual journal publications to Themes to determine the level of synergy across Themes. However, it is worth assessing whether the quantum and quality of the journal papers from CCAFS is sufficient for a program of its size.

Table 9 shows the numbers of ISI journal papers for each CRP in 2012, where data was available from individual CRP Annual Reports. It was not possible to access the numbers of
scientists in each CRP to make the ideal comparison of journal papers per scientist FTE. Instead the total number of $ expended by each CRP in 2012 was used as the normalizing factor, recognizing that this is not ideal. The expenditure numbers were sourced from the CGIAR 2012 Annual Report. This table that reveals in terms of journal papers per $M of budget that CCAFS performed below average in comparison with other CRPs producing 1.2 papers per $M compared with an overall average of 2.0 papers per $M.

Table 9. Analysis of ISI publications in different CRPs relative to Program expenditure.

<table>
<thead>
<tr>
<th>CRP</th>
<th># ISI journal papers in 2012</th>
<th>Expenditure in 2012 ($M)</th>
<th>Papers per $M expended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock and Fish</td>
<td>78</td>
<td>16</td>
<td>4.9</td>
</tr>
<tr>
<td>Dryland Cereals</td>
<td>24</td>
<td>7</td>
<td>3.4</td>
</tr>
<tr>
<td>A4NH</td>
<td>115</td>
<td>37</td>
<td>3.1</td>
</tr>
<tr>
<td>Wheat</td>
<td>121</td>
<td>41</td>
<td>3.0</td>
</tr>
<tr>
<td>Water, Land and Ecosystems</td>
<td>158</td>
<td>56</td>
<td>2.8</td>
</tr>
<tr>
<td>Rice</td>
<td>215</td>
<td>99</td>
<td>2.2</td>
</tr>
<tr>
<td>Forests, Trees and Agroforestry</td>
<td>151</td>
<td>71</td>
<td>2.1</td>
</tr>
<tr>
<td>Maize</td>
<td>112</td>
<td>74</td>
<td>1.5</td>
</tr>
<tr>
<td>Aquatic Agricultural Systems</td>
<td>30</td>
<td>20</td>
<td>1.5</td>
</tr>
<tr>
<td>Roots, Tubers and Bananas</td>
<td>75</td>
<td>51</td>
<td>1.5</td>
</tr>
<tr>
<td>Policies, Institutions and Markets</td>
<td>105</td>
<td>75</td>
<td>1.4</td>
</tr>
<tr>
<td>CCAFS</td>
<td>77</td>
<td>63</td>
<td>1.2</td>
</tr>
<tr>
<td>Grain Legumes</td>
<td>15</td>
<td>22</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>1276</strong></td>
<td><strong>632</strong></td>
<td><strong>2.0</strong></td>
</tr>
</tbody>
</table>

To make an international comparison, Table 10 shows the number of journal publications in CCAFS in 2012 compared with CSIRO’s Sustainable Agriculture Flagship Program. Flagship Programs in CSIRO are not dissimilar to CRPs in many respects. They are cross-cutting research programs drawing on staff from Divisions (akin to Centers) in a matrix management organizational structure. Also like the CGIAR system, CSIRO is a mission-oriented research organization that aims to achieve significant impact in policy, industry and communities and at the same time maintain a high standard of research outputs.

Table 10. Comparison of CSIRO Sustainable Agriculture Flagship and CCAFS in journal paper metrics. CSIRO data extracted from internally available statistics.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Scientists (FTE)</th>
<th># journal papers in 2012</th>
<th>Papers/FTE</th>
<th>Ave ISI Impact factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCAFS</td>
<td>132</td>
<td>77</td>
<td>0.58</td>
<td>3.0</td>
</tr>
<tr>
<td>CSIRO Sustainable Agriculture Flagship</td>
<td>104</td>
<td>212</td>
<td>2.04</td>
<td>3.2</td>
</tr>
</tbody>
</table>

The journal paper productivity per scientist FTE in the Sustainable Agriculture Flagship is considerably higher than in CCAFS. However, there is little difference in the journal quality where papers are published, using ISI Impact factor as the quality metric. It is also apparent from the analysis of journal papers in Section 3.1.4 that journal papers in CCAFS are highly collaborative, generally involving multiple authors and institutions (Annex 7).
In terms of citation numbers, the average citations per journal paper over 2011 and 2012 were 5.6 and 1.7, respectively. Table 11 shows the top ten citation papers for the 2011 and 2012 years. All except one of these top ten papers were published in 2011. There is no particular pattern in the type of article that has been well cited as they range from specific aspects of climate change on plant physiology or plant disease to land use and management to broader issues of food security.

Table 11. Citation metrics for the ten most highly cited papers published in 2011 and 2012.

<table>
<thead>
<tr>
<th>Paper title</th>
<th>Journal and IF (brackets)</th>
<th>Citation # ISI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and food systems in sub-Saharan Africa in a 4 degrees C+ world</td>
<td>Philosophical Transactions of the Royal Society Series A (2.9)</td>
<td>30</td>
</tr>
<tr>
<td>Agricultural biotechnology for crop improvement in a variable climate: hope or hype?</td>
<td>Trends in Plant Science (11.8)</td>
<td>23</td>
</tr>
<tr>
<td>Complexity in climate-change impacts: an analytical framework for effects mediated by plant disease</td>
<td>Plant pathology (2.7)</td>
<td>19</td>
</tr>
<tr>
<td>Potential impacts of climate change on the environmental services of humid tropical alpine regions</td>
<td>Global Ecology and Biogeography (7.2)</td>
<td>18</td>
</tr>
<tr>
<td>Climate Change Affects Winter Chill for Temperate Fruit and Nut Trees</td>
<td>Plos One (3.7)</td>
<td>18</td>
</tr>
<tr>
<td>Monitoring and assessment of land degradation and desertification: towards new conceptual and integrated approaches</td>
<td>Land Degradation and Development (2.0)</td>
<td>17</td>
</tr>
<tr>
<td>What Next for Agriculture After Durban?*</td>
<td>Science (31.0)</td>
<td>17</td>
</tr>
<tr>
<td>Application of indicator systems for monitoring and assessment of desertification from national to global scales</td>
<td>Land Degradation and Development (2.0)</td>
<td>14</td>
</tr>
<tr>
<td>Assessing the vulnerability of traditional maize seed systems in Mexico to climate change</td>
<td>PNAS (9.7)</td>
<td>13</td>
</tr>
<tr>
<td>Management and land use change effects on soil carbon in northern China's grasslands: a synthesis</td>
<td>Agriculture, Ecosystems and Environment (2.9)</td>
<td>12</td>
</tr>
</tbody>
</table>

* Published in 2012

There are likely to be multiple factors contributing to the relatively low number of journal publications in CCAFS. First, the whole area of climate change, agriculture and food security is relatively new and this domain of research was first established in the CGIAR system in 2009. It takes quite a few years for work to be undertaken and to appear in journal papers so the low number of journal publications in CCAFS may in part be explained by the relatively recent emergence of climate change. Certainly, the quality of journals in which the papers are being published cannot be questioned as an Impact Factor of 3.0 is high in the field of agriculture, which on average across a range of journals has an Impact Factor of around 1. As indicated earlier in the Section 3.1.4 the engagement from Centers in CCAFS has taken some time and so the early drive in journal paper publication has come from the Theme Leaders. As the Centers become more deeply engaged in CCAFS it would be expected that publication rates would increase but this may need some performance management to ensure this occurs given that between two-thirds and three-quarters of the CCAFS budget flows through Centers.
Another contributing factor may relate to the effort CCAFS has put into producing a diversity of IPGs ranging from data and tools to working papers and policy briefs to journal papers. This goal to create a range of products to address the needs of end users has most likely diluted the effort and resources available to devote to journal publications. Nevertheless, the publication rate in journals could and should be increased.

There is a note of caution in suggesting journal publication rates be increased and that is the need to maintain balance between high quality publications in numbers in keeping with a research program the size of CCAFS and the need to have impact in policy and on the ground. This is a challenging balance for a research organization that has dual goals of outcomes and high quality research outputs. Increasing publication output should not be at the expense of delivering outcomes critical to the success of CCAFS.

**Recommendation 14:**

*CCAFS should develop a plan to lift publication rates in ISI journals. This will require a mix of measures ranging from performance indicators to short term incentives to longer term capacity building in Centers and done in a way that doesn’t compromise a focus on achieving outcomes.*

3.5.6.3 Data and tools

CCAFS has put considerable effort into making available data, e.g. baseline surveys from core sites, and tools such as downscaled climate projections, climate analogues, climate services for managing today’s variability, and food security maps. Usage statistics are available for these outputs.

In terms of data, CCAFS-Climate is heavily used with 27,000 visitors to the site in 2012, with more than 39,000 individual downloads of data totaling more than 28 terabytes. This data was cited 37 times in peer reviewed journals in 2012. Other key databases (Agtrials, Dataverse- baseline surveys) were used less frequently but the information and data contained in them is much more targeted and location specific. There was considerable interest in the methods and approaches used in the baseline surveys, indeed receiving more visitors than the baseline data itself.

Of the tools, Climate Analogues was the most heavily used, with 3287 visits in 2012. A feature of this tool was the wide diversity of users, suggesting the analogue approach is an innovative way of communicating and engaging about climate change. The MarkDim standalone tool was also popular, receiving over 2500 visits.

It is almost impossible to benchmark these usage statistics given the individual nature of all web-based tools and databases. The most “like for like” comparison is the CCAFS-Climate database which can be compared with other sites that offer climate projections for a range of climatic variables for different emission scenarios and from different climate models. For example, the Climate Change in Australia website ([www.climatechangeinaustralia.com.au](http://www.climatechangeinaustralia.com.au)), was established in 2007 to provide climate projections for different regions in Australia based on the 2007 IPCC CMIP3 model runs. It received between 350,000 and 500,000 unique visitors per year between 2007 and 2010. It of course had a national coverage and was relevant to all sectors of the economy, not just agriculture.
3.5.7 International Public Goods - influence and lasting impact of IPGs

There is strong evidence to suggest that the IPGs are influential and contributing to decisions being made from scales of national policy to farm-scale management. The CCAFS Annual Report – “Unfolding results: CCAFS research into action” provides details of how a range of IPGs are influencing decision-makers. These include:

- The recommendations of the Commission on Sustainable Agriculture and Climate Change have been readily accepted and embraced by a large number of national governments and international agencies even though the goal of the Commission to have agriculture incorporated into the UNFCCC has not yet been successful
- Influencing the development and implementation of Nationally appropriate mitigation actions (NAMAs) (Policy Brief)
- Scaling up climate services to reach a much wider group of farmers and government agencies e.g. national frameworks in West Africa, application of seasonal forecasts (Workshops, Tools, Reports)
- Research outputs demonstrating innovations in coffee-banana systems influencing policy decisions in Rwanda (Papers, Workshops, Reports)
- Influencing youth through modern ICT methods (Tools)
- Building capacity in measurement and mitigation of greenhouse gases (Reports, Workshops)
- Disaggregating gender data from household surveys to target different actions based on gender in areas such as adaptation and innovation in carbon financing for smallholders (Data, Reports, Training Guides)
- Development of future scenarios and back-casting to influence policy decisions (Tools, Data, Workshops)

This list, which isn’t comprehensive and provides a series of examples, highlights the value in having a wide range of IPGs in the “toolkit” to influence decision-making. It is apparent from these examples that the investment in a diversity of approaches is paying off and having them available in a well produced web site is essential.

**Recommendation 15:**

*CCAFS should maintain its investment in a diversity of IPGs as a means of influencing decision-making and achieving desired outcomes and impacts.*

Based on this diverse approach to IPGs, it is likely that they will continue to have important influence into the future. While some IPGs have immediacy in influencing decisions (e.g. Policy Briefs) and won’t have a long life-span, others will play an important long-term role in influencing decision-making. For example, baseline data from core sites and climate smart villages will be valuable when the impact of interventions need to be assessed in future years. Similarly, having data on various agricultural trials will be a valuable resource into the future.

The significant up-front investment in tools such as climate scenarios, seasonal climate forecasts, climate analogues should have a long-term benefit, particularly where those tools provide information that can be contextualized for decision-making at local scales. There is no doubt that these various tools will need to be refined or even replaced as needs change and technology improves but they provide an important long-term mechanism for engaging with and influencing decision-makers across a range of scales. Likewise, research papers in journals provide the scientifically robust platform on which to develop policy and
management recommendations. There is often a significant lag between publication of research papers and their impact so the research publications currently being produced by CCAFS should provide benefits into the foreseeable future.
### Annex 1. Evaluation matrix to be used in the CCAFS Theme by Region Review.

<table>
<thead>
<tr>
<th>Evaluation criteria</th>
<th>Evaluation questions to be addressed</th>
<th>Expected evaluation product</th>
<th>Expected approach and sources of information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relevance</strong></td>
<td>1. Is the matrix being managed in line with the main goals and System Level Outcomes (SLOs) of the CGIAR?</td>
<td>Analysis of whether the CCAFS outcomes, Intermediate Development Outcomes, and IPGs are in line with the SLOs</td>
<td>For SLOs see “Strategic Results Framework”; see Annex 3 documents under “outcomes” and “IPGs”.</td>
</tr>
<tr>
<td></td>
<td>2. Is this matrix management in line with the reform process in the CGIAR?</td>
<td>Analysis of the Centers involved in the management of the matrix and how this fits with the reform process (e.g. are there cross-centre relationships)</td>
<td>See the “Strategic Results Framework” for information on the reform; Interviews of program participants and partners</td>
</tr>
<tr>
<td></td>
<td>3. Is there evidence of demand for the program from intended beneficiaries and how is the matrix managed in relation to assessing demand for thematic and regional topics?</td>
<td>Assessment of the degree to which partner and stakeholder concerns shape strategic directions and research products; and how the matrix is managed to get partner and stakeholder input.</td>
<td>Interviews of program participants and partners; example of workshop reports where stakeholders are engaged (see Annex 3 under “Basic information about CCAFS in South Asia”</td>
</tr>
<tr>
<td></td>
<td>4. Are appropriate stakeholders consulted at appropriate moments in the research?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Effectiveness</strong></td>
<td>5. How successful is the matrix management in CCAFS in terms of progress made?</td>
<td>Analysis of the most recent annual report of CCAFS, augmented by views from Theme Leaders and Centre participants</td>
<td>“CCAFS Annual Report CGIAR Consortium 2012” – see Annex 3 under “Outcomes”; Interviews of program participants and partners</td>
</tr>
<tr>
<td></td>
<td>6. Is sufficient attention paid to ensuring synergies are achieved across themes, and is there sufficient evidence of synthesis in the IPGs?</td>
<td>Analysis of cross-theme interactions and the evidence of synthesis in the IPGs</td>
<td>IPGs (see lists in Annex 3 under “IPGs”); Interviews of program participants and partners</td>
</tr>
<tr>
<td></td>
<td>7. Is there a sufficient level of comparability across regions, and is this reflected in the IPGs?</td>
<td>Analysis of how South Asia’s structures and partnerships compare with those of West Africa</td>
<td>IPGs (see lists in Annex 3 under “IPGs”); Interviews of program participants and partners</td>
</tr>
<tr>
<td></td>
<td>8. How well is the local-to-global set of activities managed, in terms of having an appropriate mix of activities at different scales and managing the cross-scale connections?</td>
<td>Analysis of activities across scales and evidence of cross-scale products</td>
<td>See lists in Annex 3 of IPGs under “IPGs”; Interviews of program participants and partners</td>
</tr>
<tr>
<td>Efficiency</td>
<td>9. Are management systems tracking progress and proposing adjustments to research as necessary? Is this system working well?</td>
<td>Analysis of management procedures, PMC and ISP Minutes to assess how effective the systems are performing and evolving</td>
<td>See documents in Annex 3 under “CCAFS planning processes”; Interviews of program participants and partners</td>
</tr>
<tr>
<td>Efficiency</td>
<td>10. How successful is the matrix management in CCAFS with respect to efficiency?</td>
<td>Analysis of program participant perceptions of transaction costs</td>
<td>Interviews of program participants and partners</td>
</tr>
<tr>
<td>Impact</td>
<td>11. Are the initial outcomes or incipient outcomes being reported by CCAFS of sufficient scale for a program of this size?</td>
<td>Analysis of the number and significance of outcomes reported for 2012, augmented by views of partners</td>
<td>See lists and analysis in Annex 3 under “Outcomes”; Interviews of program participants and partners</td>
</tr>
<tr>
<td>Impact</td>
<td>12. Do the initial outcomes or incipient outcomes reflect an integrated program?</td>
<td>Analysis of degree to which the emerging outcomes can be the building blocks for outcomes at a larger scale; and whether outcomes represent integrated efforts?</td>
<td>See lists and analysis in Annex 3 under “Outcomes”; Interviews of program participants and partners</td>
</tr>
<tr>
<td>Impact</td>
<td>13. Are the IPGs and initial outcomes influential?</td>
<td>Analysis of outcomes and IPGs reported for 2012 in relation to the degree to which they are or could be influential</td>
<td>See lists and analysis in Annex 3 under “Outcomes” and “IPGs”; Interviews of program participants and partners</td>
</tr>
<tr>
<td>Impact</td>
<td>14. Is it likely that the IPGs produced and outcomes will lead to impacts in regard to the CGIAR System Level Outcomes (SLOs): Less rural poverty; better food security; better nutrition and health; sustainably managed resources?</td>
<td>Analysis of outcomes and IPGs reported for 2012 in relation to their relevance to the SLOs</td>
<td>See lists and analysis in Annex 3 under “Outcomes” and “IPGs”; Interviews of program participants and partners</td>
</tr>
<tr>
<td>Sustainability</td>
<td>15. To what extent are the benefits of the program expected to continue based on the international public goods and initial outcomes produced? Why or why not?</td>
<td>Analysis of outcomes and IPGs reported for 2012 in relation to (a) the likelihood of outcomes leading to long-lasting impacts and (b) IPGs having long-term value.</td>
<td>See lists and analysis in Annex 3 under “Outcomes” and “IPGs”; Interviews of program participants and partners</td>
</tr>
<tr>
<td>Quality of science</td>
<td>16. Are the IPGs of sufficient number and quality for a program of this size?</td>
<td>Analysis of the numbers of IPGs and the degree to which they are in “high impact” journals. Assess the quality of a sample of the IPGs.</td>
<td>See lists in Annex 3 under “IPGs”; Interviews of program participants and partners</td>
</tr>
</tbody>
</table>
## Annex 2. List of documents accessed and examined for the review.

<table>
<thead>
<tr>
<th>Document type/information source</th>
<th>Key documents and key content</th>
<th>Link/availability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic information about CCAFS</strong></td>
<td>CCAFS website</td>
<td><a href="http://www.ccafs.cgiar.org">www.ccafs.cgiar.org</a></td>
</tr>
<tr>
<td></td>
<td>The primary repository for information about CCAFS governance, management, research and international public goods</td>
<td><a href="http://ccafs.cgiar.org/publications/climate-change-agriculture-and-food-security#Uk77-tLdfsc">http://ccafs.cgiar.org/publications/climate-change-agriculture-and-food-security#Uk77-tLdfsc</a></td>
</tr>
<tr>
<td></td>
<td>Two-page overview of CCAFS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provides a brief overview of CCAFS activities and where CCAFS works</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CCAFS Program Plan summary</td>
<td><a href="http://ccafs.cgiar.org/publications/ccafs-program-plan-summary">http://ccafs.cgiar.org/publications/ccafs-program-plan-summary</a></td>
</tr>
<tr>
<td></td>
<td>The Program Plan is the basic document of CCAFS about goals, objectives, research areas and governance. This is a summary, below is the full document.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CCAFS Program Plan</td>
<td><a href="http://ccafs.cgiar.org/publications/ccafs-program-plan-#Uk785dLdfsc">http://ccafs.cgiar.org/publications/ccafs-program-plan-#Uk785dLdfsc</a></td>
</tr>
<tr>
<td></td>
<td>See above</td>
<td></td>
</tr>
<tr>
<td><strong>CCAFS planning processes</strong></td>
<td>Terms of Reference for Theme Leaders, Regional Program Leaders and Contact Points</td>
<td><a href="http://ccafs.cgiar.org/about/governance/theme-leaders#Uk79WdlLdfsc">http://ccafs.cgiar.org/about/governance/theme-leaders#Uk79WdlLdfsc</a></td>
</tr>
<tr>
<td></td>
<td>Outlines the basic tasks of CCAFS research leaders who implement the theme by region matrix</td>
<td><a href="http://ccafs.cgiar.org/about/governance/regional-program-leaders#Uk79dtLdfsc">http://ccafs.cgiar.org/about/governance/regional-program-leaders#Uk79dtLdfsc</a></td>
</tr>
<tr>
<td></td>
<td>CCAFS Strategy for Priority Setting, Monitoring and Evaluation</td>
<td><a href="http://ccafs.cgiar.org/about/governance/cgiar-contact-points#Uk79t9Ldfsc">http://ccafs.cgiar.org/about/governance/cgiar-contact-points#Uk79t9Ldfsc</a></td>
</tr>
<tr>
<td></td>
<td>The document shows how CCAFS is dealing with monitoring and evaluation (M&amp;E), and to demonstrate the cascade from the overarching logframe down to project activities in specific sites</td>
<td><a href="http://cgspace.cgiar.org/handle/10568/25108">http://cgspace.cgiar.org/handle/10568/25108</a></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>A rolling three-year document. Identifies Objectives, Outcomes, Outputs and Milestones with associated performance indicators and means of verification (i.e. outputs), assumptions, and partners involved.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outlines the annual CCAFS planning on research, synthesis, capacity enhancement, engagement, communication and budgets (format for 2012 onwards)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Theme and Regional Program Leader Workplans 2013 - consolidated</strong></td>
<td><a href="https://www.dropbox.com/s/dw6fz8phee08fmc/TL%20%20RPL%20Consolidated%202013%20Activities.xlsx">https://www.dropbox.com/s/dw6fz8phee08fmc/TL%20%20RPL%20Consolidated%202013%20Activities.xlsx</a></td>
<td></td>
</tr>
<tr>
<td>Provides an in depth outline of the consolidated activities in the theme by region matrix for those activities directly implemented by these Leaders (i.e. excludes the Centre activities)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Management and management discussions about annual planning (reference to minutes)</strong></td>
<td><a href="https://www.dropbox.com/s/3fejbeoupnms1/Management%20and%20governance%20discussions%20about%20annual%20planning.docx">https://www.dropbox.com/s/3fejbeoupnms1/Management%20and%20governance%20discussions%20about%20annual%20planning.docx</a></td>
<td></td>
</tr>
<tr>
<td>An overview of the discussions about annual planning. Example of the management and governance discussions about annual CCAFS planning for 2013.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Governance and management discussions about the theme by region matrix (reference to minutes)</strong></td>
<td><a href="https://www.dropbox.com/s/b5pzmyf55lwa/Governance%20and%20management%20discussions%20about%20theme%20by%20region%20matrix.docx">https://www.dropbox.com/s/b5pzmyf55lwa/Governance%20and%20management%20discussions%20about%20theme%20by%20region%20matrix.docx</a></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2013 external governance and management review of CCAFS by Maureen Robinson</strong></td>
<td><a href="https://www.dropbox.com/s/j2z5gjni5z92l4s/2013%20external%20governance%20and%20management%20review%20of%20CCAFS%20by%20Maureen%20Robinson.docx">https://www.dropbox.com/s/j2z5gjni5z92l4s/2013%20external%20governance%20and%20management%20review%20of%20CCAFS%20by%20Maureen%20Robinson.docx</a></td>
<td></td>
</tr>
<tr>
<td>reflecting on the relationship between themes and regions (excerpts from review report)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Link to the full report:</td>
<td><a href="http://ccafs.cgiar.org/governance-and-management-review#.UIMkWdLdfsc">http://ccafs.cgiar.org/governance-and-management-review#.UIMkWdLdfsc</a></td>
<td></td>
</tr>
<tr>
<td>2012 external review of CCAFS by EC/IFAD (excerpts from review report)</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Satisfaction survey</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td>Satisfaction survey based on feedback from Contact Points and CCAFS Management</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td>Outcomes</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td>All CGIAR Centers, Regional Program Leaders and Theme Leaders have to report outcome stories annually.</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td>CCAFS Annual Report 2012 pp. 3-8</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td>CCAFS Annual Report CGIAR Consortium 2012 p. 1, 2-6 (for outcomes)</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td>External assessment of 2012 outcomes (by Peter Cooper)</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td>External assessment of 2012 outcomes (summary by Bruce Campbell of the Peter Cooper assessment)</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td>The three below a), b) and c) are examples of planning for outcomes:</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td>a) Draft Knowledge to Action Strategy</td>
<td><a href="https://www.dropbox.com/s/ji0phzc1mup04xe/EC%20IFAD%20review%20of%20CCAFS%20excerpt.docx">Link to the full report</a></td>
<td></td>
</tr>
<tr>
<td><strong>International Public Goods (IPGs)</strong></td>
<td><strong>CCAFS list of publications 2011-2012</strong></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>---------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contains list of all CCAFS funded outputs in the period 2011 to 2012.</td>
<td></td>
</tr>
<tr>
<td><strong>CCAFS publications (usage statistics)</strong></td>
<td>Gives an overview of: top 25 publications downloads from CCAFS databases for 2012 and top 10 publications downloaded so far in 2013</td>
<td></td>
</tr>
<tr>
<td><strong>CCAFS databases</strong></td>
<td>Contains an overview of CCAFS databases on our website</td>
<td></td>
</tr>
<tr>
<td><strong>Other CCAFS knowledge products overview and usage statistics</strong></td>
<td>In addition to being made freely available online, CCAFS knowledge products are promoted online via a number of channels including the</td>
<td></td>
</tr>
</tbody>
</table>
| CCAFS partnerships | Stock-take and recommendations on mobilizing effective partnerships in CCAFS – discussed at CCAFS ISP meeting October 2013 | https://www.dropbox.com/s/gevguajgwn4vyp3/Mobilizing%20effective%20partnerships.docx  
https://www.dropbox.com/s/nu8d5h5gy0v4yu/Mobilizing%20effective%20partnerships.pptx |
|---|---|---|
| Basic information about CCAFS in South Asia | CCAFS South Asia website  
The primary repository for information about CCAFS South Asia publications, activities, stories, events, partners, etc. | http://ccafs.cgiar.org/regions/south-asia  
https://www.dropbox.com/s/dfraqjlprkgu41q/South%20Asia%202013%20Workplan.xlsx  
| CCAFS partnerships | Gender  
CCAFS Gender Theory of Change and Outcome Strategies  
CCAFS gender material  
Journal publications from other CRPs | https://www.dropbox.com/s/h3rjz3er1olhby/CCAFS%20Gender%20Theory%20of%20Change%20and%20Outcome%20Strategies.pptx  
http://www.ccafs.cgiar.org/gender  
http://www.cgiar.org/resources/crp-documents/ |
| CCAFS partnerships | CCAFS Website (http://ccafs.cgiar.org) and Blog (http://ccafs.cgiar.org/blog), e-bulletins (including regionally targeted bulletins), Facebook and Twitter channels. | |
Annex 3. List of interviews undertaken for the review.

<table>
<thead>
<tr>
<th>Person</th>
<th>Role</th>
<th>Date</th>
<th>Interview type</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.J. Joseph</td>
<td>External partner, Chairman and MD, Agricultural Insurance Company of India</td>
<td>04/11/2013</td>
<td>In person, Delhi</td>
</tr>
<tr>
<td>P.K. Joshi</td>
<td>Center partner, Director, IFPRI, South Asia</td>
<td>04/11/2013</td>
<td>In person, Delhi</td>
</tr>
<tr>
<td>Thomas Rosswall</td>
<td>Chair, ISP</td>
<td>05/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>Philip Thornton</td>
<td>Theme Leader (Theme 4)</td>
<td>06/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>Pramod Aggarwal</td>
<td>Regional Program Leader, South Asia</td>
<td>07/11/2013</td>
<td>In person, Delhi</td>
</tr>
<tr>
<td>Alok Sikka</td>
<td>External partner, Deputy Director-General, ICAR</td>
<td>07/11/2013</td>
<td>In person, Delhi</td>
</tr>
<tr>
<td>Andy Jarvis</td>
<td>Theme Leader (Theme 1)</td>
<td>08/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>Robert Zougmore</td>
<td>Regional Program Leader, West Africa</td>
<td>08/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>Bruce Campbell</td>
<td>Program Director, CCAFS</td>
<td>11/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>Ram Badan Singh</td>
<td>Member ISP, President National Academy of Agricultural Sciences, India</td>
<td>18/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>M. Lal Jat</td>
<td>Center partner, CIMMYT, Delhi</td>
<td>18/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>James Kinyangi</td>
<td>Regional Program Leader, East Africa</td>
<td>18/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>James Hansen</td>
<td>Theme Leader (Theme 2)</td>
<td>19/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>Prem Mathur</td>
<td>Center partner, Bioversity, Delhi</td>
<td>19/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>Torben Timmerman</td>
<td>Head of Coordination &amp; Communications</td>
<td>22/11/2013</td>
<td>Skype</td>
</tr>
<tr>
<td>Vanessa Meadu</td>
<td>Communication and Knowledge Manager</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Annex 4. Extract from CGIAR Financial Report 2012 showing the sources of funding for each of the CRPs.

<table>
<thead>
<tr>
<th>Table 5: Summary of CGIAR Research Program funding 2012 US$ million</th>
</tr>
</thead>
<tbody>
<tr>
<td>From financial statements of individual Centers</td>
</tr>
<tr>
<td>W1/2</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Dryland Systems</td>
</tr>
<tr>
<td>Humid tropics</td>
</tr>
<tr>
<td>AAS</td>
</tr>
<tr>
<td>PIM</td>
</tr>
<tr>
<td>WHEAT</td>
</tr>
<tr>
<td>MAIZE</td>
</tr>
<tr>
<td>GRIStP</td>
</tr>
<tr>
<td>RTB</td>
</tr>
<tr>
<td>Grain Legumes</td>
</tr>
<tr>
<td>Dryland Cereals</td>
</tr>
<tr>
<td>Livestock and Fish</td>
</tr>
<tr>
<td>A4NH</td>
</tr>
<tr>
<td>WLE</td>
</tr>
<tr>
<td>Forests, Trees and Agroforestry</td>
</tr>
<tr>
<td>CCAFS</td>
</tr>
<tr>
<td>Genebanks</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>
Annex 5. Governance structure of CCAFS.

<table>
<thead>
<tr>
<th>Theme</th>
<th>West Africa (WA)</th>
<th>East Africa (EA)</th>
<th>Indo-Gangetic Plains (IGP)</th>
<th>Global</th>
<th>Other Regions</th>
<th>Subtotal</th>
<th>CCAFS, Theme and Regional Coordination</th>
<th>CGIAR System Costs (2%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme 1 Adaptation to Progressive Climate Change</td>
<td>3.1</td>
<td>4.5</td>
<td>4.4</td>
<td>3.8</td>
<td>5.4</td>
<td>21.2</td>
<td></td>
<td></td>
<td>21.2</td>
</tr>
<tr>
<td>Theme 2 Adaptation through Managing Climate Risk</td>
<td>1.5</td>
<td>2.2</td>
<td>1.9</td>
<td>1.3</td>
<td>1.4</td>
<td>8.3</td>
<td></td>
<td></td>
<td>8.3</td>
</tr>
<tr>
<td>Theme 3 Pro-poor climate change mitigation</td>
<td>1.7</td>
<td>1.8</td>
<td>2.5</td>
<td>2.4</td>
<td>2.4</td>
<td>10.9</td>
<td></td>
<td></td>
<td>10.9</td>
</tr>
<tr>
<td>Theme 4 Integration for decision making</td>
<td>2.3</td>
<td>1.9</td>
<td>1.8</td>
<td>8.1</td>
<td>1.5</td>
<td>15.6</td>
<td></td>
<td></td>
<td>15.6</td>
</tr>
<tr>
<td>CCAFS, Theme and Regional Coordination</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.8</td>
<td></td>
<td></td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>8.6</strong></td>
<td><strong>10.4</strong></td>
<td><strong>10.5</strong></td>
<td><strong>15.7</strong></td>
<td><strong>10.8</strong></td>
<td><strong>56.0</strong></td>
<td></td>
<td><strong>1.8</strong></td>
<td><strong>57.8</strong></td>
</tr>
<tr>
<td>CGIAR System Costs (2%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>0.8</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>8.6</strong></td>
<td><strong>10.4</strong></td>
<td><strong>10.5</strong></td>
<td><strong>15.7</strong></td>
<td><strong>10.8</strong></td>
<td><strong>56.0</strong></td>
<td><strong>1.8</strong></td>
<td><strong>0.8</strong></td>
<td><strong>58.6</strong></td>
</tr>
<tr>
<td>Percentage</td>
<td>15%</td>
<td>18%</td>
<td>18%</td>
<td>27%</td>
<td>18%</td>
<td>96%</td>
<td></td>
<td>3%</td>
<td>100%</td>
</tr>
</tbody>
</table>

58
### Annex 7. Analysis of journal publications in CCAFS using 2011 and 2012 publication lists

<table>
<thead>
<tr>
<th>Journal title</th>
<th>Impact factor</th>
<th>Article title, authors, affiliations</th>
<th>Citation rate</th>
<th>No of Centers</th>
<th>No of Institutions</th>
<th>No Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acta horticulturae</td>
<td>N/A</td>
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<td>Wheat yield and tillage-straw management system x year interaction explained by climatic co-variables for an irrigated bed planting system in northwestern Mexico / Verhulst, Nele; Sayre, Ken D.; Vargas, Mateo; Crossa, Jose; Deckers, Jozef; Raes, Dirk; Goyaerts, Bram. DEC 2011.</td>
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**Functional plant biology** 2.471

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<th>Selection of extra-early maize inbreds under low N and drought at flowering and grain-filling for hybrid production / Badu-Apraku, Baffour; Fakorede, Morakinyo A. B.; Oyekunle, Muhyideen; et al. 2011.</th>
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<th>Land use and climate change adaptation strategies in Kenya / Adimo, Aggrey Ochieng; Njoroge, John Bosco; Claessens, Leaven; et al. FEB 2012.</th>
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<td>Evaluation of cowpea (Vigna unguiculata (L.) Walp.) germplasm lines for tolerance to drought / Fatokun, CA ; Boukar, O ; Muranaka, S. DEC 2012. 1. Int Inst Trop Agr, Oyo Rd,PMB 5320, Ibadan, Nigeria</td>
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<td>Weather indices for designing micro-insurance products for small-holder farmers in the tropics</td>
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<td>Food security and climate change: on the potential to adapt global crop production by active selection to rising atmospheric carbon dioxide / Ziska, Lewis H.; Bunce, James A.; Shimono, Hiroyuki; Gealy, DR; Baker, JT; Newton, PCD; Reynolds, MP; Jagadish, KSV; Zhu, CW; Howden, M; Wilson, LT. OCT 2012. 1. USDA ARS, Crop Syst &amp; Global Change Lab, Beltsville, MD 20705 USA 2. Iwate Univ, Fac Agr, Morioka, Iwate 020, Japan 3. USDA ARS, Dale Bumpers Natl Rice Res Ctr, Stuttgart, AR 72160 USA 4. USDA ARS, Wind Eros &amp; Water Conserv Lab, Big Spring, TX 79720 USA 5. AgResearch, Land &amp; Environm Grp, Palmerston North, New Zealand 6. Int Maize &amp; Wheat Improvement Ctr CIMMYT, Texcoco 06600, Mexico 7. Int Rice Res Inst, Crop &amp; Environm Sci Div, Manila, Philippines 8. Chinese Acad Sci, State Key Lab Soil &amp; Sustainable Agr, Nanjing 210008, Jiangsu, Peoples R China 9. CSIRO Climate Adaptat Flagship, Adapt Primary Ind &amp; Enterprises, Canberra 10. Texas A&amp;M Univ, Agrilife Res &amp; Extens Ctr, Beaumont, TX 77713 USA</td>
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<td>Derivation of a household-level vulnerability index for empirically testing measures of adaptive capacity and vulnerability (title differs slightly from one in list) / Notenbaert, A; Karanja, SN; Herrero, M; Felisberto, M; Moyo, S. APR 2013.</td>
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<td>Climate change perception and adaptation of agro-pastoral communities in Kenya / Silvestri, S; Bryan, E; Ringler, C; Herrero, M; Okoba, B. DEC 2012.</td>
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<td>Coping with climate-induced water stresses through time and space in the mountains of Southwest China / Su, YF; Xu, JC; Wilkes, A; Lu, J; Li, QH; Fu, Y; Ma, X; Grumbine, RE. DEC 2012.</td>
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<td>Smallholder farmers' perceptions of and adaptations to climate change in the Nigerian savanna / Tambo, JA; Abdoulaye, T. APR 2013.</td>
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<td>Spikelet Proteomic Response to Combined Water Deficit and Heat Stress in Rice (Oryza sativa cv. N22) / Jagadish, S. V. Krishna; Muthurajan, Raveendran; Rang, Zhongwen W.; Malo, Richard; Heuer, Sigrid; Bennett, John; Craufurd, Peter Q.</td>
<td>MAR 2011. 1. Int Rice Res Inst, Plant Breeding Genet &amp; Biotechnol Div, Manila, Philippines. 2. Univ Reading, Plant Environm Lab, Reading RG2 9AF, Berks, England. 3. Hunan Agr Univ, Coll Agron, Changsha 410128, Hunan, Peoples R China.</td>
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<td>Construction and application of SSR molecular markers system for genetic diversity analysis of Chinese tartary buckwheat germplasm resources / Gao Fan ; Zhang ZongWen ; Wu Bin. 2012. 1. College of Life Science of Shanxi University, Taiyuan 030006, China</td>
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<td><strong>Cassava production and pest management: present and potential threats in a changing environment</strong> / Bellotti, A.; Herrera Campo, B. V.; Hyman, G.</td>
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<td><strong>Is cassava the answer to African climate change adaptation?</strong> / Jarvis, A. ; Ramirez- Villegas, J. ; Herrera Campo, B. V. ; Navarro-Racines, C.</td>
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<td>1. International Center for Tropical Agriculture (CIAT), Cali, Colombia 2. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Cali, Colombia 3. Institute for Climatic and Atmospheric Science (ICAS), School of Earth and Environment, University of Leeds, UK</td>
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2. Int Ctr Trop Agr CIAT, Cali, Colombia  
3. Int Water Management Inst, New Delhi, India  
4. Beijing Normal Univ, Key Lab Water & Sediment Sci, Beijing 100875, Peoples R China  
5. Int Food Policy Res Inst, Washington, DC USA  
6. UMR HydroSci, Montpellier, France  
7. IRSTEA, Montpellier, France  
8. CSIRO Land & Water, Canberra. | 5 | 3 | 8 | 10 |
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| Freshwater, climate change and adaptation in the Ganges River Basin / Hosterman, HR ; McCornick, PG ; Kistin, EJ ; Sharma, B ; Bharati, L. 2012. | 1. Duke Univ, Nicholas Inst Environm Policy Solut, Durham, NC 27708 USA  
2. Delhi Off, Int Water Management Inst, New Delhi 110012, India  
3. Nepal Off, Int Water Management Inst, Dept Irrigat, Kathmandu, Nepal | 1 | 1 | 2 | 5 |
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2. Bureau of Meteorology, 14 Childers St, Canberra
3. International Water Management Institute, ICRISAT, Patancheru 502324, AP, India
4. National Geophysical Research Institute, Uppal Road, Hyderabad 500606, Andhra Pradesh, India
5. Livelihoods and Natural Resource Management Institute, 12-2-417/18 Sarada Nagar, Mehdipatnam, Hyderabad 500067, Andhra Pradesh, India
6. Graduate School of the Environment, Macquarie University, NSW 2109
7. Centre for Planning, Edith Cowan University, Joondalup Perth WA 6027
8. Central Research Institute for Dryland Agriculture, Santoshnagar, Hyderabad 500059, Andhra Pradesh, India

Water SA 0.876

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