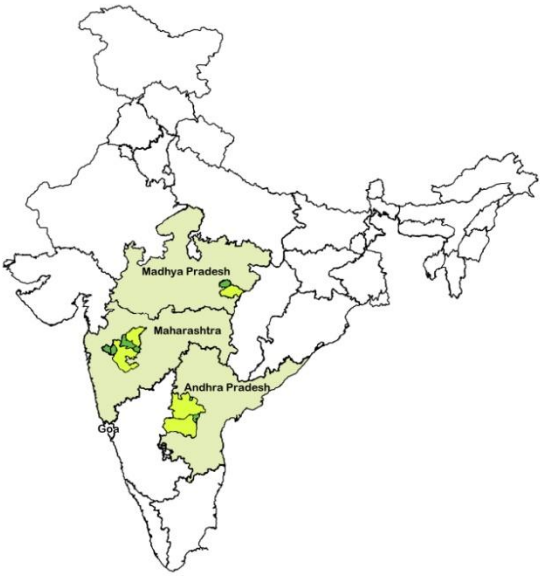
Global Climate Adaptation Partnership

External Review

External Review of "Climate change adaptation in rainfed regions of Maharashtra, Madhya Pradesh and Andhra Pradesh"



John Colvin
Global Climate Adaptation Partnership
Oxford Centre for Innovation
New Road
Oxford OX1 1BY

with

Moho Chaturvedi (Independent Consultant)
Dimka Stantchev Skeie (SDC)

4 July 2014

Table of Contents

Acronyms

ACCRA	African Climate Change Resilience Alliance
AFPRO	Action for Food Production
ALCES	A Landscape Cumulative Effects Simulator
BMC	Biodiversity Management Committee
BVIEER	The Institute of Environment Education and Research, Bharati Vidyapeeth University
BYP	Backyard Poultry
CARD	Centre for Advanced Research & Development
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CASDAAT	Climate Adaptive Sustainable Development Assessment and Adjustment Tool
CBDM	Community Based Disaster Management
CBO	Community Based Organisation
CC	Climate Change
CCA	Climate Change Adaptation
CCAFS	Climate Change, Agriculture and Food Security
CCD	Climate Change and Development Section (Embassy of Switzerland)
CDE	Centre for Development & Environment
CDM	Clean Development Mechanism
CGIAR	Consultative Group on International Agricultural Research
CHF	Swiss Francs
CO-DriVE PD	CO-DRIVE Programme Designer tool
CRIDA	Central Research Institute for Dryland Agriculture
DFID	Department for International Development (UK)
DRR	Disaster Risk Reduction
EC	European Commission
EDP	Exposure Dialog Program
ETH	Swiss Institute of Technology
FES	Foundation for Ecological Security
GCAP	Global Climate Adaptation Partnership
GIS	Geographic Information System
GPCC	Global Program Climate Change
GoAP	Government of Andhra Pradesh
GoM	Government of Maharashtra
GPFS	Global Program Food Security
GSDA	Groundwater Survey and Development Agency
HH	Household
ICAR	Indian Council of Agricultural Research
ICRAF	World Agroforestry Centre
IDEI	International Development Enterprises, India
IDRC	International Development Research Centre (Canada)

IFFCO	Indian Farmers Fertiliser Cooperative Limited
IIT	Indian Institute of Technology
IK	Indigenous Knowledge
IMD	Indian Meteorological Department
INGO	International Non-Governmental Organisation
IRWG	Inter-Agency Resilience Working Group
IWMP	Integrated Water Management Program
LETS	Local Economic Trading System
LFA	Logframe
LM3	Local Multiplier 3
M & E	Monitoring and Evaluation
M, E & L	Monitoring, Evaluation and Learning
MFT	Maintenance Fund Training
MOU	Memorandum of Understanding
MP	Madhya Pradesh
MPKV	Mahatma Phule Krishi Vidyapeeth (Agricultural State University)
MSBB	Maharashtra State Biodiversity Board
MSSRF	MS Swaminathan Research Foundation
NABARD	National Bank for Agriculture and Rural Development
NAPCC	National Action Plan on Climate Change
NCCARF	National Climate Change Adaptation Research Facility
NGO	Non-Governmental Organisation
NIDM	National Institute of Disaster Management
NIE	National Implementing Agency
NNCP	National Nature Camping Programme
NRLM	National Rural Livelihood Mission
NRLP	National Rural Livelihoods Project
OECD	Organisation for Economic Co-operation and Development
OECD-DAC	OECD Development Assistance Committee
OGB	Oxfam Great Britain
OMS	Outcome Monitoring Summary
OS	Othmar Schwank
P3DM	Participatory 3D Modelling
PBR	People's Biodiversity Register
PIM	Participatory Impact Monitoring
PPM	Project Planning and Management
PRADAN	Professional Assistance for Development Action
PRI	Panchayati Raj Institutions
RBS	Royal Bank of Scotland
SCI	System of Crop Intensification
SDC	Swiss Agency for Development and Cooperation

SHG	Self-Help Group
SMS	Short Message Service
S-S	South-South
TISS	Tata Institute of Social Sciences
ToC	Theory of Change
ToR	Terms of Reference
UK	United Kingdom
UKCIP	UK Climate Impacts Programme
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Vulnerability Assessment Tool
VDC	Village Development Committee
WOPAT	WOTR Project Adjustment Tool
WOTR	Watershed Organisation Trust
WRI	World Resources Institute

Executive Summary

"The IMD considers this partnership a successful and pioneering model of collaboration for both scientific and practical purposes"[i]

This review provides a hybrid evaluation[ii] of the SDC - WOTR - NABARD project: 'Climate change adaptation in rainfed regions of Maharashtra, Madhya Pradesh and Andhra Pradesh' (hereafter referred to as the 'CCA project'). The review highlights the value of this unique experiment in multi-level, system innovation for climate resilient development, with WOTR playing a sophisticated role as systemic intermediaries in beginning to scale up a series of pioneering and integrated local-level innovations in village clusters across three states of India. The review takes as its basis the OECD-DAC evaluation criteria[iii], complementing these with a substantial list of additional questions set out in the terms of reference. The different elements of the project, including local level interventions, knowledge management and scaling up through policy engagement are considered in relation to each of these criteria below.

Relevance

Drawing on the OECD-DAC definition, relevance concerns the extent to which an aid intervention is suited to the priorities and policies of the target group, recipient and donor. In this context we considered three questions: *To what degree do the programme's objectives remain valid? Are the programme's activities and outputs consistent with its key goals and attainment of objectives? Are the programme's activities and outputs consistent with its intended impacts and effects?*

In terms of **validity**, the CCA project was highly valid during the period of conceptualization and design and remains so today. In 2009 SDC India had done very little work on adaptation, so this was the start of an important journey – to learn how to do climate adaptation work and in particular, how to integrate climate resilience and the management of climate risk into development. Moreover, with the recent publication of the Government of India's National Action Plan on Climate Change (2008)[iv], which highlighted the co-benefits of development and adaptation, the CCA project was well timed. For SDC in Bern, this was also their main CCA project in semi-arid areas globally, and again there was a real interest to learn from the experience of undertaking this project and to draw lessons from this. And for the village-level beneficiaries of the project, the interventions were both welcomed and seen as highly relevant.

Today there is a wealth of lessons that flow from this project and are set out in this review, both for the three project partners, for its local beneficiaries, and for key Indian state and national partners including adaptation-related planning initiatives, demonstrating the continuing validity of the programme's objectives.

In terms of **consistency with key goals**, our review highlights that all but one of the local level interventions funded by SDC (either alone or jointly with NABARD) was consistent with one or other of the two criteria selected at the outset of the project to indicate a focus on an 'adaptation deficit' rather than a pure 'development deficit'. Drawn from the publication 'Weathering the Storm' (2007)[v], these two criteria were: 'building response capacity' and 'managing climate risk'. The knowledge management, scaling up and policy engagement activities pursued by the project were also, in our view, consistent both with the goals of SDC's Global Programme Climate Change (GPCC) and with effective trajectories for policy influencing based on learning from on-the-ground experience. The project pursued an approach to scaling up which focused both on policy formulation and on policy implementation, and was supported both by key knowledge partners and by a rich portfolio of knowledge products and intermediation practices.

In terms of **consistency with intended impacts and effects**, effective project management was one of the weakest elements of the CCA project, with progressive tensions emerging in the

collaboration between SDC and WOTR which limited the extent to which an effective, adaptive management approach based on joint learning was possible. These tensions can partly be explained in terms of failure to jointly articulate and agree a shared theory of change for the CCA project (including shared assumptions of processes of adaptation and change) and to develop a monitoring, evaluation and learning (M,E&L) system that reflected this theory of change. Such a system would have allowed for more effective strategic steering and learning as well as ensuring accountability to sources of donor funding.

Effectiveness

Under the OECD-DAC definition, effectiveness' is defined as 'a measure of the extent to which an aid activity attains its objectives'[vi]. Relevant questions include: *to what extent did the interventions reach their 'delivery' 'targets' agreed at the outset of the project? has resilience been built on the targeted village clusters? what has been learned to date from this work?* and *to what extent is it valued by different partners?*

The CCA project worked with multiple local level interventions, both technological and social, in some villages testing just a few of these but in many villages working with the full portfolio of interventions, taking an integrated approach. Considered individually, several interventions stand out as particularly effective, both in terms of what has been achieved and/or learned (Table ES1), and as reflected in a growing interest by knowledge/policy partners for upscaling.

Table ES1. Review of the effectiveness of key interventions at the local (village cluster) level

Intervention	Were original targets met?	Has local resilience improved?	What has been learned to date?	To what extent was it valued by different partners?
Agro-met based advisories	0 Targets for the number of agro-met stations and percentage of farmer population using agro-advisories were exceeded. 0 Fewer weather boards (68%) were displayed in villages than originally targeted.	Weather forecast is now available at the village level (previously at the district level only), with access via SMS to agro-met and crop-specific planning advisories (12 crops) for 5,000 farmers in the project areas	A number of challenges were addressed and overcome, including those linked to connectivity, social acceptance and use by farmers. Cost/ benefit issues need further consideration	Widely valued by stakeholders ranging from local farmers to district government (Maharashtra); state government (Andhra Pradesh); national government (Indian Meteorological Department); and the World Bank.
Sustainable adaptive agriculture	0 776 farmer demonstration plots were developed against an original target of 150. 0 However the numbers of hectares under agro-horticulture or crop cultivation were lower than originally targeted (48% achieved for agro-horticulture and 75% for crop cultivation).	Many farmers report: - increased yields (varies from 30-80% across sites); cost reductions of 20-40%; healthier crop (weight and density); improved soil quality when using organic compost rather than chemical fertilizers; greater crop diversity supporting increased food security & fodder needs.	Challenges addressed and overcome included: linking field-based research with academic research for adaptive agriculture; integration of low external input practices into advisories; outreach for farmers' adaptive capacity building (peer-to-peer and farmers field schools)	ICRAF, which will play a pivotal role in the design of India's agroforestry mission, is impressed by the sustainable adaptive agriculture work undertaken through the CCA project. It sees WOTR as playing an important role in the feedback it can offer into evidence-based policy making.
Water budgeting and water management	0 Targets were exceeded both for the numbers of villages which have accepted water-budgeting plans; and for the numbers of water resource management interventions (including micro-irrigation) implemented across different sites	As a result of water budgeting exercise, many farmers report: shifting from flood to drip irrigation, and understanding better the implications of different patterns of water use	Challenges addressed and overcome include translating better water budgets into micro-irrigation systems and contingency crop planning	The experiences of the CCA project have been widely reflected at local and State levels in the press
Disaster risk reduction	Although targets weren't set, 31 villages have established Village CBDM plan, hazard mapping and	Many farmers report that: preparing the DRR map helps them to communicate with the government what	Challenges still to be addressed include: understanding better the links between climate change	The Panchayats are interested in linking the disaster management plans for villages to the

	seasonal activity calendars; and 12 villages have 3D models linking disasters into the village planning process and management response. • The target for Wasanhara Sevak training was exceeded.	the hazards and risks are; and that the weather and agro-advisories helps saving harvested crops in case of rain and manage livestock in case of excess heat.	and DRR at the local level and probable response (from contingency crop planning to weather based insurance products); better linking disaster manage-ment plans (prepared by the community) with govern-ment block level disaster management.	government block level disaster management plan. Hence the Panchayat Raj Institution can play a role of leadership in DRR at all stages, and DRR can be seen as a good entry point to integrate more CCA and DRR at the local level.
Capacity building and awareness raising	Although targets weren't set, extensive local capacity building took place. This included: capacity to understand what is going on with climate and how to deal with this; practical capacity to experiment and to adapt; and an emphasis on gender inclusiveness in terms of access to resources, livelihoods and governance		Our interviews highlighted that the introduction of new ways of doing things at the village level is much appreciated by women, as it substantially increased their capacity to diversify agricultural products and consumption (horticulture), to increase their income (cash crops), and to build knowledge on nutrition and for monitoring the growth of their children.	
Women's self-help groups (SHGs)	• Targets for numbers of women's SHGs exceeded by 670%	Women's SHGs reported improved coherence on what they plan to do in the group, and increased confidence to face government officials if required, due to capacity building through the CCA project.		Discussions in villages showed an appreciation for the formation of women's SHGs, which has led to greater sharing of information and reliance upon one another.
Governance including village development committees (VDCs)	• All governance targets were exceeded, including for: village visioning and wealth ranking exercises; and numbers of VDCs (49) and Samyukt Mahila Samiti (55) formed.		All local stakeholders spoken to during the evaluation mentioned that governance and local accountability of the project was good. From our field visits we noted how the project pays considerable attention to cultural specificities and how these interact with the project design and implementation, which is also a good indicator of account-ability, helping to ensure responsiveness to local needs.	

While not all targets were achieved, with some interventions (for sustainable livestock management, development of People's Biodiversity Registers and numbers of households participating in relevant programmes for alternate and renewable energy) notably falling short, overall, we consider that the CCA project was effective in delivering the local-level outcomes agreed in the logframe at the outset. An additional strength of the project was that local-level interventions were tested in different agro-ecological and cultural contexts, thereby providing the basis not only for comparative knowledge and learning, but also for scaling up in three different states.

We have also reviewed the effectiveness of the CCA project in terms of knowledge management and policy engagement. Regarding knowledge management, the project logframe devoted a full outcome and 11 activity areas to the generation and dissemination of knowledge products, with the main focus for some of these activity areas on policy engagement. This generated an impressive array of knowledge products (over 90 in total), which we were able to selectively review. In terms of effectiveness, all logframe targets were met. While we were unable to comprehensively assess levels of 'uptake', or what key partners valued about or had learned from these knowledge products, SDC expressed some concerns about the quality of some of these. In our view, a number of knowledge products were of high quality; these include the three CoDrive manuals as well as the six policy briefs and five position papers – the recent position paper on resilient agriculture stands out in particular. We also observed that the showcasing of the CoDrive manuals in the context of events at the Darewadi Training Centre has led to some significant engagements, for example with the Commissioner, Integrated Water Management Program for the Government of Andhra Pradesh.

Regarding the quality of research undertaken, while the action research approach adopted by WOTR was highly relevant to the CCA project, producing many valuable results, one area of improvement would be to find ways in which the project's extensive action research findings

could be contextualized within more traditional forms of research as an aid to policy influencing; new research partnerships are currently being explored for this purpose.

In terms of policy engagement, the logframe highlighted four main approaches, with specific targets set for the latter two: 'conventional means'; Exposure Dialogue Programs (EDPs); five policy workshops at state and national levels, and one international EDP-cum-training program. Here all targets were met, with the CCA project also performing strongly on the delivery of EDPs. The five policy workshops served to create linkages as well as to share with participants the progress of the CCA project, highlighting the realities and emerging learning about doing adaptation work at the field level. These workshops also reinforced the process by which WOTR was able to sign MOUs with key knowledge partners ICRAF, CRIDA, IMD and MPKV. The CCA project also actively participated in the SDC-led policy engagement process which culminated in the "National Policy Dialogue on Climate Change: Linking Grassroots Actions to Policy Debate, Up-scaling, Knowledge Sharing and Science".

Equity

Measuring equity is a component both of assessing value for money and of a number of specific questions in the ToR for the review: *Was the project engaged with the right mix of stakeholders at different levels?* and *Assessment of the overall achievements (accountability aspects), keeping in view aspects of equity.* One of the real strengths of the CCA project was its focus on policy learning which is embedded in a strong field process which engaged approx. 53,500 persons (10,000 households) spread across a geographical area of around 38,000 ha., and represented communities that are culturally and ethnically different as well as different levels of backwardness and integration with the wider economy. The table above further attests to a design which invested in gender empowerment, women's SHGs and new governance arrangements which took into account wealth rankings, and paid considerable attention to cultural specificities and how these interact with the project design and implementation, which is also a good indicator of accountability, helping to ensure responsiveness to local needs.

Impact and Innovation

The CCA project succeeded in pioneering an integrated approach to CCA and adaptive sustainable development at the village and village cluster level. This integrated approach is arguably a unique innovation for CCA within rural development in arid and semi-arid regions of India, albeit still at a relatively early stage of development. Drawing on OECD-DAC criteria, the local impact of this intervention can be measured in the following ways *To what extent did the project improve local human, social and environmental indicators while also building response capacity? To what extent did the project improve local economic indicators while also managing climate risk? To what extent did the project result in local innovation?*

Improved human and social impact is reflected in the development of new governance capacity for DRR and CCA through strengthening of Gram Panchayats and the development of 50 VDCs; in substantially improved gender inclusiveness in terms of access to resources, livelihoods and governance; in improved understanding within the village communities about what is going on with climate and how to deal with this; and in the gradual establishment of an "adaptive management" culture among farmers. Improved environmental impact is reflected in the reduction in pesticide use through organic composting; reduction in the use of carbon-based energy; improved water budgeting and water management techniques; and gradual improvements in biodiversity management.

Improved economic impact is primarily reflected in increased yields (30-80% productivity gains on average) at less cost (reductions of 20-40%) among 5,000 farmers in 45 villages, as a result of the interventions in sustainable adaptive agriculture. Moreover, the weather and agro-

advisories have been found useful to save harvested crops and manage livestock in the case of excess heat, reflecting the value of improved disaster risk reduction (DRR) practices. The promotion of livelihoods diversification, through a mix of on-farm and non-farm livelihoods, have both increased the skill of local populations engaged in these activities and diversified livelihoods available to women and the landless. As all these activities are still at a very early stage of implementation and their link with resilience and climate change adaptation is an indirect one, it is difficult to tell whether they have contributed to building resilience at this stage.

In terms of local level innovation, the introduction of various new and/or improved technologies or systems has been very instrumental in building capacity for innovation at the village level. Whilst introducing a series of on-farm improved methods to develop adaptive sustainable agriculture, water efficiency, alternate energy use and biodiversity conservation, the CCA project has by the same token increased the participation of farmers in the whole cycle of innovation (testing, adjusting, and dissemination). At a general level, we therefore feel that an important effect of the increased capacity which has been built amongst farmers is the gradual establishment of an "adaptive management" culture, where farmers are gradually becoming more empowered to access relevant information on CCA, test and use them under different conditions, and feed the learning and research community on CCA with their findings. Furthermore, while the innovative nature of some interventions introduced (e.g. treadle pumps, cook stoves, vermi-composting) can be questioned in a global context, they were nonetheless locally innovative, and contributed to a broader portfolio of interventions that were conceived in a holistically integrated way, as a means to develop sustainable adaptive agriculture and low carbon, climate resilient village development pathways. The question of local level innovation, and its contribution to policy, can thus be answered differently depending on whether the CCA project is viewed as a test bed for discrete local level innovations or as a broader experiment in adaptive sustainable development. It should be noted that, in the later-start village clusters (in Aurangabad, Madhya Pradesh and Andhra Pradesh, starting in 2011), the CCA project undertook some testing of interventions in a more discrete way, albeit that these were always considered within a broader integrative framework and sequencing.

In terms of the ways in which the findings from this local level action research on innovation for CCA were drawn on in a broader context of policy influencing, in our view the CCA project developed a unique approach to multi-level system innovation and systemic 'intermediation' for climate resilient development, which demonstrates significant synergies with the vision expressed in SDC's Global Programme on Climate Change (GPCC). For example, in terms of policy formulation, the project built an important set of strategic partnerships at state and national level for the scaling-up of agro-met based advisories, in which IMD plays a key role. Other key relationships for policy formulation include those with the State Government in Maharashtra and with Biodiversity Boards at national and state levels. In terms of policy implementation, the project influenced policy and created a significant demand at the State level in Andhra Pradesh for the upscaling of adaptive actions. Other key relationships for policy implementation include engagement with the Neeranchal programme, supported by the Government of India and the World Bank, and collaboration with ICRAF and CRIDA in the context of the National Mission on Sustainable Agriculture.

Sustainability

For the OECD-DAC, sustainability is concerned with "measuring whether the benefits of an activity are likely to continue after donor funding has been withdrawn. Projects need to be environmentally as well as financially sustainable." Relevant questions include: *To what degree did the project's benefits persist following the end of donor funding? What chief factors were responsible for the achievement or failure of the project's overall sustainability?* As the CCA project is not yet finished, we are not yet in a position to answer the above questions. Indeed we

would recommend a gap of at least 2 years before seeking to assess the extent to which project benefits persisted following the end of SDC funding. However, SDC questioned the sustainability of its investment in a relatively small number of villages, requiring high levels of investment by WOTR field staff. This can best be addressed with reference to theories of change of the CCA project, and more specifically, assumptions about how systemic learning and change can best be achieved. While the assumptions of SDC throughout the project were that early policy engagement should be encouraged, WOTR's approach was to invest substantially in the testing of local level interventions in order to be fully confident of findings before engaging with key policy actors. This reflects their previous experience with the Indo-German Watershed Development Programme, where substantial on-the-ground investment took place over a 10-year period before effective scaling up; an approach which was also championed by NABARD. In our view, there is considerable merit in this slower and more solid approach to learning and upscaling for CCA, but it clearly requires a sustainable funding base if it is to be fully effective.

Financial Management and Value for Money

The ToR for the review requested appraisal of a number of different financial measures, including: efficiency and effectiveness relating to use of SDC funds; cost benefit aspects of various initiatives pursued under the project; extent to which the project managed to mobilise/ leverage additional funding support to climate adaptation; and cost effectiveness and financial sustainability of various interventions pursued. Given the time and resource limits of the review and the very limited evaluation by the project itself of its financial investments, we focus here on questions of efficiency, financial sustainability and mobilization of additional funding support.

In terms of efficiency (cost-effectiveness), SDC felt that its funds had been well spent in testing interventions exploring agro-met-based advisories, adaptive sustainable agriculture, DRR, gender empowerment, governance and taking a landscape-level approach in the context of CCA. SDC also felt that its investment was sometimes used too much for developmental rather than "genuine" adaptive interventions and for implementation of activities on the ground rather than knowledge generation/dissemination and upscaling. NABARD was appreciative of the local level experiments on agro-met based advisories, DRR, health and nutrition and on livelihood diversification, but expressed the view that the design of the programme was too complex and that "learning" was expensive. WOTR considered that the SDC funding had been very effective for developing and testing adaptive actions and models. WOTR has not measured the impact of its knowledge management, because it is too early to assess how policy has been influenced. But they expressed the following: "we highly value the contribution of SDC for knowledge management at the qualitative level: this component has made a huge difference in terms of influence with the national agencies. It was great value for money. And the effects in the future will be even more important!"

In terms of financial sustainability of adaptation, limited work was undertaken by the CCA project, with the main focus on an economic evaluation study of adaptation in watersheds, undertaken jointly by WOTR and WRI. Further investment in analysing financial sustainability of the CCA project would be an important step towards a better understanding, for SDC and WOTR, of the costs and long-term benefits of adaptive actions, and possibly also help to capture some unintended results of adaptation (maladaptation).

In terms of mobilizing additional funding support, the most significant outcome lies in the potential collaboration with the IMD, in its work across 6000 blocks in India for scaling out agro-met advisories. In the words of Dr. Chatopadhyay, IMD Pune Office: "The work of WOTR is very valuable because for IMD funding is not a problem, but the challenge is to give customized and timely information to the farmers. This is what WOTR helps us to do. WOTR plays a great role

for India". Given that most of the other areas resulting from the project's policy engagement are still at an early stage of formulation, it is difficult to assess the value of the funding which may be mobilized, but this could be the object of future work.

Main reflections and lessons emerging from the review and recommendations associated with these

In this review we have sought to present a balanced assessment of the SDC-WOTR collaboration in the context of the CCA project. This has highlighted an ambitious and unique experiment in multi-level system innovation for climate-resilient development, still in its early stages, and with longer term viability and sustainability (i.e. resilience) an emergent feature. Key reflections and recommendations from this review are as follows:

1. Climate change adaptation challenges many current development practices and requires a strong conceptual framing of climate resilient development pathways

The CCA project drew on a rich mix of conceptual framings of CCA, including the idea of development and adaptation 'deficits', a development-adaptation continuum, and framings of CCA as a process of adapting (and potentially transforming) current developmental pathways using integrated, adaptive and sensing/learning approaches. While often challenging to the actors involved, there is now rich learning to draw on in the design of future CCA initiatives. Insights include the following:

Recommendation 1 (R1). In considering future options for investment in CCA, both SDC India and SDC Bern should undertake a critical review of how they understand innovation for climate resilient development, in terms of pathways and theories of change.

2. The GPCC also requires stronger conceptual framing to ensure that policy is properly grounded in real, on-the-ground experience

A major learning for the GPCC has been the importance of properly grounding policy advocacy and policy dialogue in on-the-ground experience. This has important implications for the design of upscaling and policy dialogue processes, raising questions both about the timing of policy engagement in relation to on-the-ground experiments, and about the ways in which policy makers are enabled to learn from local experiments, be this through 'seeing is believing' study tours, through policy workshops or through credible and authoritative knowledge products.

As it focuses on multiple levels of engagement, the GPCC framework also suggests a resonance with the idea of multi-level innovation systems; here there is an opportunity is for the GPCC to hone its theory of change of multi-level innovation systems, enabling it to decide which types of multi-level innovation system design it might wish to support and to showcase on the global stage. The fact that investment through the GPCC is targeted at China, India, South Africa and the Peru/Andean region, suggests that it could make a significant knowledge and/or policy impact globally, if it were to test a multi-level innovations systems design for CCA across these key countries/regions.

Recommendation 2 (R2). In framing the GPCC, SDC should further reflect on (a) how learning local innovations on the ground is key to informing the other levels of the framework and (b) how best to formulate a theory of change for GPCC as a multi-level innovation system.

3. Effective climate adaptation requires investment in design

Climate change adaptation is not just about reframing development pathways but also about translating new conceptual frameworks into practice. This highlights the value of a proper design phase at the start of any new CCA initiative.

Recommendation 3 (R3). In planning for future CCA initiatives, SDC and WOTR, whether working together or separately, should set aside a design period of at least six months to enable partners to seek agreement on a shared theory of change, how this is to be translated into a project design including partners' roles, how M&E & L will be undertaken, and for what purposes (strategic steering, learning, accountability).

4. Effective climate adaptation requires investment in new capabilities

Recommendation 4 (R4). CCD/SDC India, SDC Bern and WOTR should each consider investing in building the capacity of their staff to:

- become more proficient in working with theories of change and M&E frameworks appropriate to the transformational challenges of innovation for CCA, drawing on international good practices and relevant networks of learning and support; working with dynamic conflict in CCA situations: both in noticing where conflict is developing and in learning how to manage it, not only inter-personally but also through improved programme design.
- work more reflexively and self-critically – both are increasingly recognised as vital skills in supporting effective adaptive management and change.

5. Future investments – options for SDC India

The CCA project revealed a tension between WOTR, with its ambitious emphasis on holistic and integrated approaches based on the 'engine' of adaptive sustainable development, and SDC, with greater interest in smaller number of interventions, understood in more discrete terms. The latter may have also reflected limits in management capacity and the desire to draw stricter boundaries around the focus of the CCA work.

Recommendation 5 (R5). CCD/SDC India should consider a range of options for future investment in CCA projects. These could include:

- **Investment in highly targeted innovations for CCA.** Agro-met based advisories provide a good example. For example, what would it now take to develop a system of simple, effective, demand-driven, useable agro-met advisories, supported by locally credible climate information, in states that were not the focus of the CCA project? What would be the added value and how could SDC work with IMD and other partners in the outscaling/ upscaling process?

- **Investment in one or more carefully boundaried portfolios of innovation for CCA.** This would provide an opportunity for SDC to maximise the learning from the CCA project while still working within manageable boundaries. Consistent with the GPCC, the focus could be on a nexus of inter-related interventions, for example: water-agriculture-climate; water-agriculture-DRR-climate; water-agriculture-energy-climate.

- **Investment in one or more integrated innovation portfolios – working with multiple partners.** This is the most ambitions option and the one most similar to the CCA project. SDC could however consider new approaches to managing such a complex project – for example by putting out a call for proposals from consortia which include (a) multiple partners and (b) a coordinating partner experienced in managing complex, multi-level adaptation processes. The call could highlight the importance of policy processes which are grounded in strong, local-level experiments in innovation, as in the CCA project.

6. Future investments – options for SDC's Global Programme Climate Change

There is much of value in the learning and lessons from the CCA project which can be used to shape options for SDC's GPCC beyond India.

Recommendation 6 (R6). SDC Bern should consider the following:

- **Showcasing internationally the value and learning from the CCA project.** As an ambitious and unique experiment in multi-level system innovation for climate-resilient development, the learning and lessons from the CCA project deserve to be shared, showcased and promoted internationally. Consideration should be given to presenting the findings from the review and other sources, using multi-media and innovative, story-telling approaches.
- **Learning from the CCA project – spreading to other countries.** At a more targeted level, lessons drawn from the CCA project, both on what should be done and what should be done differently, could be used to shape GPCC projects in other countries, particularly in other arid and semi-arid regions of the world, for example in Morocco. Careful consideration should be given to the design of a process that learns from the CCA project, transferring relevant design principles to a new context, rather than attempting to 'replicate'.
- **Drawing on lessons from the CCA project in the further development of the full GPCC portfolio.** Building on R2, and the recommendation to design the full GPCC as a multi-level innovation system, SDC Bern might consider strategic alliances with other donors, such as DFID, who are also interested in multi-level innovation system design (and demonstrate an increasingly sophisticated use of theory of change and translation into knowledge and learning systems), as a means of building capacity and strengthening their approach to CCA in China, South Africa and the Peru/Andean region as well as in India.

7. Future investments – options for WOTR

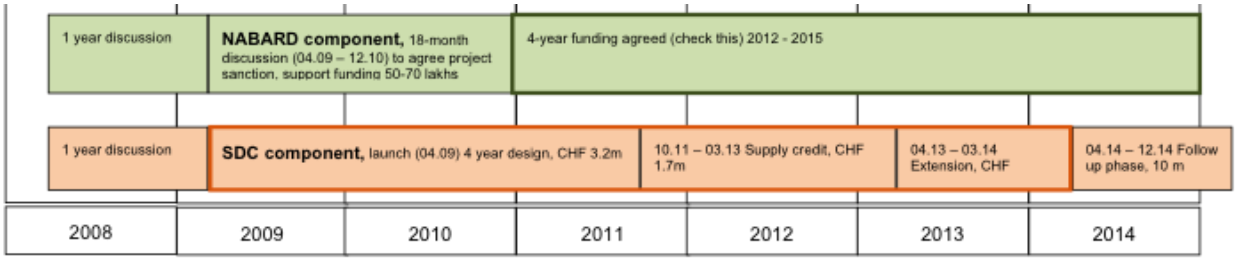
For WOTR, further investment in maintaining and strengthening the resilience of the complex system innovation for adaptive sustainable development in which they have invested in Maharashtra, Andhra Pradesh and Madhya Pradesh is highly dependent on continuing sources of funding. This presents a challenge for WOTR in considering how best to institute a resilient funding platform; we would recommend careful investment in ensuring that the funding platform is sufficiently robust to 'hold' the system innovation; this may, for example, involve diversification of funding, or it may involve a focus on a small number of core funders who are very clear about what it is they are being asked to support in terms of theory of change and their role as partners, particularly when it comes to acting as co-learners.

1. Introduction

In 2009 CCD/SDC[vii] (hereafter referred to as SDC, or as SDC India where there is a need to differentiate it from SDC Bern), WOTR and NABARD embarked on a new and ambitious collaboration – the climate change adaptation (CCA) project. Making sense of this collaboration, its progress, outcomes and learning, is the subject of this review. The work undertaken through the collaboration was not only ambitious, but also rich and multi-faceted. Furthermore it was experimental and innovative, both conceptually and in practice. After 5 years, the work has thrown up many good questions. For example, has the CCA project built resilience, and if so, how? What has been learned from the many experimental interventions undertaken? To what extent were these interventions the right ones from a CCA perspective? And to what extent has this project been innovative, both in terms of on-the-ground outcomes, and at a wider, systemic level?

When the CCA project started in 2009, WOTR had already been working on participatory approaches to watershed development for approximately 15 years. From 2001 this work had been supported through a productive partnership relationship with SDC. However, CCA brought with it new challenges. With CCA still a relatively new discipline, during 2007 - 2008 both SDC and WOTR had therefore entered into a period of serious reflection and dialogue in order progressively to re-orient their policies and approaches to take into account the challenges and opportunities of a climate changing world. From 2009 onwards, as SDC reoriented its engagement in India away from classical development cooperation to one of global cooperation on climate change, WOTR was also in a stronger position to work on climate resilient development under a new phase of project funding. This resulted in agreement between SDC and WOTR to develop and implement the CCA project over a 4-year period (April 2009 – March 2013), subsequently extended by a further 21 months to December 2014 (this review covers the period to the end of March 2014). Funding for the project was also agreed with NABARD, although the two funding components of the project started at different times (Figure 1). This review focuses primarily on the SDC-funded components, which include many jointly funded components of the CCA project (summarized in Annex 1).

Figure 1. Timeline showing the two funding components of the CCA project



The CCA project was designed in the context of India's National Action Plan on Climate Change (NAPCC)[viii] as well as SDC's reorientation in India to address the impacts of climate change through adaptation and energy efficiency. The original project proposal sought to develop knowledge, strategies, approaches, measures and processes that would enable vulnerable communities to cope with and adapt to the impending impacts. It also stipulated that these approaches would need to be replicable and upscalable[ix]. It recognised that "climate change adaptation is a green-field area where little validated field experiences and successes exist in the country in terms of building resilience and capacities of rural communities. Most activities under the project, therefore, will be innovative, exploratory and experimental in nature, with built-in flexibility based on existing and emergent circumstances"[x]. The goal and main outcomes of the project are shown in Box 1:

Box 1: Goal and main outcomes of the CCA project[xi]

Goal: Communities, especially the poor within, live in dignity and secure their livelihoods in climate change resilient and sustainable ecosystems.

Specific **outcomes** envisaged under the project are listed as follows:

- Communities sustainably manage enhanced ecosystems in the project area.
- Increased productivity of natural and other resources that contribute to improved quality of life among the most vulnerable, especially the, poor.
- Local Institutions have in place effective governance mechanisms to sustainably manage regenerated ecosystems.
- Integrated adaptation into Government policies and key programmes at the State/ National levels through systematic generation, documentation and dissemination of knowledge products[xii].
- WOTR emerges as a national/ international referral and knowledge agency for practice oriented climate change adaptation and disaster risk reduction.

At the start of the project in 2009, the focus was on 25 villages in the Akole and Sangamner blocks of the Ahmednagar District of Maharashtra State. These were chosen as, together, they were seen as representative of the bulk of vulnerable, backward and poor communities in rainfed agrarian India, yet also represented different agro-ecological and climatic zones, were culturally and ethnically different, and represented different levels of integration within the wider economy (Annex 2a). WOTR had previously worked in both blocks over a period of several years - in 4 villages in Akole and 6 villages in Sangamner. Through these previous watershed projects various soil and water conservation structures had already been developed for these villages. In 2009 the total population in all 25 villages was 4,745 households, consisting of at least 25,786 persons spread across a geographic area of 20,558 ha.

In 2011 the project was expanded to include additional focal communities (Annex 2b). As a result, the focus shifted from implementing the project in 3 clusters comprising 25 villages across 1 state (Maharashtra), to 7 Clusters comprising 53 villages across 3 states (Maharashtra, Andhra Pradesh and Madhya Pradesh), having a total population of approximately 53,652 persons (10,024 Households) spread across a geographical area of around 38,006 ha (380.06 sq.kms). Together these represent different agro-ecological and climatic zones; are culturally and ethnically different and also represent different levels of backwardness and integration with the wider economy.

This review has not been easy to undertake. Partly this reflects the complexity and ambitious-ness of the project design. However, besides its complexity, one of the main challenges faced by the review team has been to make sense of sometimes conflicting accounts of the CCA project from the perspective of its key actors (SDC and WOTR, and to a lesser extent NABARD). In particular there appears to have been a progressive differentiation and in some areas polarization of views over the project period. Thus, throughout the review we often give more than one account of the project outcomes and processes, to ensure that both SDC and WOTR perspectives are heard, as well as our own. We also explore some of the reasons why these differences may have arisen, particularly from the perspective of how CCA is framed. Here we simply note that such differences in perspective are not uncommon, given the many complexities, uncertainties and disruptions that climate change gives rise to[1].

Ultimately, however, we have tried to keep our focus on two key sets of beneficiaries – the rural poor of India and the taxpayers of Switzerland. For the poor, marginalized, rural communities living in semi-arid lands of India, climate variability can be devastating. The drought in Maharashtra of 2000 – 2003 (and again in 2012-13)[xiii] forced many communities to diversify their livelihoods, entering into patterns of temporary annual migration in search of a living, often

[1] Climate change, as with some other forces of globalisation, is highly disruptive, experienced both as short-term shocks and longer term stresses. Climate change disrupts understanding and thinking as well as livelihoods, behaviours and routines.

in hazardous conditions (for example sugarcane cutting, brick kilns, chemical factories etc.) and barely above subsistence level[xiv]. More recently, patterns of increasing climate uncertainty and of increasingly extreme events have become more commonplace – for example, during our four week field review period, two separate and intense hail storm events devastated many crops first in Madhya Pradesh and subsequently in many areas of Maharashtra.

Finding ways of adapting to these changes in short term climatic conditions, let alone anticipated longer-term changes, is fraught with difficulties and with difficult questions. Put simply, there are no easy (or indeed right) answers (Box 2). Rather, poor communities, NGOs, government, donors and the global community alike have since the mid-1990s embarked on a period of intense experimentation to try to find out what works and indeed, how continuous experimentation (and adaptation) can best be instituted. As good solutions are often highly contextualized both locally and systemically, there are no silver bullets. Instead, poor communities, NGOs, government, donors and the global community are already inside a learning journey which will involve many mistakes as well as breakthroughs. While increasing resilience is both the goal and the name of the journey, there is in fact no endpoint when one can say that one has arrived safe and sound - and resilient! We have therefore sought in this report to highlight the nature of the learning journey of the CCA project, with the intention that this will be of particular benefit to SDC on behalf of its broader constituency, the citizens and taxpayers of Switzerland, as well as to WOTR and NABARD. Apart from supporting learning, our intention is that the perspectives articulated through this review should also help in effective design, planning, implementation and review of climate adaptation policies and actions in future, both in India and more widely.[xv]

Box 2 Definitions of CCA and resilience

During the review process we uncovered diverse understandings amongst partners of two key terms, 'climate change adaptation' and 'resilience'. In some ways this is not surprising, given the diversity of definitions available[xvi] and the rate of development internationally in new paradigms and praxes[xvii] in these two areas[xviii]. At the same time, the task of building shared understanding and learning around these two terms proved challenging within the CCA project. Rather than offer a definition of these terms here, we set out through this review how each partner understood these terms and how different understandings shaped the dynamics of the CCA project. We also contextualise the development of both terms in Annexes 8, 9 and 10.

2. How we have approached this review

The review is structured follows:

- First, we review the range of local, experimental interventions undertaken through the CCA project, looking at their relevance, effectiveness, efficiency, impact, replicability and sustainability (section 3);

- In sections 4 & 5 we address the linked issues of scaling up, policy engagement and knowledge management. We ask how effective the CCA project has been in its approach to scaling up, looking at how it has engaged with policy and how it has developed and deployed knowledge products and practices in the service of scaling up, policy influencing and global dialogue;

- In section 6 we review the approaches taken in the CCA project in terms of strategic steering, learning and accountability. Following this, we provide an assessment of innovation across the project as a whole (section 7);

- In section 8, we seek to address the value for money in the SDC investment;

- Finally, we provide an overall assessment of the CCA project (section 9) and draw out recommendations (section 10).

In Annex 3 we introduce the review team and in Annex 4 we summarise the approach and methodology of the review.

3. Local level interventions

A key focus of the CCA project has been on local level interventions in village clusters as a means to learn about the social, political and technical innovations required for effective CCA. Building on the established WOTR portfolio of community-based mobilisation and ecosystem-based development practices, the CCA project selected a broad portfolio of local interventions for testing. These included: agro-met-based advisories; sustainable adaptive agriculture; livestock management; water budgeting and water management; DRR; biodiversity conservation; sustainable livelihoods; alternate and renewable energy; food security, nutrition & health; gender mainstreaming and women's empowerment; and the development of governance arrangements for improved DRR and CCA planning. This broad portfolio was chosen to ensure a balanced and integrated approach to CCA and adaptive sustainable development in the 25 villages initially targeted in Ahmednagar district, Maharashtra[xix]. This balanced and integrated approach is a hallmark of the CCA project, as represented in its vision (and implicit theory of change) for adaptive sustainable development (Annex 5) in which the five outcomes of the project are linked with the strengthening respectively of natural, financial, social, physical and human capital (Annex 6). In addition to adopting this integrated approach, from 2011 onwards a reduced number of interventions were tested in a more focused manner, working in 24 additional target villages in Maharashtra (Aurangabad district), Madhya Pradesh and Andhra Pradesh[xx].

The summary results of these local experiments in each activity area are given in Annex 7, which also lists for each activity area the indicators set out in the original CCA project proposal and achievements for the year ending March 2013 (in some cases December 2013). To give the reader a flavour of these results, short vignettes are given in boxes 3 - 6 below.

Drawing on these results, we address here the broader questions of the overall relevance, effectiveness, efficiency, replicability and sustainability of these interventions.

Box 3 Examples of local interventions (1): Locally specific weather-based advisories

Results on the ground:

- Weather forecast is available at the village level (previously at the district level only)
- 5,000 farmers in the project areas have access via SMS to agro-met and crop-specific planning advisories (12 crops)

Challenges addressed and overcome:

Connectivity, social acceptance and use by farmers; cost/benefit

Box 4 Examples of local interventions (2): Adaptive Sustainable Agriculture (based on the promotion of SCI (system of crop intensification), organic fertilisers and low external inputs)

Results:

From adaptive sustainable agriculture practices supported by agro-met based advisories among 5,000 farmers in 45 villages:
- Increased yields (varies from 30-80% across sites)
- Less cost (reductions of 20-40%)

Building resilience: Many farmers report: healthier crop (weight and density); improved soil quality when using organic compost rather than chemical fertilizers; greater crop diversity supported increased food security & fodder needs

Challenges addressed and overcome:

Linking field-based research with academic research for adaptive agriculture; integration of low external input practices into advisories; outreach for farmers' adaptive capacity building (peer-to-peer and farmers field schools)

Box 5 Examples of local interventions (3): Water budgeting and water management

Results on the ground:

38 villages have accepted water-budgeting plans; water resource management interventions (including micro-irrigation) implemented across 83 different sites

Building resilience: Many farmers report, as a result of water budgeting exercise: shifting from flood to drip irrigation; understanding better the implications of different patterns of water use

Challenges:

Translating better water budgets into micro-irrigation systems and contingency crop planning

Box 6 Examples of local interventions (4): Disaster risk reduction (DRR)

Results on the ground:

31 villages have established Village CBDM (Community-based disaster management) plan, hazard mapping and seasonal activity calendars; 12 villages have 3D models («visual integrators»), linking disasters into village planning process and management response

Building resilience: Many farmers report that: preparing the DRR map helps them to communicate with the government what the hazards and risks are; the weather and agro-advisories helps saving harvested crops in case of rain, and manage livestock in case of excess heat.

Challenges:

Differentiate better between climate related disasters and other hazards (e.g. earthquakes); understand better the links between climate change and DRR at the local level (e.g. unseasonal rain and hail) and probable response (from contingency crop planning to weather based insurance products); link disaster management plans (prepared by the community) with government block level disaster management.

3.1 Relevance

The first question to ask of the on-the-ground experimental work undertaken through the CCA project is: were these the right interventions? In other words, how relevant were they? This is an important question both for SDC and NABARD, who want to know that their funding has been spent on the right things. While this is a question which was asked at the outset of the CCA project in 2009, it is important to revisit it in 2014 as this project comes to an end and choices for future investment open up.

Here we consider 'relevance' from a number of perspectives. According to the OECD-DAC definition, relevance is concerned with "the extent to which the aid activity is suited to the priorities and policies of the target group, recipient and donor". Relevant questions include:

- To what extent were the project investments valued by the partners and beneficiaries involved?
- To what extent were the project's activities and outputs consistent with its objectives and intended impacts?

In relation to this second question, and given that two key objectives of the project were to learn about climate change adaptation through testing of innovative interventions, we could ask:

- How relevant were the project's activities and outputs in terms of their focus on climate change adaptation?
- How relevant were the project's activities and outputs in terms of their focus on testing innovations, in the sense of being 'ahead of the game' (see section 3.6)?

To what extent were local-level interventions valued by different actors?

During the review process, we were able to hear from many different actors about the portfolio of local interventions they had participated in or contributed to, and the extent to which they valued these. During the workshops and field visits the engagement and enthusiasm of local communities came over strongly. While initial community engagement in understanding the rationale of trying new approaches, and their link with climatic changes, had taken some time (as reported by local WOTR field staff), and while it had also taken local WOTR field staff some time to understand local climate situations and thereby develop a shared understanding with villagers of how to approach the CCA work, persistence on both sides had paid off.

SDC. Based on our interviews, for SDC the work on the development of agro-met advisories was highlighted as the most valued intervention, together with adaptive sustainable agriculture, DRR, capacity building, governance and gender empowerment, and the value of taking a landscape-level approach in the context of CCA. SDC expressed reservations about those interventions which they saw as focusing primarily on developmental activities rather than climate resilience. This included some of the activities related to livelihood diversification (see Annex 7.viii) as well as work on women's and children's health (both however were funded almost exclusively by NABARD). The sustainability of SDC's investment in a relatively small number of villages, requiring high levels of investment by WOTR field staff, was also questioned by SDC (see below).

NABARD. For NABARD, while particularly appreciative of some of the local experiments (some SDC, some NABARD and some jointly-funded), for example on agro-met based advisories; DRR; health & nutrition; and on livelihood diversification, a different kind of concern was expressed, focusing more on the mechanics and timeframes of logframe-based implementation and on whether targets were being met[xxi].

How relevant were the project's activities and outputs in terms of their focus on climate change adaptation?

The question of relevance based on the extent to which activities were properly focused on climate change adaptation is an important one, albeit not simple to answer. The question matters because funders need assurance that funding that is set aside for adaptation is not simply being used for 'development as usual'. This means in turn that funders and beneficiaries need a shared understanding of how adaptation and development are inter-related and the extent to which useful distinctions can be drawn between the two. In the case of the CCA project, this question took on further import, as a joint funding arrangement was negotiated in which SDC would fund those interventions which were seen as primarily adaptation-related, whereas NABARD would fund those interventions which were seen as primarily focused on development as usual.

As highlighted in our interviews, this resulted in an ongoing conversation about 'is this development or is it adaptation?' We believe that such a conversation, while of heuristic value, also contains conceptual traps. The conversation becomes enabling if it focuses attention on the relationship between adaptation and development, and in particular, what constitutes good 'adaptive development'. However, the conversation can turn counterproductive if it ends up focusing on how to draw a distinct line between adaptation and development[xxii].

For SDC, an influential document in framing the relationship between adaptation and development was the 2007 publication: Weathering the Storm[xxiii]. This publication set out a continuum which highlighted, at one end, activities that addressed the drivers of vulnerability (the 'developmental' end of the continuum) and at the other end, activities with a more exclusive focus on 'confronting climate change'. Moving from one end of the continuum to the other involves an increasing focus on 'climate proofing' ongoing development efforts but also a more exclusive focus on addressing the impacts of climate change, for example, relocation in response to sea level rise (Annex 9). In parallel with this continuum-based approach, the publication also highlights (we think in a useful way) the importance of building capacities for governance and decision making under uncertainty, for example through an emphasis on appropriate M&E and learning approaches[xxiv].

For SDC, then, one way of assessing the relevance of the local-level interventions undertaken through the CCA project is in terms of this continuum, in particular, focusing on where these interventions might fall along the continuum, and whether any fell only into the purely 'development-as-usual' category. As shown in Table 1, all but one of the interventions funded by SDC alone or jointly with NABARD reflect, in our view, one of the two central categories of the continuum – either 'building response capacity' or 'managing climate risk' (Annex 9). Furthermore, of the two interventions, which might be considered (on the basis of the Weathering the Storm criteria) to fall into the 'development-as-usual' category, one (focused on nutrition and women and children's health) was funded by NABARD only and is therefore entirely consistent with their 'development deficit' funding focus[2].

There is a danger, however, in seeing the interventions in the CCA project as discrete, rather than as part of an integrated portfolio. Viewing the portfolio of interventions as an integrated whole would suggest that none fell into the purely 'development-as-usual' category but rather that all were part of an integrated experiment focusing on the two central categories of the continuum. Comparison with a checklist of good adaptation practices further reinforces the

[2] In the literature there is increasing recognition of the need to integrate food security, nutrition and climate change adaptation. As argued in the 2010 UNFCCC Message to the negotiators: "Nutrition security should be explicitly addressed in climate resilient development, national adaptation and disaster risk reduction plans in low and middle income countries (LMIC)". Hence an argument could be developed that this work fell within the Weathering the Storm category of 'building response capacity'.

argument that as a portfolio, all the interventions tested were not only consistent with an adaptation focus but also fell within a well-balanced selection (Annex 11). This further highlights that the practical distinction drawn early on in the project between those interventions funded by SDC as being about adaptation and those funded by NABARD as being about development-as-usual risked leading to confusion rather than acting as a valuable heuristic.

Table 1. Comparison of the CCA project interventions with the four categories set out with the 'Weathering the Storm' continuum

		(Sustainable) Development	'Adaptation'		
Funding	***Interventions***	**Address drivers of vulnerability**	**Building response capacity**	**Managing climate risk**	**Confronting climate change**
Joint	Sustainable adaptive agriculture – SCI			*	
Joint	Sustainable adaptive agriculture – Organic composting		*		
Joint	Sustainable adaptive agriculture – Livestock management			*	
Joint	Agro-met-based advisories		*		
SDC/Joint	Water budgeting and water management			*	
Joint	Disaster Risk Reduction (DRR)			*	
Joint	Biodiversity (PBRs)		*		
NABARD	Alternate and renewable energy		*		
Joint/ SDC	Sustainable livelihoods linked to local economies and local exchange trading systems	*			
NABARD	Nutrition and women and children's health	*			
Joint	Village Development Committees		*		
Joint	Women's self-help groups (SHGs)		*		
Joint	Capacity building on climate change issues		*		

Nonetheless, a critical test to ensure that each intervention is contributing to a climate-adaptive trajectory would be to ask: has this intervention been 'climate-proofed' or might it be adaptive in the short term but contribute to maladaptation in the longer term? Unfortunately, the 2007 continuum is not sufficiently rigorous conceptually to support this kind of analysis, so that to address this question one might instead need to turn to continua developed more recently (see e.g. Annex 10), including those that engage with more recent debates on resilience (Annex 8). We present two such analyses in Annexes 12a and 12b, the first of which draws on the CCA project's Co-DRIVE framework, and the second on the resilience framework developed by the ACCRA project.

Our understanding is also that WOTR, while paying pragmatic lip service to the adaptation/ development-as-usual distinction for funding purposes, pursued from the outset quite a different framing of the relationship between adaptation and development, namely that of 'adaptive sustainable development'. This is entirely consistent with its focus up until 2009 on sustainable development and its interest in how to adapt this framing in the light of climate change. This adaptation is expressed through the CCA project 'engine for adaptive sustainable development' (Annex 5), which emerges early on in the project as a key framing and conceptual strategy' (see Box 7) for WOTR[xxv].

Box 7: Conceptual Strategy and Implicit theory of change

As set out in our original proposal for this review (in response to the Terms of Reference from SDC), in places we adopt a conceptual strategy[xxvi] or 'theory of change' perspective in this report. This does not mean that we have attempted, ex-post, to retrofit a theory of change (ToC) on the CCA project, as a project ToC was never developed.

Nonetheless, as adaptation is by definition concerned with change and how change happens, we have probed for understandings and assumptions within the CCA project - including those articulated by the different partners involved - that reflect understandings of how change – and therefore adaptation – happens. Explicit *assumptions* are a key component of ToCs (and to an extent also of good logframe development)[xxvii]. We have focused in particular on assumptions at the start of the project.

We note that the Weathering the Storm framework focuses on the 'what' of adaptation (i.e. 'to what extent is an intervention development or adaptation focused?'), rather than on the 'how' of adaptation (i.e. 'what is the nature of the change processes needed under adaptation?')

These differences in conceptual understanding, framing and implicit theories of change, and the ways in which these were played out through the dynamics of the SDC-WOTR-NABARD partnership, are discussed further in section 6 below.

3.2 Effectiveness

Under the OECD-DAC definition, effectiveness' is defined as 'a measure of the extent to which an aid activity attains its objectives'. The question of effectiveness can be addressed in several ways: for example, to what extent did the interventions reach their 'delivery' 'targets' agreed at the outset of the project? has resilience been built in the targeted village clusters[3]? what factors were responsible for the achievement or failure of the objectives? what has been learned to date from this work and what is its potential to bring further benefit to the targeted village

[3] 'Resilience' is a term increasingly deployed both in policy discourse and by researchers and practitioners. For some, it has now replaced climate change adaptation, while others consider resilience on a continuum between disaster risk reduction (DRR) and adaptation to long-term climatic changes. Like 'sustainability' it is a highly mobile term with multiple meanings and usages. In Annex 8 we illustrate how the term is currently being deployed both by a donor, DFID, and by an influential INGO, Oxfam GB. Following Oxfam GB and the UK-based Resilience Learning Group; here we use the term to refer both to a set of outcomes and to a process of learning.

clusters in the future? to what extent is it valued by different partners? and: what is its potential for scaling up[4]? Table 2 addresses the first of these questions: to what extent did the local project interventions reach their 'delivery' 'targets' agreed at the outset of the project?

Table 2 Extent to which each intervention reached its delivery targets. Targets that were exceeded are shown in green; those that were matched are shown in orange; and those that the CCA project failed to reach are shown in red.

		Target 1	Target 2	Target 3	Target 4
Joint	Sustainable adaptive agriculture – SCI	**150: 776** farmer demonstration plots	132: 64 hectares under agro-horticulture	4259: 3192 hectares under crop cultivation	
Joint	Sustainable adaptive agriculture – Organic composting	262: 335 composting units			
Joint	Sustainable adaptive agriculture – Livestock management	All villages in 2 clusters: 90 BYP shelters in AP	- : 82 animal health camps		
Joint	Agro-met-based advisories	**31: 51** agro-met stations	**20%: 30%** farmer population using agro-advisories	75: 51 weather boards displayed in villages	
SDC/ Joint	Water budgeting and water management	**20: 38** villages with water budgeting plans	**8: 83 WR** management techniques installed		
Joint	Disaster Risk Reduction (DRR)	**4: 12** DRR training for Wasundhara Sevak	-: 20 DRR plans	-: 12 DRR activities promoted	-:17 villages with DRR hotspots mapped
Joint	Biodiversity (PBRs)	33: 17 PBRs			
NABARD	Alternate and renewable energy	3204: 356 households participated in relevant programs	- : 6 parabolic solar reflectors in schools	- : 14 solar community streetlights	- : 32 biogas units
Joint/ SDC	Sustainable livelihoods linked to local economies and local exchange trading systems	25%: - increase in gainful employment	3: 3 new livelihood options in all villages	1:1 concept note for a carbon neutral village	

[4] It is difficult to discuss 'potential for scaling up' without understanding how scaling up will be done in practice. This is considered in section 4. However, some of the partner perspectives listed in this section do indicate the potential for scaling up.

NABARD	Nutrition and women and children's health	**750: 1817** children in growth monitoring programs	**30%: 34%** decrease in malnourished children	**10%: 19%** decrease in anaemia among women	
Joint	Governance including Village Development Committees (VDCs)	**20: 25** village visioning exercises	**20: 43** wealth ranking exercises	**43: 49** VDCs formed	**43: 55** Samyukt Mahila Samiti formed
Joint	Women's self-help groups (SHGs)	**84: 562** women's SHGs formed			
SDC	Vulnerability mapping studies	**16: 16** studies conducted			

As shown in Table 2, targets were matched or exceeded for the majority of interventions. Achievement against targets fell short in four main areas:

- there was a shortfall of hectares under sustainable agro-horticulture and crop production;
- there was a shortfall in the extent of work undertaken against targets for sustainable livestock management;
- there was a shortfall in the development of People's Biodiversity Registers;
- there was a shortfall in the numbers of households participating in relevant programmes for alternate and renewable energy.

Based on the results shown in Table 2, our view is that, on balance, the CCA project can be judged as effective in delivering the outcomes agreed in the logframe at the outset. Not only is this a strong result considering the local level interventions in terms of an integrated portfolio, but also, for the several interventions considered as significant by SDC (sustainable agriculture, agro-met, water budgeting, DRR, capacity building and governance), the results in large part also demonstrated effectiveness.

As indicated in boxes 3-6 and discussed in more detail in Annex 7, there has also been significant learning across the local interventions.

3.3 Efficiency

Efficiency measures the outputs - qualitative and quantitative - in relation to the inputs. It is an economic term which signifies that the aid uses the least costly resources possible in order to achieve the desired results (OECD-DAC, 2000). This generally requires comparing alternative approaches to achieving the same outputs, to see whether the most efficient process has been adopted. The efficiency of the CCA project is discussion in section 8, as part of the broader review of value for money.

3.4 Impact and Innovation

The OECD-DAC defines impact as 'the positive and negative changes produced by a development intervention, directly or indirectly, intended or unintended'. This involves the main impacts and effects resulting from the activity on the local social, economic, environmental and other development indicators. A review of impact should be concerned with both intended and unintended results and should also include the positive and negative impact of external factors, such as changes in terms of trade and financial conditions. Relevant questions are:

- What occurred as a direct result of the programme/project?
- What real difference was made to the beneficiaries as a result of the activity?
- How many people were affected?

In terms of impacts resulting from the CCA project interventions on local social, economic, environmental and other development indicators, we note that the CCA project directly impacted a total population of approximately 72,352 persons (14,119 Households) spread across a geographical area of around 45,108 ha (451.08 sq.kms). We suggest that this impact should be assessed in terms of the following four measures, which between them combine the questions above with the focus of this project on building adaptive capacity and innovation:

- To what extent did the CCA project improve local human and social indicators while also building response capacity?
- To what extent did the CCA project improve local environmental indicators while also building response capacity?
- To what extent did the CCA project improve local economic indicators while also managing climate risk?
- To what extent did the CCA project result in local innovation?

To what extent did the CCA project improve local human and social indicators while also building response capacity?

Drawing on Table 1 and Annex 7, the following impacts should be noted:

- The development of new governance capacity for DRR and CCA through strengthening of Gram Panchayats and the development of 50 VDCs, based on a wealth ranking approach;
- Substantially improved gender inclusiveness in terms of access to resources, livelihoods and governance
- Improved understanding within the village communities about what is going on with climate – both conceptually, and in terms of how to deal with this (through agro-met based advisories);
- The gradual establishment of an “adaptive management” culture among farmers, with farmers gradually becoming more empowered to access relevant information on CCA, test and use this under different conditions, as well as feeding the research community on CCA with their findings.

In addition, the CCA project led to a reduction in malnourishment among children of 30%, while the incidence of anaemia among women was reduced by 19%. These demonstrate improved social impacts, which are in our view significant, given the fact that improved nutrition security is key to building resilience to climate change.

To what extent did the CCA project improve local environmental indicators while also building response capacity?

Drawing on Table 1 and Annex 7, the following impacts should be noted: reduction in pesticide use through organic composting (also resulting in improved soil quality); reduction in the use of carbon-based energy (including local firewood collection) through the introduction of alternative and renewable energy technologies (the introduction of the hot water chullah has resulted in an estimated 40% reduction in fuel wood consumption per household – equivalent to 1000 kgs of wood fuel per household per year); improved water budgeting and water management techniques – applied to date in 83 locations/farms, with many farmers shifting from flood to drip irrigation; and gradual improvements in biodiversity management as a result of both improved understanding of the role of biodiversity (based on People’s Biodiversity Registers and training for local youth) and the introduction of biodiversity-enhancing livelihoods, such as bee-keeping.

To what extent did the CCA project improve local economic indicators while also managing climate risk?

Drawing on Table 1 and Annex 7, the following impacts should be noted:

- Increased yields (30-80% productivity gains on average) at less cost (reductions of 20-40%) among 5,000 farmers in 45 villages, as a result of the interventions in sustainable adaptive agriculture. The experience of WOTR in its project villages indicates that climate variability is already hitting crop production, causing economic losses for the farmers despite the tangible benefits of participatory watershed development[xxviii]. In view of this, new strategies to support agriculture in general and the smallholder producers in particular, are vital. However, it is too early to judge whether the investments by the CCA project in sustainable adaptive agriculture yet reflect improved management of climate risk;
- In Andhra Pradesh, savings have been reported following a switch to Backyard Poultry Production;
- While weather-related hazards remain a challenge to manage, the weather and agro-advisories have been found useful to save harvested crops and manage livestock in the case of excess heat, reflecting the value of improved disaster risk reduction (DRR) practices;
- In the case of slow-onset disasters, such as drought, the integrated watershed development approach pioneered by WOTR through the Indo-German Watershed Development Programme and subsequently upscaled by the Government of India has proven key to the resilience of villages. In the 15 districts of Maharashtra declared drought-hit in 2013, villages where integrated watershed development had been implemented were more resilient as compared to neighbouring villages where no similar programme had been done[xxix]. A further and striking finding is that in the Kumbharwadi village of Ahmednagar district, the drought of 2012–13 provoked an interesting response from farmers – crop diversification[xxx]. Here farmers prioritised household food security and fodder needs rather than market demands, noting that the benefits of watershed development – water availability and land productivity – gave them the confidence to make judicious decisions and take calculated risks during adverse conditions[xxxi].
- The promotion of livelihoods diversification, through a mix of on-farm and non-farm livelihoods, have both increased the skill of local populations engaged in these activities and diversified livelihoods available to women and the landless. As all these activities are still at a very early stage of implementation and their link with resilience and climate change adaptation is an indirect one, it is difficult to tell whether they have contributed to building resilience at this stage. Yet, during the workshops and field visits the engagement and enthusiasm of local communities to take up these income-generating activities came over strongly.

To what extent did the CCA project result in local innovation?

The introduction of various new and/or improved technologies or systems has been very instrumental in building capacity for innovation at the village level. Whilst introducing a series of on-farm improved methods to develop adaptive agriculture, water efficiency, alternate energy use and biodiversity conservation, the CCA project has by the same token increased the participation of farmers in the whole cycle of innovation (testing, adjusting, and dissemination). This capacity to actively participate in the experiments is most developed at the following levels:

i) the CCA project has helped farmers to become aware of the “old” way of doing things and how this compares with results/challenges obtained with new experiments on their plots;
ii) the CCA project has helped farmers to integrate these experiments within a planning and monitoring system, which is linked with climate variables (agro-met advisories);

iii) the CCA project has made accessible to farmers support and innovative knowledge to experiment on the ground, whilst establishing linkages with research institutes or universities to integrate the results of these local experiments, including farmer's perceptions, within the broader research agenda. Although this latter process is still at an initial stage, mostly relying on the contribution of Dr. Mwani (a retired agricultural university professor working for WOTR), we feel that it has good potential for linking on-site research with more established research on CCA agriculture.

At a general level, we feel that an important effect of the increased capacity which has been built amongst farmers is the gradual establishment of an "adaptive management" culture, where farmers are gradually becoming more empowered to access relevant information on CCA, test and use them under different conditions, and feed the learning and research community on CCA with their findings.

There was however some divergence of views among the CCA project partners as to the extent to which all interventions were innovative (in the sense of being 'ahead of the game'). Thus SDC noted in its 'back-to-the-office' report of 13th October 2013 that:

> "we were left with a distinct and unmistakable impression…that the truly innovative content/ character in some of the actions (notably treadle pumps, cook stoves, bio gas, extensive support to vermi-compost etc.) was missing. SDC is aware of validated time-tested experiences already available (e.g. in bio gas, treadle pumps, cook stoves) in these thematic areas (also extensively supported by SDC through its partners such as Gram Vikas, IDEI, AFPRO etc. in 1980s and 1990s) and it should be possible for WOTR to make full use of these (for upscaling with resources for addressing development deficit) rather than reinvent the wheel."

Here the underlying rationale for SDC was to see the CCA project as a test-bed only for innovations in local level adaptation that had yet to be explored, and not for those that were being explored elsewhere or were already further developed in the innovation curve.

By contrast, the approach of WOTR towards innovation, from both an ethical and a normative standpoint, was to take an integrative approach, as set out in the 'engine for adaptive sustainable development' (Annex 3). Thus vermi-composting is not treated by WOTR as a discrete experiment, but rather as part of a wider innovation cluster closely linked with other aspects of sustainable adaptive agriculture. Likewise, cooking stoves and biogas (both in this case NABARD funded) are seen as part of a broader experiment in the reduction of drudgery, the empowerment of women, and a carbon neutral development pathway linked to a broader vision of adaptive sustainable development. Nonetheless, in the later-start village clusters (in Aurangabad, Madhya Pradesh and Andhra Pradesh), the CCA project undertook some testing of interventions in a more discrete way, albeit that these were always considered by WOTR within a broader integrative framework and sequencing.

As it was outside the remit of this rapid review to undertake a comprehensive review of innovation for adaptive sustainable development in the arid and semi-arid lands in India, our answer to this question can only be very partial, and must depend on feedback from key actors. Nevertheless, as innovation is necessarily contextual to both people and place, feedback from key actors provides a reasonably reliable indicator. Based on these criteria, the tables in Annex 13 and 14 indicate the extent to which the different innovations of the CCA project can be considered as innovative in the sense of being 'ahead of the game', if considered discretely. These indicate widespread recognition of the innovative nature of many of the CCA project interventions, not just among the villages involved, but also from the perspective of state, national and international level actors.

When taken as part of an integrated portfolio, based on the 'engine for adaptive sustainable development', then the 'innovation quotiant' of the local level interventions is likely to be much

higher. This is reinforced through the innovative approach taken in the Co-Drive framework (see section 5), developed through the project for use in identifying contextually appropriate adaptation options. Our overall assessment is that as an integrated portfolio, the local-level experiments of the CCA project are highly innovative, even though still at a relatively early stage of development, and furthermore that they are of international interest. An up-to-date comparative analysis, for example with programmes such as the Climate Change, Agriculture and Food Security (CCAFS) programme of the CGIAR programme, would help to confirm this.

3.5 Sustainability and replicability

For the OECD-DAC, sustainability is concerned with "measuring whether the benefits of an activity are likely to continue after donor funding has been withdrawn. Projects need to be environmentally as well as financially sustainable." Relevant questions include:

- To what degree did the programme/project's benefits persist following the end of donor funding?
- What were the major factors
- What chief factors were responsible for the achievement or failure of the programme/project's overall sustainability?

As the CCA project is not yet finished, we are not yet in a position to answer the above questions. Indeed we would recommend a gap of at least 2 years before seeking to assess the extent to which project benefits persisted following the end of SDC funding. However, the question of sustainability has already raised some important questions for the CCA project. The following questions were highlighted in March 2013 by Othmar Schwank (OS) in his role as a provider of backstopping support (see also section 6.4):

> "What is the role of WOTR? The underlying topic discussed with WOTR in a number of missions is: Shall WOTR act as an organization providing innovative technical assistance rather than a service provider engaged in an area in the long term? Which strategies are adopted to transit from "innovation investment" and "capacity & institution building in a cluster area" to a process of sustainable operation of the services developed (which shall work also in absence of WOTR's presence)?"[xxxii]

Such questions are closely linked to theories of change and to the design of strategies for replication (for conceptual reasons, we prefer the terms 'scaling out' and 'scaling up'), which is considered in section 4 below.

4. Scaling up and policy influencing[xxxiii] in the context of CCA and innovation

4.1 What is scaling up?

Scaling up and policy influencing formed an increasingly important focus as the CCA project progressed – in this respect it reflected the highly dynamic environment in which the project was operating. For WOTR, policy influencing has always been integral to its work, as evidenced through its previous collaboration with NABARD and other national policy actors, in which it was able over a 17-year period to scale up its community-driven approach to water management[xxxiv]. For CCD/SDC there was an increasing prerogative during the life of the CCA project to place scaling up and policy influencing centre stage, in line with SDC's evolving Strategic Framework of the Global Program Climate Change (GPCC) 2013-2017[xxxv] (see thrust 2 in Box 8). This is also in line with the development of an increasing attention to scaling up, over the same period, on the part of many development practitioners and donors. Alongside conceptual discussions seeking to differentiate between 'replication', 'scaling up' and 'scaling out'[xxxvi], practitioners have been experimenting with a multiplicity of approaches in these areas. Theories of change, also,

have focused increasingly on different pathways for scaling up[xxxvii]. In some fields, such as agriculture and natural resource management[xxxviii], systems which shape approaches to scaling up have been under debate and development for several decades, evolving through a series of distinct paradigms (see section 7 on innovation, Annex 22)[xxxix]. In others, such as CCA, this is a relatively new field[xl].

Some key themes that emerge from recent work on scaling up are as follows:

- Scaling up is still by and large a conceptual and practical challenge for development practitioners.

Box 8: The main thrusts of the Global Program Climate Change 2013-2017[xli]

1. Active participation in national and international **policy dialogue** and multilateral processes, including representation on the Executive Boards of multilateral climate funds (*GPCC outcomes 1.1 & 1.2*)[xlii]. The latter function is performed by the SDC head office in Bern;
2. Design, implementation and participation in **innovative projects and initiatives** in specific thematic fields taking into account the nexus with water, food security and DRR (*GPCC outcomes 3.2 & 3.3*). **Emphasis will be given to the policy dimension and scaling-up** (bold highlighting added).
3. Proactive engagement in **knowledge sharing and integration of climate change** issues in development cooperation (*GPCC outcomes 4.1 & 4.2*) through SDC's Climate Change and Environment Network.
4. Building bridges and strengthening **synergies and interlinkages between these three levels** – i.e. through dissemination and communication of concrete results on the ground such that they find a way into policy processes and initiatives at regional and global levels.
5. This also requires **multi-disciplinary approaches**, by creating links, bridges, platforms for dialogue and partnerships between actors from government and quasi government agencies, NGOs, academia, the private sector, development practitioners and stakeholder associations.
6. For all these reasons, the **operational portfolio** for 2013 – 2017 will remain in regions and countries which are highly affected by climate change and play an important global and regional role in resolving the climate change problem. As in the previous period, India, China, South Africa and Peru/Andean region are areas targeted by GPCC operations.

- Scaling up is a gradual process, which can involve multiple strands of activity, including policy influencing, capacity building, partnership building, research and knowledge management through a multiplicity of actors at multiple levels;
- Scaling up is not a linear process and its realization depends on many factors lying beyond the direct control of the NGO or other stakeholders involved, ranging from the financial and institutional capabilities of different actors, to the degree of acceptability and ownership of innovations by the other local communities targeted in the scaling up/out process;
- The possibilities for scaling up in a given context should therefore be analysed and understood in the light of its political economy, its administrative and institutional arrangements, culture of change, etc.;
- While in reality it is often not possible to analyse these questions thoroughly enough, it is nevertheless helpful to capture what is understood by "scaling up" in specific projects and contexts through articulating a theory of change, including for example: which policies are targeted and at what administrative levels, what changes and influence are expected and how these are expected to occur, and the expected outreach (geographical coverage and number of people concerned);
- The pathways of change may vary according to the strands of activity involved (policy influencing; capacity building; research etc.);

- Significant conceptual analysis has been undertaken in recent years of the different roles that may be required in order to facilitate different pathways of change within a scaling up portfolio. These are usefully captured under the rubric of 'K*' (Annex 16).

4.2 Framing and targets for scaling up set out in the original proposal of the CCA project

The original proposal for the CCA project highlighted four main approaches to scaling up and policy influencing, with specific targets underpinning the latter two:

- 'conventional means' adopted to ensure engagement of key framework actors (the governmental and political establishments), policy makers, opinion leaders and academia
- a specific instrument for policy advocacy called *the Exposure Dialogue Program* (EDP), with which WOTR had over a decade's experience[xliii]. This instrument was selected as it had had significant impact in terms of securing policy and institutional changes at the national and state levels in regard to participatory watershed development. It was proposed that 'this instrument will be further developed to suit the needs and possibilities of a wider group of people such as those in industry and commerce, donors as well as those who wish to experience the life of the marginalized and vulnerable and understand "how the world looks like from below"'.
- organising two policy workshops, at the state and national level respectively, in order to facilitate mainstreaming and dissemination of experiences, learnings and best practices. In the proposal for extension (September 2011), two further policy workshops were agreed, one each in MP and AP at the state level respectively;
- one international EDP-cum-training program (15 participants) will also be conducted.

4.3 Delivery against original targets

In terms of delivery, both against the targets set out for the latter two approaches, and of EDPs, the CCA project performed strongly:

- Three policy workshops were delivered at the national level – the first in July 2010, the second in February 2011 and the third in June 2012. Each workshop had participation from many states including Maharashtra, Madhya Pradesh and Andhra Pradesh, and all appear to have been successful[xliv]. Each event served to create linkages as well as to share with participants the progress of the CCA project, highlighting the realities and emerging learning about doing adaptation work at the field level. These workshops also reinforced the process by which WoTR was able to sign MOUs with key knowledge partners (Dec 10 with ICRAF; June 11 with CRIDA; July 2011 with IMD; Dec 2011 with MPKV). The first workshop (in July 2010) also fed into the SDC-led process to take the experiences of grassroots to policy (see below);
- Two policy workshops were delivered at the state level, both in Maharashtra – the first in June 2013 and the second in March 2014[xlv];
- Extensive delivery of EDPs was undertaken, drawing on funding both from the CCA project and elsewhere. In total this included 12 'traditional' EDP sessions (lasting 7-9 days on average) and 220 'shorter' EDP sessions, lasting on average 2 – 3 days (Annex 15).
- The CCA project also participated in the SDC-led process to take the experiences of grassroots to policy, which culminated in the "National Policy Dialogue on Climate Change: Linking Grassroots Actions to Policy Debate, Up-scaling, Knowledge Sharing and Science" held in Delhi on 12 November, 2010. Chaired by the MS Swaminathan Research Foundation and organised by SDC in partnership with MSSRF, WOTR, Development Alternatives and IUCN, this national dialogue had wide stakeholder participation from various ministries, departments and academic institutes including the Prime minister's office. The discussions were centred on mainstreaming some of the insights gained from

the regional consultations (including the CCA project July 2010 workshop in Pune and a 2-day workshop held in Chennai and hosted by MSSRF) into the various missions under the national action plan on climate change. Suchil Bajpai and Marcella D'Souza on behalf of the CCA project participated in all three events (including presenting papers at the Chennai workshop). In support of the above process, the CCA project also contributed to the document 'Voices from the Grassroots', prepared by the SDC, and an accompanying film in which WOTR's villages, people and staff played a role[xlvi]. (In this review we were not however able to establish the concrete outcomes of this policy influencing process, making it difficult to trace further synergies between this broad influencing strategy established by SDC in 2010 and the specific policy engagement pathways of the CCA project during 2011-2014).

4.4 How did SDC understand progress on upscaling and policy influencing?

As noted above, for SDC the role of scaling up and its linkage to policy influencing assumed an increasingly central role in the later years of the CCA project. Moreover, as the CCA project progressed, SDC increasingly felt that WOTR was paying insufficient attention to this aspect of the project. At a project meeting in May 2013 this was stated unequivocally as follows:

> "Activities under the current project are not fully in sync with the orientations, principles, strategies and approaches of SDC's Global Cooperation Programme on climate change and this will need full reorientation before we attempt to plan for the potential next phase…Working with the Government at different levels, especially on policy development processes, has become *sine qua non* of the GPCC project. The initiatives on contribution to policies, strategies, plans, concepts and programmes on climate change/ climate resilient development at the national and State levels will need highest level of intensity and focus (e.g. State and National action plans on climate change, national missions, sectoral plans etc.)."[xlvii]

To progress this area, SDC proposed that:

> "We should not shy away from forging close links with other organisations similarly placed, through leading a common platform or network for policy dialogue, integrating experiences and lessons from all quarters. Similarly, our different knowledge products should be demand/ needs based and meet high quality standards."[xlviii]

Reflecting these statements, a significant concern for SDC was that no links were formed by WOTR with the nodal Ministry of Environment and Forestry. Similarly, no attempt was made by WOTR to link up with the Maharashtra State Action Plan for Climate Change throughout the five years of the programme. Equally, it is curious why SDC, in its role as a knowledge partner and knowledge broker within the CCA project, did not itself initiate these key linkages.

Tensions between SDC and WOTR over both the timing and the approaches taken to policy engagement and scaling up emerged as a significant dynamic within the CCA project, further discussed in section 6. However, we note here that SDC does not remember attending the first state level workshop in Maharashtra, that they were unaware of the EDPs, and that not a single event organized by WOTR within the CCA project took place 'at the Delhi level'.

Responding to the concerns expressed by SDC in May 2013 (see above quotes), a new partnership working arrangement was developed between WOTR and WRI India as a means to strengthen the policy influencing component and forms an important thrust of work during 2014.

4.5 What approaches did the CCA project adopt in practice and what has been achieved in terms of scaling up?

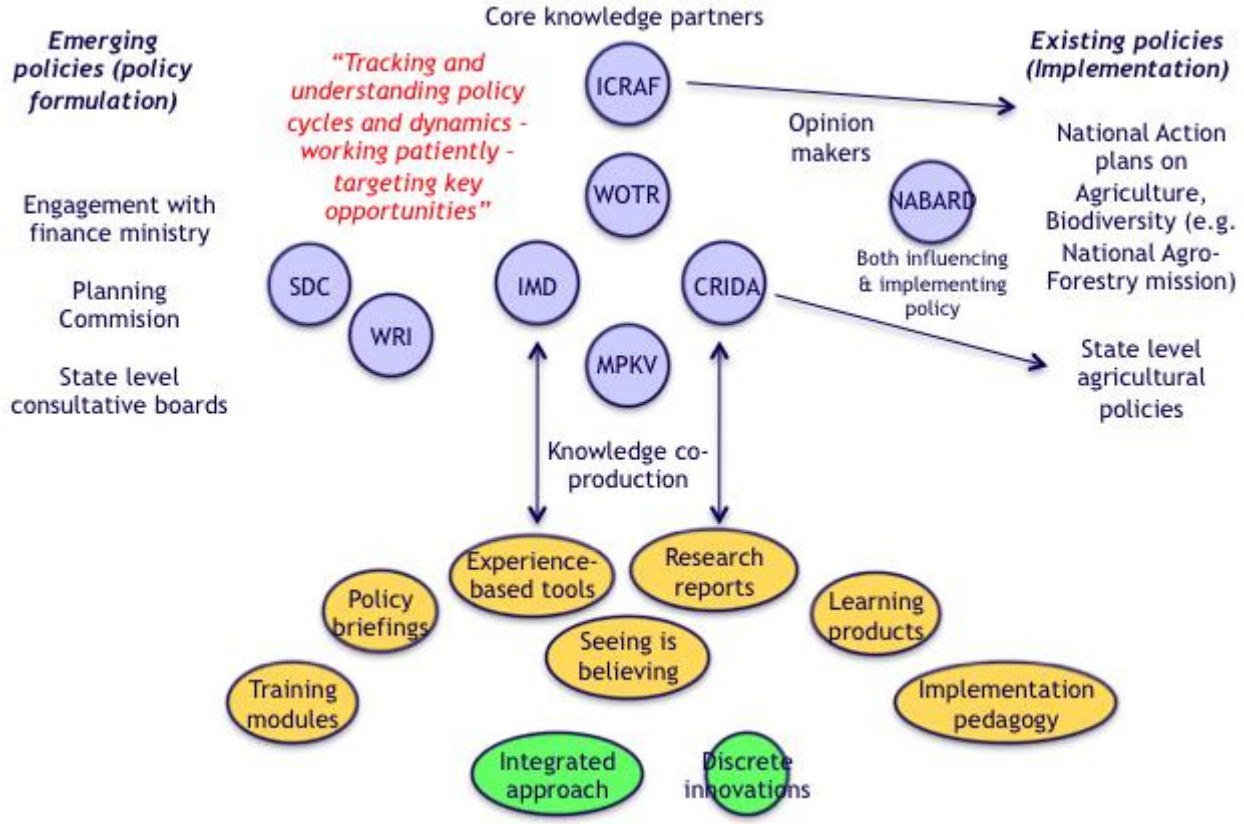
In contrast to some of the concerns expressed by SDC over the approach taken by WOTR and the pace of development in this area, we identified quite a sophisticated approach to scaling up

and policy influencing on the part of WOTR, based on an appreciation of the complexities involved.

While this might in part have developed as the result of SDC's exhortations, it also quite clearly built on the experience and on the many networks and key relationships developed by WOTR prior to the CCA project. The experience of the Indo-German watershed Development programme in particular had taught WOTR that government is best convinced when it sees results on the ground and substantially so – that is, in many villages and locations. When such results are visible – and moreover supported by studies on the impacts of the various implementation activities - there is a greater likelihood that these are then incorporated into state and national programmes and plans. Furthermore, by 2014 this policy influencing approach and capacity was well embedded not only in the WOTR Pune team but also within the field teams, both in Maharashtra and Andhra Pradesh.

WOTR's approach to scaling up, which is grounded in the design of the CCA project in clusters and in several districts and states, is designed to create policy interest and demand at multiple levels of governance. The overall design is illustrated in Figure 2[xlix]. This highlights two main strands of policy influencing and upscaling, both supported by a number of key partnerships and a range of knowledge tools and processes.

Figure 2 The approach to scaling up and policy influencing for climate change adaptation enacted through the CCA project The approach focuses on: two strands of policy influencing (policy formulation and policy implementation); eight key knowledge partners (shown in blue circles); supported through a range of different knowledge modalities (yellow circles). Both discrete innovations and the integrated approach championed in the CCA project (green circles) are being scaled up in this way.



The two strands of policy influencing consist of (i) contributing to the development of current policies (i.e. policy formulation) at district, state and national level, for example working with state consultative boards and nationally, with the Ministry of Finance[l] and the Planning Commission[li] (left hand side of Figure 2), and (ii) supporting the implementation of existing policies, for example state level water and agricultural policies and national action plans on agriculture and biodiversity (right hand side of Figure 2). For WOTR, the approach required is not a linear one, but requires working patiently and organically, understanding and tracking policy cycles and dynamics and targeting key opportunities. While one-off policy workshops (as identified in the original proposal and for SDC a key component of policy influencing) can help to build the 'mood music' within policy processes, WOTR highlighted that these need to be understood in context, and be carefully positioned within a broader strategy. This perspective of WOTR on the need to position one-off policy dialogue events within a broader and well-timed strategy was supported by Othmar Schwank, a Swiss advisor to the CCA project, who highlighted it as one of the strengths of WOTR's contribution to policy engagement within the CCA project.

Policy coalitions are also key to the CCA project approach (the need to 'forge close links with other organisations' identified by SDC in the May 2013 meeting). Figure 2 shows that WOTR has chosen to work with a number of core knowledge partners for the purposes of scaling up: IMD, ICRAF, CRIDA[lii] and MPKV[liii] (as well as SDC and NABARD[liv]) and has developed an MOU for this purpose with the majority of these partners.

Furthermore, its work with several of these partners involved a 'knowledge co-production approach' (see Annex 16), in which experience-based tools and research reports were jointly shaped. These knowledge tools were in turn a part of a broader panoply of knowledge modalities that included training modules, policy briefings, study site visits ('seeing is believing') and other learning products, all shaped by an implementation pedagogy (see also section 5).

In addition (and not shown in Figure 2) the CCA project also enabled WOTR to participate in a number of arenas for the purpose of engaging with and influencing international policy. These included COP 18 Doha, World Water Week in Stockholm and the South Asian Network on Climate Change. An emerging target is to build links with the Adaptation and Green Climate Funds.

Building on these approaches, the key achievements to date of the CCA project's scaling up and policy influencing activities are shown in Figure 3.

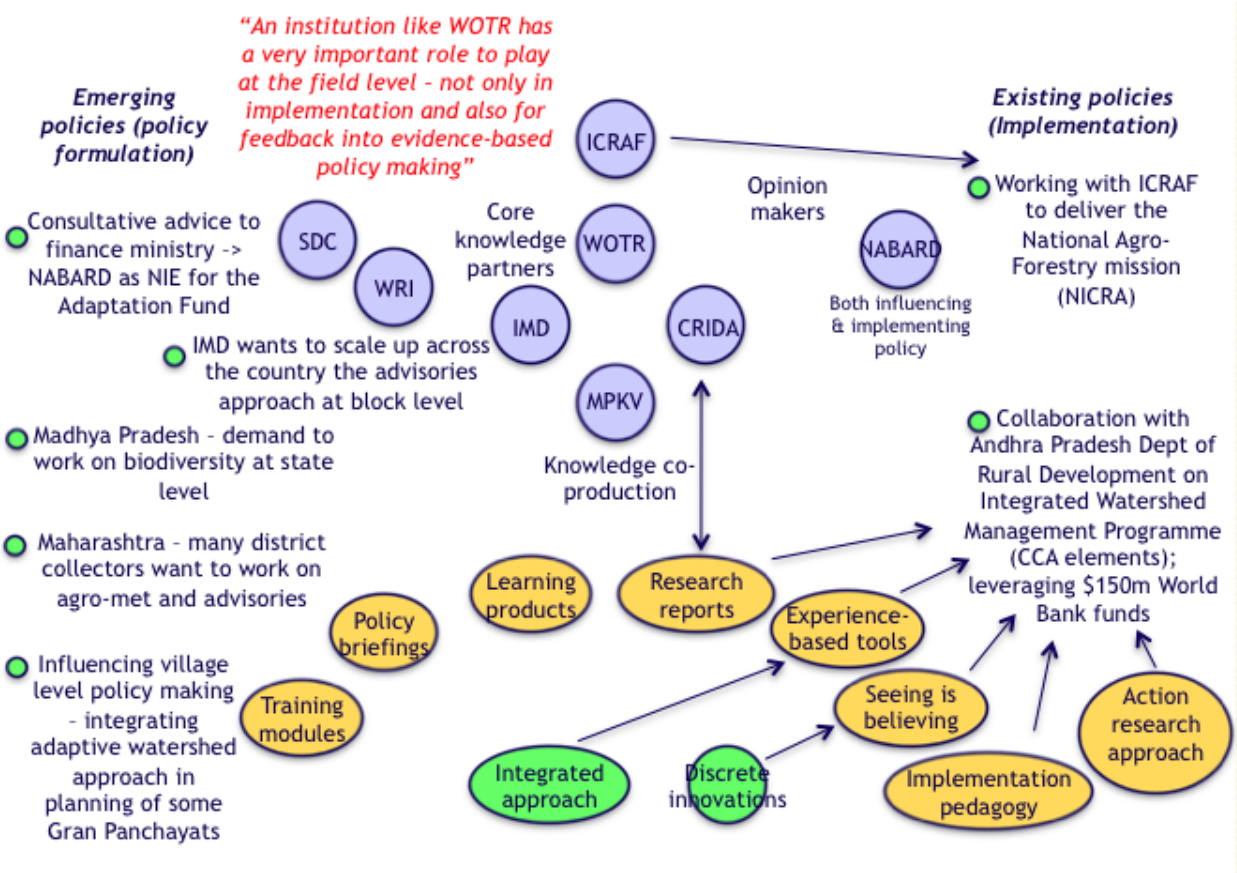
This highlights:

Policy formulation

- **Ministry of Finance.** In addition to the role played by the CCA project in suggesting to NABARD that they should consider applying for recognition as the National Implementing Agency (NIE) for India of the Adaptation Fund, the finance ministry also took note of the views of the CCA project in coming to its decision;
- **IMD.** There is excellent collaboration and recognition by IMD of the work undertaken by the CCA project. Not only do they acknowledge the relevance of the project's work on agro-met stations, they have also shown a keen interest to take this to scale. This has led to a collaboration between the project and the IMD and the local agricultural universities to help provide required information to the farmers as a part of the twice a week agro-met advisories sent out to all farmers who are a part of the CCA initiative. IMD is also committed to working across 6000 blocks in India for scaling out, as an objective under the "Grameen Krishi Mausam Sewa", under which agro-met services were to be extended from district to block level and for which a budget of Rs 266 crores was already allocated under the 12th

five Year Plan (2012-17), planning for which starts at least 2-3 years before. However, this is not without challenges. Apart from technical challenges in Madhya Pradesh, the preferred partners for agricultural support are the agriculture universities, who work at the district level, while this information needs to be disseminated at the block level. In outscaling to the block level, the objective will be to refine the model, iron out the shortcomings, improve the "last mile connectivity" – getting to the farmer, namely, the targeting and effectiveness of advisories together with developing a robust feedback mechanism - and validate the process so that it can be rolled out country-wide. More effective communication platforms will be assessed and collaborations with public and private players will be explored in this regard.

Figure 3 Key achievements of the CCA project's scaling up and policy influencing activities, by March 2014. The figure also highlights how several knowledge tools are used to influence and shape each targeted initiative, as illustrated in this figure by the coordination of the IWMP[lv] by the Andhra Pradesh Department of Rural Development.



- **Biodiversity Boards.** Collaborations are now planned with both the Madhya Pradesh and Maharashtra State Biodiversity Boards, the Green India Mission and the National Biodiversity Board to mainstream and popularise the Children's Biodiversity Register as well as the PBR. This will inculcate environmental and biodiversity awareness amongst school children as well as villagers.
- **Village level policy making.** Influencing village level policy making by integrating the adaptive watershed approach in the planning of some Gram Panchayats is an example of policy influencing at the most local level.

Policy implementation

- **ICRAF.** The recognition of WOTR by ICRAF is important, as ICRAF will play a pivotal role in the design of India's agroforestry mission, which includes a strong CCA focus. WOTR is planning to work with the National Mission on Sustainable Agriculture (Guidelines recently released) and ICRAF and the ICAR system through NICRA (National Initiative for Climate Resilient Agriculture managed by CRIDA), in developing the format and processes whereby the learnings generated in regard to sustainable adaptive agricultural practices (SCI, agro-met advisories, LEISA, integrated nutrient-pest-diseases-irrigation-soil health management and environmentally friendly practices) are mainstreamed and up-scaled. This would entail partnering related institutions (CRIDA, State Agricultural Universities, ICAR Institutions) in on-going or emergent programs and developing new ones that would help complement or improve current ones. It would also entail working with government ministries to develop the protocols and processes to ground and operationalise the various related national missions' programs.
- **Engagement with other national missions.** Besides the contribution outlined above to the National Mission on Sustainable Agriculture, WOTR has also mapped four other national missions against corresponding activities being undertaken in the CCA project and the policy/upscaling potential (Annex 17).
- **Government of Andhra Pradesh (Rural Development Department).** As was evident from our interview with Dr Suvarna, Commissioner, IWMP, WOTR has built a close and ongoing partnership with the Government of Andhra Pradesh over the past 2.5 years. The development of this relationship and the emergence of key influencing partners are charted at Annex 18. One example of successful policy influencing is the recent agreement by the Government of Andhra Pradesh to use the Co-Drive Vulnerability Assessment tool for watershed design for two village clusters, using Neeranchal funding (see below). WOTR also plans to work with the State Government on the State Action Plan for Climate Change.
- **Neeranchal Program.** The World Bank is supporting the Government of India to launch the Neeranchal Program to help state authorities implement the IWMP while mainstreaming hydrological considerations in watersheds and eco-systems management. Integrated watershed development and ecosystem management, especially in rain-fed agrarian systems, are the cornerstone to building resilience of communities to climate variability. WOTR has been involved in the formulation of the Neeranchal Program and is well placed in regard to the principals, namely the World Bank and the Department of Land Resources. The agreement with the Government of Andhra Pradesh to pilot the Co-Drive Vulnerability Assessment tool will draw on Neeranchal funding and is an important first step with regards to a potentially unique and significant opportunity to work more widely (in Andhra Pradesh and Maharashtra to begin with) to develop approaches to make the IWMP climate smart. Here the eventual long-term impact in terms of policy and practices could be nationwide and extensive.

Globally

- **CARIAA.** The inclusion of WOTR within the IDRC-DFID-funded Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) programme is a significant development for WOTR and an important example of South-South collaboration in international policy influencing[lvi].

4.6 Was the project engaged with the right mix of stakeholders at different levels?[lvii]

From what has been described in section 4 above, we believe that the project has targeted an effective mix of stakeholders at different levels, while also ensuring that the scaling up and influencing work is well grounded in experimental interventions spread across village clusters in three states showing a mix of agro-ecological and agro-climatic zones.

4.7 What has been learned?

We were particularly struck by the differences between what we found that WOTR have been doing in terms of scaling up and how this has been viewed by SDC. WOTR, it seems, drew on a combination of carefully targeted relationship building with key partners, and patient, strategic working, understanding and tracking key policy cycles and dynamics and targeting key opportunities, to build what can be viewed as an effective approach to policy influencing and scaling up, now starting to come to fruition.

CCD/SDC, by contrast, saw things differently, expressing increasingly strong concerns about WOTR's failure to engage effectively in policy dialogue, including with targeted actors such as the nodal Ministry of Environment and Forests. Moreover, while SDC pushed early for policy engagement, WOTR held back, believing in the importance first of establishing solid evidence at the local level. What is clear is that the two organizations, as knowledge partners, did not learn well together in this particular arena. As previously noted, this dynamic is further explored in section 6.

5 Knowledge management – supporting capacity building, scaling up, policy influencing and global dialogue

The project logframe gives extensive space to the development of knowledge products, devoting a full outcome (outcome 4) and 11 activity areas to this. These include: action research studies; impact/thematic studies; audio-visual documentation; net-based product dissemination; seminars, workshops and training (discussed in sections 4 and 6); mobile extension services; Village Knowledge Centres; and South-South Knowledge Exchange (discussed in section 6). This generated an impressive array of knowledge products (over 90 in total), which we are able to (selectively) review.

5.1 Research

Research is an essential component of the activities under this project, with the CCA project actively undertaking field based action research. This can be illustrated by the work on agro-advisories, water budgeting and the hot water stove. The CCA project has been working on agro-advisories and water budgeting since 2009. However, it continues to improve its agro-advisories, to provide better quality agro advisories and more tailor made advice to the farmers. This is presently seen as an ongoing process, which involves understanding farmer's needs and also local knowledge sharing mechanisms and issues.

Similarly, and seen as a relevant and effective adaptive intervention, is the hot water stove. While there has been extensive research internationally on challahs, in the CCA project the stove underwent a number of action research trials to enable it to be tested in the local village context, resulting in a stove that has reduced the consumption of fuel by 40% and also provides hot water as an extra product, which is much appreciated by the village women.

However, there is a need for continued analysis and growth of knowledge in the area of CCA for farmers in the different project areas. Recent weather variations with unexpected rains and hail storm require further risk mitigation actions reflecting climate change realities for rural livelihoods identified under the project.

Presently, WOTR is also thinking of methods to undertake collaboration on academic and experimental research. It is also looking at possibilities to undertake field trials for various crops in farmer's fields in their project areas, along with research areas. For example, this would enable ICAR institutes to undertake field trials on farmer's fields and not just in experimental farms of the research institute. However, these actions are still in the formulation stage. In this regard, SDC has expressed a concern that several of WOTR's staff, with the capacity to lead

such collaborations, have left WOTR in recent months[lviii].

5.2 Tools

In terms of tools and manuals the CCA project produced a number of relevant products, designed to provide support for further replication/ outscaling/ upscaling of actions undertaken in the seven village clusters. These included manuals on water budgeting, on how to make a biodiversity register, and three CoDrive manuals. These latter are for (i) vulnerability evaluation – for project design and implementation[lix], (ii) livelihoods assessment – for a bottom up response to climate change[lx], and (iii) visual integrator - community driven community evaluation[lxi]. The quality of these Co-Drive manuals in particular is very high. We were not in a position to assess the uptake and application of these tools by different actors. However, use and showcasing of these tools in the context of events at the Darewadi Training Centre has for example led to significant engagement with Dr Suvarna, Commissioner, IWMP for the Government of Andhra Pradesh.

5.3 Policy briefs and position papers

Six policy briefs and five position papers (which include policy recommendations) have been developed. The policy papers include one each on food and nutritional security in rural India, resilience and sustainability for small holders, livestock production systems in drylands, biodiversity concerns and watershed development in ecosystem based adaptation, participatory approach to community based disaster risk reduction, and weather based agro-advisories. The position papers focus on food and nutritional security; agriculture; livestock; biodiversity and energy. While we were not in a position to assess the contribution of policy briefs and position papers to effective policy dialogue, the quality of the policy briefs was in our judgment good and the quality of position papers, particularly that on resilience agriculture[lxii], excellent.

5.4 Other knowledge products and processes

The CCA project also published a number of research papers, focusing for example on the use of bio-fertilizers and organic inputs for agriculture and community water management in Madhya Pradesh. Other products as required under the projects on livelihoods and CCA, crop weather calendars and crop contingency planning have also been developed. A number of newsletters, brochures and policy implication papers were also developed as a part of this project.

An important practical method of knowledge management at the local level has been the use of demonstration plots (see activity 4.1.10, Village Knowledge Centres). Here willing and progressive farmers have been identified in each cluster, whose lands are used for demonstration of alternate agriculture methods for specified crops. Based upon WOTR's expert knowledge, cultivation of the identified crops using methods like SRI, SCR and organic farming are undertaken. Not only is this to help the village and the farmers who participate in the process actively learn these new methods; through farmer field days, farmers from other clusters and villages from the same cluster gather around the farm at regular intervals to see progress, discuss methods and how to replicate this activity on their own lands. The CCA project on its part ensures that in case of poor harvest and insufficient returns it will compensate the farmers, to ensure that the trial goes unhindered.

5.5 Forms of intermediation

Knowledge sharing takes place by the distribution of knowledge products through WOTR's mailing list and networks, sharing hard copies of documents at workshops and conferences and targeting of special interest groups like agriculture institutes, CRIDA, ICRAF. Apart from traditional methods for knowledge dissemination, the CCA project also used social media tools like face book and twitter to reach out to various audiences and direct them to their work.

Direct knowledge dissemination also takes place through farmer's field schools, training activities in the project villages such as improved cropping patterns which are geared towards improving agricultural productivity while also addressing issues of CCA. Exchanges within villages and between clusters were also noted in the Ahmednagar clusters, where there are three clusters in close proximity of one another. Similarly the PBR and the children's biodiversity register are seen as a way to document and create awareness on the issues around biodiversity at the village level.

While the CCA project has actively shared and disseminated its learning, monitoring of information dissemination and uptake is limited. During discussions WOTR mentioned that a few surveys had been undertaken to identify numbers of downloads of various products from their website, comments and effectiveness of uptake of agro-advisories had been taken up. The approach to knowledge management is largely seen as use driven and not demand driven, with most knowledge management products taken from line items of the log frame, which required conceptualizing and then developing through agreed pedagogical approaches.

5.6 Areas of learning for SDC and WOTR

Discussions with SDC and WOTR revealed that expectations and understanding on knowledge management differed in some areas. Both partners saw SDC's role in supporting knowledge management as central to the agency's inputs. However, while SDC shared information, supported networking for knowledge management and provided support it perceived to be essential to fulfill this role, in the latter years of the project WOTR saw the support given by SDC to be more in terms of financial than of knowledge-based support.

6 The SDC-WOTR-NABARD partnership – strategic steering, learning and accountability

The dynamic between the three main partners, SDC, WOTR and NABARD, naturally has had a significant influence on the development of the CCA project over the past 5 years. It has also shaped how we have structured this review - we found ourselves trying out a number of narrative structures before settling on this one.

A significant dynamic revealed by this review concerns the differences in perspective between WOTR, SDC and NABARD. We have referred to these several times already - see pages 14, 15, 16, 22, 27, 31, 35 and 36. Here we focus primarily on the nature of the SDC-WOTR partnership, as this review was commissioned only by SDC and not by NABARD. We address the dynamic of this partnership for several reasons:

(i) Firstly, the expectations and understandings that each partner brought to the working relationship, and the dynamics to which these gave rise, are key to answering several of the review questions set out in our terms of reference. These include review questions concerned with: accountability aspects (review question (c)); monitoring and the way this is used to support results based management, change management, learning and flexibility (h); and backstopping arrangements (i)[lxiii];

(ii) Secondly, we believe that a focus on conceptual frameworks and strategies, as highlighted in review question (b)[lxiv], is an important element of effective CCA – hence our interest in implicit Theories of Change ('conceptual strategies') and the assumptions associated with these;

(iii) Thirdly, we are hopeful that a clearer surfacing of these dynamics might help to draw out significant learning and lessons from the CCA project as a whole.

We approach these issues in the following ways:

- We start by noting the history of partnership working between SDC and WOTR before 2009;
- Next we consider how both partners came to shift their focus to CCA during the period 2008-2009, leading up to the agreement of the CCA project and the institutional arrangements to support this;
- We also consider the initial expectations by each partner of their roles within the CCA project;
- Next, we look at the backstopping arrangements put in place to support the CCA project and specifically, the role of Schwank Earthpartner AG;
- We then summarise the conceptual frameworks and strategies deployed by each partner, many of which have been discussed in previous sections of this review. This analysis enables us to review the extent to which the two partners built and maintained a shared understanding of what they were doing together, while noting also the sources of divergent framings, leading in some cases to a polarisation of views and approaches;
- In this context, we then review the arrangements set up within the CCA project to enable the partners to monitor, evaluate and learn together;
- Finally, we highlight what we consider to be the most significant learning and lessons that can be derived from this analysis of the partnership dynamics within the CCA project.

6.1 The history of the SDC - WOTR partnership before 2009

Many donor-funded projects are based on a process of competitive bidding in response to a call put out by the donor. The CCA project was different, in that it was conceived and shaped through a process of dialogue between WOTR, SDC and NABARD, arising out of previous institutional partnership and funding arrangements.

The beginning of the partnership arrangement between WOTR and SDC can be traced to around 2000-2001 when SDC entered into a partnership with WOTR on the basis of small actions, which drew on small funds[lxv] to organise activities in participatory watershed development. This gave both SDC and WOTR an opportunity to understand and appreciate each other better. On the basis of lessons learned from this initial collaboration, from 2004 onwards SDC and WOTR entered into an 'institutional partnership', which continued up to 2009. This involved funding in the range of CHF 800,000 to 1m a year. The institutional partnership arrangement meant that this funding was not tied to certain specific activities prescribed by SDC. Instead, WOTR was able to use the funds to pursue their vision and mission on the basis of overall annual action plans. Furthermore, SDC worked with WOTR to enable the latter to develop their vision, mission, guiding principles of engagement, overall strategies, human and institutional development trajectories etc. Moreover, it was agreed that WOTR would disclose themselves to SDC as a 'whole organisation', thus disclosing their reporting to the several donors involved over this period rather than confining this to the funds provided by SDC alone.

We note this history here, as previous dynamics often exert a strong influence over what subsequently develops.[lxvi] Moreover, this type of institutional partnership arrangement is not only relatively unusual, but also carried with it specific entailments, including the opportunity for considerable flexibility as well the trust required for close collaboration.

6.2 2009: A change of focus and institutional arrangements

The beginning of the CCA project in 2009 signaled several changes, not only in focus but also in institutional arrangements.

Firstly, during the years leading up to 2009, both SDC and WOTR had begun progressively to re-orient their thinking and approaches to take into account the challenges and opportunities of a climate changing world, a significant internal adaptation for both organizations. For SDC this

meant reorienting its engagement in India away from classical development cooperation to one of global cooperation on climate change (see Box 2). For WOTR it meant a broadening of focus as it thought through the nature of climate change adaptation, of 'adaptive sustainable development' and the interventions that might support this. For both organizations, considerable sense-making took place both separately and jointly, in order to understand climate change adaptation and how it might best be framed. An important piece of collaborative thinking took place in the context of the project planning mission for the Western Indian Climate Adaptation project, funded and organized by SDC and undertaken by the Centre for Development and Environment (CDE) at the University of Bern[lxvii].

The switch of focus by SDC to global cooperation on climate change meant that it was no longer in a position to provide such flexible funding to WOTR as previously, based on an institutional partnership arrangement. Instead SDC would now fund only those activities that could be explicitly identified as addressing an 'adaptation gap', as distinct to those addressing 'development as usual (the 'development deficit'), although within this frame of adaptation activities there was still considerable flexibility in how WOTR might use the funds provided by SDC. In SDC's view, WOTR never properly internalized this shift by SDC from institutional partnership to 'project mode'.

We have already discussed the ways in which a distinction between interventions that focus on adaptation and those that focus on development-as-usual can both be enabling and also act as a conceptual trap (section 3.1). The reality for the CCA project was however that:

- In early 2009 an agreement was reached between SDC and WOTR that SDC would fund elements of the CCA project that focused on climate risk and knowledge management over a 4-year period (April 2009 – March 2013), subsequently extended by a further 21 months to December 2014 due to time and cost overruns in the earlier phase;
- Parallel negotiations with NABARD led to agreement to fund further work addressing the development deficit, as well as some work on adaptation, which would be jointly funded with SDC (see Annexes 1 & 6). This agreement also built on a long-term relationship with NABARD and an emerging interest on the part of NABARD in climate change adaptation.

In terms of institutional arrangements, a further feature of this new phase of funding (from an SDC perspective) was that it would no longer be tied to a very broad brush approach which could be revised annually, but to a specific set of activities, outputs and outcomes agreed at the start of the programme and to be managed through a logframe approach;

These 'start conditions' are thus important for understanding not only the framing of the CCA project, but also how it was structured and managed. In summary it meant that:

- A separation was introduced at the outset between 'funding the development deficit', 'funding the adaptation deficit', and 'funding knowledge management';
- Different funding components were based on different timescales and starting points (Figure 1);
- The two different funding streams were monitored separately rather than in a joined up manner[lxviii];
- This is further reflected in this end of project review, which focuses primarily on the SDC- or jointly-funded components.

6.3 Initial expectations of roles within the CCA project

For SDC, both in India and Bern, there was considerable interest in the CCA project from the outset. In 2009 SDC India had done very little work on adaptation, so this was the start of an important journey – to learn how to do climate adaptation work and in particular, how to integrate climate resilience and the management of climate risk into development. Moreover,

with the recent publication of the Prime Minister's National Action Plan on Climate Change in 2008[lxix], which highlighted the co-benefits of development and adaptation, the CCA project was seen to be well timed. For SDC in Bern, this was also their main CCA project in semi-arid areas globally, and again there was a real interest to learn from the experience of undertaking this project jointly with WOTR and NABARD and to draw lessons from this.

SDC India therefore approached the CCA project not only in the role of a funder, but also as a co-creator, co-learner and co-traveller, with the intention to take joint responsibility for project conceptualization, design, steering and monitoring. SDC were very keen for NABARD also to adopt a similar role and although this didn't happen, SDC persisted in encouraging such an approach for several years.

As a funder, SDC had a responsibility to ensure that the broader objectives of the GPCC were achieved through the CCA project. While these evolved during the course of the project, from the outset these included a clear focus on:

- SDC playing a role of "knowledge broker, networker, promoting linkages between international and national levels, as well as a promoter of alternative and innovative solutions and know how. The provision of seed money and the testing of new approaches and techniques, which can be taken over and replicated by other actors (public/private), [was] seen as an important component of SDC's strategy in India"[lxx];
- For SDC, the idea of a knowledge-driven partnership implied concretely "the promotion and facilitation of access to knowledge through national, regional or global networks and platforms; the representation of Indian field expertise and knowledge in international fora; the facilitation of access to and transfer of technology and know-how between Indian, Swiss and foreign partners, including through tripartite cooperation arrangements; and the promotion of collaboration between Swiss and Indian actors[lxxi];
- With respect to policy engagement, SDC's role was more circumscribed. This was because from 2008 onwards the relationship between the Indian and Swiss Governments was reframed away from bilateral dialogue[lxxii] . This meant that any policy engagement by SDC at state and national levels now had to be undertaken through and with its partner NGOs, in this case WOTR. With such a strong emphasis under the GPCC on policy dialogue (Box 8), this increased the importance for SDC of effective partnership working through the CCA project.

As previously discussed, SDC's expectations of WOTR were that it would adopt a dual role, both as an implementer of local actions and as a knowledge partner involved in policy engagement and influencing. Working with NABARD as a third partner, the focus on the ground would be to understand how to integrate climate risk management into development interventions wherever appropriate, thus delivering the co-benefits signaled by the Government's National Action Plan on Climate Change. As a knowledge partner, the expectation was that WOTR would generate knowledge based on its action research approach, which would then be translated into appropriate knowledge products to support a process of policy influencing at state, national and international levels (the latter led by SDC). However, SDC did not specify any clear terms of reference for the policy engagement process to be undertaken by WOTR, delegating this instead to their Swiss 'backstopping' partner (Schwank Earthpartner AG) to negotiate with WOTR[lxxiii] (see also Annex 6, output 4.1).

WOTR's expectations of SDC within the CCA project were as follows[lxxiv]:

- To provide WOTR with feedback and monitoring support as well as technical backstopping and capacity building in relation to CCA;
- As a knowledge partner, to:
  - link WOTR with international agencies and accomplished individuals who would help WOTR fine tune some of the challenging aspects[lxxv];

  - introduce us to the latest knowledge, practice and thinking regarding CCA;
- As a policy influencing partner:
  - no particular expectations with regard to the Indian policy space;
  - to feed WOTR's experience and learnings into the bilateral and multilateral spaces that they are engaged in;
  - to inform WOTR about trends in emerging policy discourse and policy directions.

These initial expectations reveal both shared assumptions about the roles of each partner and differences. While SDC and WOTR shared an interest in community-based development, knowledge management and policy engagement for climate resilient development, and in a learning approach through the testing of local level interventions and innovations with a view to upscaling, there is a stronger emphasis on the part of SDC in a partnership approach ('co-creator, co-learner and co-traveller') whereas for WOTR, the emphasis is more on how SDC (and backstopping partners) can provide support to enable WOTR to do the work. For SDC, this emphasis by WOTR on 'ploughing their own furrow' rather than on partnership working was to become a significant source of tension as the CCA project progressed. In SDC's view, WOTR demonstrated a relative inability to work with different organizations through effective teamwork, especially where WOTR was not the sole lead organization.

6.4 Backstopping arrangements

Here we focus on the backstopping arrangements put in place to support the CCA project and specifically, the role of Othmar Schwank (OS) from Schwank Earthpartner AG. We make no comment on the role played by the second backstopping provider, Meteodat, as our interview failed to take place as scheduled[5].

During 2009 – 2013 OS undertook 7 missions India to support the CCA project. He had two roles, which were sometimes in conflict. His primary role was to support WOTR – his support had been requested by them and was agreed through a ToR. But at times OS also played an advocacy role on behalf of SDC, placing him then in a negotiating or 'go between' role. The support provided by OS to WOTR was on an 'as needed' basis, covering a range of activities from working with WOTR staff to develop the CCA project logframe and later, the Outcome Monitoring Summaries (OMS) framework; to providing training on policy-relevant 'story' writing; to advising on knowledge products, research options and policy engagement strategy.

This backstopping arrangement worked well for a number of years. However, during 2012/13 tensions developed between OS and WOTR over the development of a specific piece of work, concerning the application of a tool known as ALCES (A Landscape Cumulative Effects Simulator) in the context of the CCA project[6]. This is reflected in the comments by WOTR and SDC on the value of the backstopping support provided. While WOTR reflected on the value of the backstopping support by both OS and Meteodat, SDC's March 2013 Back to Office Report indicates that SDC experienced some problems with the backstopping actions, with a comment that SDC has been concerned and disappointed with the "clogging of communication lines" from WOTR's side with the backstopper[lxxvi]. Further discussions with SDC also suggested that there was insufficient interest from WOTR's side in the backstopping provided by SDC and a wariness to accept the backstopping support provided by them. These different perspectives may also be a further reflection of the broader dynamic of the SDC-WOTR partnership.

[5] A telephone interview with Meteodat was scheduled for 4th June. Unfortunately, Meteodat supplied an inaccurate telephone number and the interview couldn't take place as scheduled.

[6] Due to resource and time constraints, we have not reviewed this specific component of the CCA project.

6.5 Conceptual frameworks and strategies - framing and designing for adaptation

Table 3 (columns (f), (h) & (j)) summarises material presented earlier in the report which is relevant to the conceptual frameworks and strategies deployed by each partner, extending this analysis to show how these frameworks and strategies developed over the period of the CCA project. This analysis enables us to review the extent to which the two partners built and maintained a shared, relevant and effective understanding of what they were doing together, also highlighting sources of divergent framings, leading in some cases to a polarisation of views and approaches, and how these dynamics shaped project effectiveness. Other dynamics within the project (Table 3 (columns (a) - (e)) are also shown, together with a timeline for one of the community-level interventions (column (g)), as a means of ground-truthing the progress and pace of project implementation.

Comparison of columns (f), (h) & (j) in Table 3 highlights significant differences from the outset of the CCA project in how the two partners framed CCA, knowledge management and scaling up through policy dialogue, as well as how these differences became amplified over time. For example, while SDC focused throughout the CCA project on the 'Weathering the Storm' continuum as a primary framing of CCA (see section 3.1), this framing doesn't feature in the two key strategic documents developed by WOTR at the outset of the project in 2008 (*Meeting the challenges of globalization and climate change. WOTR 2020: A road map for the coming decade.* Pune: WOTR)[lxxvii] and 2009 (*Promotion of climate change adaptation in semi-arid and rainfed regions of Maharashtra. WOTR-SDC Partnership Proposal.* Pune: WOTR, February 2009)[lxxviii]. Instead, the conceptual framework of WOTR focused on four key strategies (implicit theories of change) [7]:

- at the community level, the need to **address an integrated set of issues**, associated with the strengthening of natural, financial, social, physical and human capital. Strengthening of these five capitals is then linked with the five outcomes of the CCA project (Figure 4; also Annex 6), with further details set out in the original project logframe[lxxix];
- at the community level, to **test out a range of new interventions** associated with these five capitals/outcomes, including in the areas of agro-met based advisories; sustainable adaptive agriculture; water budgeting and water management; biodiversity; DRR; sustainable livelihoods; alternate energy; food security, nutrition & health; governance; and gender mainstreaming and women's empowerment; but with a focus on seeing these interventions in relation to each other (i.e. as part of a systemic and integrated whole);
- to develop innovation processes at both the community cluster and upscaling levels through an **adaptive, learning approach** drawing on sensing[lxxx], applied research and action research.
- and in which the 'upscaling' process is undertaken through careful and timely linking of local innovations with multiple level capacity building, comparative research studies, partnership building, knowledge intermediation, policy influencing and policy implementation.

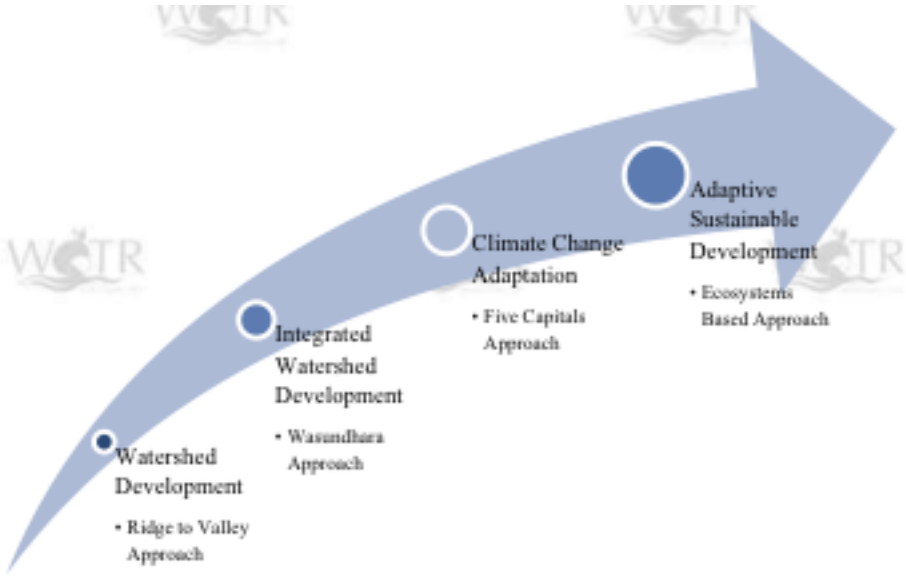
Careful reading of WOTR's Road map (2008) and CCA project proposal (2009) reveals that WOTR brought a sophisticated set of conceptual strategies to the CCA project, captured in part in the two diagrams shown at Annexes 5 and 19. These diagrams identify how WOTR conceptualized the need to build on - but also go beyond - their previous experience and investments in ecosystem-based watershed development and community-based mobilization, in order to meet the new challenges of climate change alongside other aspects of globalization. In doing so they thus embodied an adaptive approach from the outset of the project. Implicit in the

[7] The only SDC document we have been able to identify that speaks explicitly to change processes is a presentation by SDC at the November 2010 "National Policy Dialogue on Climate Change" workshop; http://www.climatechangeaction.in/knowledge-resources/presentations/files/npdcca_linking_grass_roots_voices_and_lessons_to_policy_debate.swf . The framing of the scaling up process in this presentation is a linear one, in contrast to the iterative, learning approach advocated by WOTR.

Table 3. Timeline of CCA project, illustrating development of key elements of project management and conceptual strategies

	(a) Funding	(b) SDC leadership	(c) WOTR project manage-ment	(d) Strategic steering and accountability (M&E)	(e) Learning	(f) Framing of CCA at the local level	(g) Example of implementation - agro-met and advisories	(h) Knowledge management (KM)	(j) Scaling up and policy dialogue
2009		A lot of change: four directors during project; first three not familiar with CCA; - source of frustration to WOTR	Experienced by SDC as very reliant on top leadership (CL and MD'S)	OS supports log-frame development – helps WOTR staff to focus on differences between activities, outputs and outcomes	SDC keen on a co-design and co-learning approach	CCA as a greenfield arena – few validated experiences/ successes exist. For SDC, 'Weathering the Storm' (WtS) contin-uum provides a key framing document. WOTR pay lip services to WtS, but this doesn't appear in their 2008 'roadmap' or 2009 proposal. Key framings for WOTR are: • Integrated model based on 5 capitals ('engine'); • Testing a range of interventions within the integrated model • Adaptive learning approach based on sensing, applied and action research This leads to a divergence of views between SDC and WOTR as to what is and is not 'innovative' (SDC BO report Oct 2013): discrete vs portfolio approach 2014 WOTR consolidates adaptive sustainable development framing		For WoTR, sensing, applied and action research provide key framings for KM from the outset	SDC Bern highlight need for policy dialogue but framings are unclear. SDC India starts to push for policy engagement in CCA project but OS advises patience and the need first to understand realities on the ground. In 2010 SDC Director leads series of policy workshops with MSSRF
2010				OS supports development of OMS tool as a means to improve use of logframe	However, M&E system not designed to support project level learning		First agro-met stations set up		
2011		KRV solitary champion of CCA within SDC for much of project	Improvement for SDC once CCA project manager appointed (AS starts as project manager in Jan 2012 – through to March 2014)	OMS (1) – March 2011	Tensions between SDC and WOTR (and differences of framing) further undermine opportunities for learning		Farmers becoming used to agro-met stations and taking care of them	OS provides training in story-telling and shaping of knowledge products (2012), to broaden portfolio of KM approaches and ensure effective policy influencing	WOTR takes patient, strategic approach to policy dialogue, first building MOUs with key partners on the back of 3 policy workshops (10/11)
2012		Until JK arrives in Jan 2013, project management strongly reliant on		OMS (2) – March 2012			First year in which farmers able to benefit from wallpaper and SMS advisories		Increasing tensions between SDC and WOTR over timing and approaches to scaling up – becomes a significant dynamic within CCA project
2013		KRV		OMS (3) – March 2013 OMS (4) – September 2013			5,000 farmers benefitting from wallpaper and SMS advisories – applied in a variety of decision contexts	Development of partnership with WRI to strengthen KM approach	SDC highlights that WOTR is paying insufficient attention to policy development processes (May 2013 project meeting)
2014				External review as a focus for accountability and strategic steering	External review as a focus for learning				WOTR's scaling up approach starts to yield promising results

Figure 4 The trajectory of WOTR in developing its approach to climate change adaptation[lxxxi]



-

above is a theory of change which frames climate change adaptation as a process of designing and testing innovation activities taking place across the five capitals and in an integrated way, and at multiple levels - in a nutshell, 'innovation for CCA'. This framing of innovation is consistent with an 'innovation systems' approach, now widespread within the development community, particularly in the agricultural sector[lxxxii].

Such a theory of change also appears to be consistent with the strategic priorities of the GPCC, as set out in section 4, Box 8. CCD/SDC did not however recognize the approach being pursued by WOTR in terms of an integrated change process consistent with the GPCC framework, or many of the assumptions underpinning this[lxxxiii].

While the divergences between the conceptual framings of the project partners led to some tensions at the level of local interventions, in particular around the relative emphasis placed on different interventions (section 3.1; Table 3, column (f)), it was in the context of knowledge management, policy engagement and scaling up that tensions were more significant (section 4; Table 3, columns (h) & (j)). A key question for this review, however, is whether and to what extent these tensions and dynamics undermined the effectiveness of the CCA project in promoting adaptive capacities and adaptation action (ToR review question (b)).

Difference and conflict can provide a source of creativity as well as dysfunction in the design and implementation of complex programmes. Indeed, some have argued that 'understanding and addressing the political, social, cultural and economic challenges that contemporary India faces demands heterodoxy and an adequate appreciation of its rich argumentative tradition and pluralist, interactive and dynamic heritage'[lxxxiv]. Our impression is that the different tensions within the dynamic of the project led in some areas to creative developments (for example, concerns on the part of SDC about the translation of action research findings into effective knowledge products led to valuable training work with WOTR in this area during 2012; Table 3, column (h)), while in other areas, tensions sapped the energies of both SDC and WOTR and in particular, undermined opportunities for joint learning (Table 3, column (e)), a key adaptive capacity.

One of the particular strengths of the CCA project is that in spite of the tensions with SDC, WOTR remained true to its own adaptive learning approach, coming to value this even more

strongly in the context of CCA. This is highlighted in their ongoing framing of CCA as 'adaptive sustainable development' (Figure 4) and succinctly articulated in the following quote from a recent publication of the CCA project (Box 9):

Box 9 Adaptive learning ('probe, sense and respond') as a basis for resilient agriculture[lxxxv]

For WOTR, climate-resilient agriculture is not necessarily about adopting/ inventing new methodologies/ products, but about appropriate strategies/approaches that consider extreme weather variations. With climate change, we are in a domain of complexity that is not very amenable to analysis. While the relationship between cause and effect exists, it can only be perceived in retrospect, not anticipated. As conditions change rapidly, analysis just cannot keep up at the same pace; hence, best/good practices cannot be replicated everywhere. The only possible approach would be to probe, sense, and respond. From an implementation perspective, it means testing through many small experiments, using varied alternate agricultural technologies. The process is iterative. Successful experiments get further amplified, while the not- so-successful ones provide lessons for the future.

6.6 Monitoring, evaluation and learning

M&E frameworks provide a principal mechanism by which projects and programmes maintain strategic direction and accountability. Such frameworks are also used to support results-based management, change management, learning and flexibility (see review question (c) in the ToR for this review).

Traditionally, logframes (LFA) are used by donors and others to support M&E for development projects. In relatively simple projects, LFA can provide a useful M&E framework, but their value in more complex developmental situations has been questioned (Box 10). For CCA projects, recent work (Annex 20) highlights further reasons why the LFA should be considered a supportive rather than primary tool for M&E, as these projects require a much stronger emphasis on tools that can monitor and evaluate continual processes of learning, adjustment and in some cases, reframing. In such situations, relevant tools include Developmental Evaluation[lxxxvi], Outcome Mapping[lxxxvii] and Reflexive Monitoring in Action[lxxxviii]. What is critical is that the M&E framework selected is compatible with the project's Theory of Change; explicit and shared visualization of the dynamics implied by a theory of change (Annex 21) can also help in the selection and agreement of appropriate M&E tools.

Box 10 Strengths and weaknesses of the logframe approach[lxxxix]

Logframe (LFA) is the tool of preference for project design, monitoring and evaluation in international development. It is very useful to set up a well-structured M&E framework that will satisfy the requirements of donor organizations, especially for accountability and operational information. LFA uses a logic model of how a development programme should work to solve identified problems. The model is based on a hypothesis that all inputs can and must be foreseen, and that every input should and will lead to a measurable outcome[xc]. While this is often a difficult assumption in the Western context where LFA was developed and has been discarded a long time ago, it is even more unlikely in development projects and programmes in the South, where goals tend to be less simple, clear, accepted and comparable with each other, and knowledge of causal links is weaker[xci]. From a systems point of view, it could be argued that LFA presupposes "systemic invariance". Others have pointed out that analysis of the type used in LFA, with its emphasis on attribution and accountability, can be dangerous as it leads to simplified, reductionist thinking[xcii]. The resulting disconnects between outputs, short-term outcomes and longer-term outcomes have been known to the evaluation community for almost half a century[xciii].

At the outset of the CCA project it was decided to adopt the logframe approach[xciv]. Valuable backstopping support was provided by OS to develop the capacities of WOTR field and office staff to undertake and report on effective, LFA-based (results-based) management. This capacity building work initially focused on helping staff to understand the differences between activities, outputs and outcomes, with a focus on reporting against outcomes (reflecting developments at the SDC head office in Bern) and was subsequently reinforced by the

introduction of an Outcome Monitoring Summary (OMS) tool[xcv]. The CCA project has produced four Outcome Monitoring Summaries to date; for this review (Annex 7 and sections 3 and 4) we have drawn extensively on the most recent of these[xcvi]. For WOTR the introduction of the OMS was not without complications, as the targets in the OMS sometimes differed from those within the logframe[xcvii]. For CCD/SDC however, "although difficult to use without clear baselines, this tool helped us to see better where there was little or no progress, and to support discussion with WOTR on where we currently stand." [xcviii]

While the LFA and OMS approach worked reasonably well in supporting results-based management and reporting, including this 5-year review, a more challenging issue for the CCA project lay in finding an M&E framework also capable of supporting change management, learning and flexibility. This was all the more challenging given the sophisticated adaptive developmental framework which underpinned WOTR's implicit theory of change. In 2009 WOTR as the champion of this approach within the CCA project had relatively little experience in translating such a framework into an appropriate M&E system. Despite good intentions (Box 11) and recognition of the types of tools that might be needed (Box 12), the logframe, with its implicit assumptions of mechanistic and linear change rather than systemic learning, soon came to dominate the M&E practices of the CCA project, with the use of other tools more suited to supporting learning and adaptation apparently being sidelined, although still used by WOTR to support their own learning within the context of the CCA and other projects (Box 13).

Box 11 Excerpts from the CCA project inception meeting, 6th August 2009

"An effective learning mechanism is very important as far as SDC is concerned…Since this is learning for all of us and nobody knows the exact answer. Only we have to make sure that we document all our experiments and keep records." [xcix]

"Monitoring and evaluation of the work that is being done under the project would very much required…Following are some of the very useful tools that are being used by the WOTR team – Peer Group Assessment; Participatory Monitoring." [c]

Box 12 Approach to M&E set out in the original SDC Proposition de credit 7F-03445.02[ci]

"Some of the tools that will be used for monitoring will include qualitative assessment matrix, input-output monitoring, peer group assessment, participatory impact monitoring and change detection studies. The process involved in management of climate risk and adaptation will be captured through case studies, action research and process documentation of sample projects. The WOTR Project Adjustment Tool (WOPAT) as well as GIS will be used to track changes, monitor events, fine tune and calibrate activities, uncover causal relationships and how they influence outcomes and plan additional, corrective measures."

Box 13 Development of internal M&E tools within WOTR[cii]

The Quality Assessment Matrix (QAM) was intended to be done thrice a year, but considering workloads of the field staff, in practice we manage to do it about twice a year. A Participatory Impact Monitoring (PIM) is done once a year.

Apart from these, we also do four Project Planning & Management (PPM) sessions in each village during the project period. And two Maintenance Fund trainings (MFT). Regular trainings on the concept and methodology of these sessions are also conducted.

At the programme level, we have done some GIS based change detection studies. We have also evolved the WOTR Project Adjustment Tool, for a time renamed CASDAAT (Climate Adaptive Sustainable Development Assessment and Adjustment Tool) and more recently (again) renamed as CoDriVE – Livelihoods, thus becoming a part of the series of CoDriVE tools (which include the vulnerability assessment tool called CoDriVE-PD). As the methodology and tool has evolved so much over the past few years, we are yet to actually carry out major project adjustments. However, we have documented the kind of insights the application of this tool throws up, which includes recommendations

for project adjustment. We currently have a total of five case studies where we have carried out the 'project adjustment' part of the analysis.

Perhaps the progressive tensions between the CCA project partners further discouraged a shared learning approach. Equally, it could be argued that had the CCA project had a strong, shared framework which supported joint learning, then some of these tensions might have been mitigated. More recently, in 2012, the CCA project undertook some significant conceptual work in thinking through what kind of M&E framework might be required to support learning within an adaptive developmental approach, although such a framework has yet to be applied in practice (Box 14).

Box 14 The emergence of a more explicit theory of change and linked M&E for learning (M&E4L) framework in the CCA project during 2012

During 2012 Sushil Bajpai, at that time a director of WOTR, began to develop a more explicit theory of change for the CCA project based upon the now widely accepted distinction between simple, complicated, complex and chaotic developmental pathways (Annex 22). Thus while some aspects of the CCA project take place in the realm of the simple, the majority are embedded in complicated or complex developmental pathways[ciii]. In a further and particularly promising conceptual development, Mr Bajpai also began to develop an M&E system that could support this theory of change (Annex 23).

Lessons learned As an outcome of the review process, both SDC and WOTR have highlighted that they intend in future to spend more time investing in M&E at the project design stage.

6.7 Learning and lessons deriving from the management and dynamics of the CCA project and the recommendations that flow from these

In our proposal responding to the ToR for this review, under which we were contracted, we identified 'learning histories' as a key element of our approach[civ]:

> "Given the importance of the issue of framing to CCA, and taking into account also the distinctive temporal nature of CCA (i.e. the requirement to be able to plan for both short, medium and longer term futures), we propose to draw on 'learning histories' as a core methodology in this review[cv]. The learning histories approach is a participatory methodology that enables exploration of diverse themes and questions in the context of a specified historical period, producing a visual representation of multiple lines of evidence within the dynamics of project development and learning. Targeting learning history workshops at multiple levels of engagement within the project will enable us to address the majority of the 19 review questions in a comprehensive fashion. Furthermore, the methodology is well suited not only for developing narratives of contextual learning, but also for bridging from contextual to the generic knowledge required in knowledge sharing and networking[cvi].

As things turned out, a modified learning histories approach was applied in some parts of the CCA project review, primarily in our engagements with WOTR, where one verbal and two visual learning history activities were undertaken (see Annexes 7.1 and 18). As reflective and learning activities, these were of considerable value both to the staff involved and to us as reviewers. Due to time and resource constraints (and perhaps also respecting the dynamics involved), we weren't however able to carry out the joint learning history activity planned between SDC and WOTR. As a result, we weren't able to elicit joint reflection and learning on the management and dynamics of the project. The reflections, learning and 'lessons' set out in Table 4 overleaf are therefore based on our own insights and on separate conversations with SDC and WOTR. In this table we summarise, firstly, the main learning and lessons deriving from the management and dynamics of the CCA project over the past five years and secondly, the recommendations that flow from these.

Table 4. The main learning and lessons deriving from the management and dynamics of the CCA project, and the recommendations that flow from these.

Learning and lessons		Recommendations
Given the fact that adaptation is a process of change, learning and innovation, in order to be effective CCA projects require an explicit and shared agreement of a Theory of Change (ToC), including a clear articulation of learning pathways and practices. In the absence of such a shared framing, SDC and WOTR pursued different conceptual strategies from the outset of the CCA project. This led not only to significant tensions as the project progressed but also, notably, to a failure of shared learning.		1.1 In future CCA projects, SDC and WOTR (whether in collaboration with each other or with other partners), should invest in developing an **explicit theory of change for innovation for climate change adaptation,** shared between project partners, and drawing on current framings both of innovation systems and of CCA. This should include explicit visualization of the dynamics implied by the theory of change, and assumptions underpinning these.
CCA projects make particular demands of M&E frameworks. While needing to ensure strategic direction and accountability, such frameworks must also be designed to support learning, requiring flexibility as well as new tools and practices. For example, as the policy framing of the GPCC programme was progressed by the SDC head office in Berne, and CCD/SDC was required to adapt to new ways of framing the focus of its CCA work, it needed a framework in which to negotiate and agree these new framings with WOTR[8].		1.2 This in turn will help **selection and agreement of M&E tools**, providing a clear framework within which to review progress and thus to ensure effective strategic steering and learning as well as accountability.
Clear agreement of roles is fundamental to project effectiveness. Roles need to reflect a shared ToC and should be reinforced through a shared M&E system, which applies to all partners, rather than simply relying on mutual trust.		1.3 Partners should also **clearly agree at the outset their roles** - both complementary and overlapping – for example that all will participate in a shared learning process – and should set this agreement out in an MOU.[cvii] Roles should clearly reflect a shared ToC.
Lack of clarity about the roles of backstopping partners – or indeed a conflict of roles – leads to mistrust. For example, while the work of OS was overtly to provide support to WOTR in response to their expressed needs, OS also became drawn into covertly helping SDC to manage WOTR, or at least, acting in a go-between role.		
The CCA project was preceded by significant efforts on the part of both SDC and WOTR to understand CCA and the implications for practice. However, insufficient time was invested in shared design of the CCA project, with SDC's attention primarily on the more ambitious Western India Climate Adaptation project at the time that WOTR was developing its conceptual strategies for the CCA project. This led to a misalignment, or		1.4 **The value of a design phase.** Given the design challenges involved, time needs to be set aside at the beginning of a CCA project to enable partners to seek agreement both on the theory of change, how this is to be translated into project design, how M&E will be undertaken, and for what purposes (strategic steering, learning, accountability).

[8] An appropriate M&E framework would have provided just such a space, and indeed, in our view, could have helped SDC to see that what was emerging from Berne was in fact strongly aligned with the systemic, multi-level approach being developed by WOTR.

at least a failure to explore the complementarities, between SDC's focus on the Weathering the Storm continuum and WOTR's more integrated and dynamic conceptual strategies.		
Despite the ambition of SDC to play multiple roles in the CCA project, including overall project management and knowledge brokerage as well as active involvement in co-design and co-learning, insufficient time was devoted to operationalizing these roles, which require more than 6-monthly field visits followed by a project meeting		1.5 Partners should seek agreement at the outset of and throughout the project about the best combination and scheduling of different types of meetings to support the above; for example this could involve quarterly reporting of activities; biannual reporting of outputs and outcomes and an annual, in-depth learning process when corrective or re-framing actions are taken.
The CCA project demonstrated valuable investment in staff capacity to develop conceptual strategies, practical understanding of CCA, logframe-based reporting, and action research practices.		1.6 Both CCD/SDC India, SDC Bern and WOTR should consider investing in **building the capacity of their staff** to become proficient in working with theories of change and M&E frameworks appropriate to the transformational challenges of innovation for CCA, drawing on international good practices and relevant networks of learning and support[cviii].
Difference and conflict can provide a source of creativity as well as dysfunction in the design and implementation of complex programmes. As a 'wicked issue', CCA is necessarily messy, complex and beset by multiple uncertainties, interdependencies and conflicts between stakeholders[cix]. The CCA project worked well with some sources of tension and conflict but others sapped the energies of both SDC and WOTR and undermined opportunities for joint learning.		1.7 Both CCD/SDC India, SDC Bern and WOTR should consider investing in building the capacity of their staff to become **more confident and proficient in working with dynamic conflict in CCA situations:** both in noticing where conflict is developing and in learning how to manage it, not only inter-personally but also through improved programme design. 1.8 Potentially, building staff capacity for working with conflict could be positioned within a broader approach, to develop capacity for critical self-reflection and reflexivity – increasingly recognised as vital skills in supporting effective adaptive management and change[cx].

7. To what extent can the project as a whole be considered as innovative?

In section 3.4 of the review, we answered the question: how innovative were the local experiments on the ground undertaken by WOTR? Having evaluated the broader set of activities undertaken by WOTR through the partnership with SDC, including scaling up, policy influencing and knowledge management, and having reviewed the effectiveness of mechanisms for project steering, learning and accountability, we are now in a position to ask a broader question about innovation: to what extent can the CCA project as a whole be considered as innovative in the context of climate adaptation and climate resilient development?[cxi]

7.1 Recognising different types of innovation, including at different levels

There are many ways and levels at which innovation for climate change adaptation can be introduced. In section 3 we reviewed what might be called the 'niche' experiments of the CCA project, that is, local level interventions that can be considered both discretely – for example experimentation in the System of Crop Intensification (SCI) for climate resilient development – and as an integrated portfolio of experiments being undertaken in village clusters. We argued that as an integrated portfolio the approach taken was highly innovative, with many but not all of the component interventions also demonstrating innovation (Annex 13). Innovation is often discussed in terms of different dimensions, e.g. technical, social, institutional and financial. By taking an integrated approach, as set out in the CCA project 'engine', this local level innovation is unique in the Indian context.

When we extend this analysis to factor in the scaling up, policy influencing and knowledge management components of the CCA project, then we should also note the potential for several other types of innovation, including:

- Comparative experiments – innovation through understanding what works best in different agro-climatic and agro-ecological zones;
- Knowledge management and partnership experiments – innovation for scaling up through working out what combination of processes for knowledge intermediation and knowledge partners works best, both in different technical areas and in different geographies; and linked to this:
- Discrete multi-level experiments – innovation around specific technical processes, such as agro-met stations and agro-met based advisories;
- Systemic experiments – integrated multi-level experiments seeking to innovate more holistically for climate resilient development at state and national levels;
- Experiments in financing climate resilient development – working with donors to understand how best to finance innovation for climate resilient development.

7.2 Seeing innovation systems, systemic innovation and systemic intermediation

A particular strength of the CCA project is its multi-level perspective on system innovation for climate resilient development (Annex 25). We consider this aspect of the CCA project to be highly innovative, albeit at a relatively early stage of development.

The idea of 'system innovation' has several roots. These include the literature on systemic inquiry approaches to sustainable development[cxii]; studies of the relationship between policy research and local innovation in agricultural development processes, championed by the World Bank[cxiii]; and historical analyses of socio-technical regimes[cxiv] that emerge in relation to local level innovations[cxv]. Each approach provides useful insights, the first focusing on the design of multi-level processes for innovation, the second on transformational changes in the paradigms that have underpinned agricultural research and innovation in many parts of the world during the 1980s, 1990s and 2000s (Annex 26a); and the third providing insights into the interactions

between the micro-level of 'niches' (which can act as protected experimental spaces for the generation, testing and development of local-level innovation[cxvi]) and the meso-level of socio-technical 'regimes', that is, society's rule sets embedded in formalised knowledge, practices, procedures, norms, regulations and organisational arrangements, which accounts for relative stability in the application of technology and 'lock in' to historical pathways of development (Annex 26b).

From the perspective of this third framing, during a multi-level innovation process new links are formed among actors and their material world that changes the articulation between what happens within the protected space (niche) and at regime level. Historical choices, current policies and legislation, and dominant technological infrastructures and the interests that depend on them, shape the development of novel configurations. At the same time, the creation of novelties can have profound effects at regime levels[cxvii]. If a regime is confronted by novelties with the necessity of change, tensions emerge and the dominant linkages in the configuration may begin to 'loosen up'[cxviii]. The institutional rule set evolves through dealing with those tensions and introducing new elements in the articulation of levels.

While this and the other two perspectives provide many useful insights, the processes by which multi-level innovation actually occurs are less well researched or understood. For example, there has been relatively little attention paid to how changes in the interaction between niche and regime levels, which often brings tension and conflict, can be made conducive to achieving desired institutional and technological outcomes[cxix]. What makes the CCA project so interesting, therefore, is its active exploration of multi-level institutional innovation pathways, taking an adaptive, action research-based approach. While the CCA project has yet to properly reflect on (and potentially write about) this, if it were to do so this would be of great value to the international literature on climate resilient development, where the perspective of multi-level institutional innovation pathways remains relatively undeveloped[cxx].

> "Institutional innovation in the end is dependent on the extent to which [these] interactions build enduring relationships, networks of interest and procedural or other arrangements. The implication is that institutional innovation is a highly unpredictable process[cxxi]. Some shifts bring tensions openly into discussion; others initiate new spaces for change." [cxxii]

Furthermore, such a disciplined act of strategic reflection and writing would not only sit naturally alongside the investment to date of the CCA project in both action research and systems thinking (e.g. Annex 24), but would also help to sharpen the project partners' thinking about theory of change, adaptive design and M, E & L for future work. Moreover, as already highlighted in this review, we believe this would help to clarify significant synergies between the unfolding pathways of systemic innovation in the CCA project and the vision expressed in SDC's GPCC (Box 8).

8. Has it been worth it? Value for money

The question of "value for money" is a relevant one, yet challenging to address without conducting a proper cost-benefit and/or cost-effectiveness analysis, which requires a clear definition of the objectives to be reached, baselines and monetary quantification of benefits.[cxxiii] We have therefore approached the question of "value for money" in a more qualitative than quantitative manner, looking at the three following issues:

- Perception of the efficiency and effectiveness relating to use of SDC funds
- Extent to which the project managed to mobilise/ leverage additional funding support to climate adaptation
- Financial sustainability of various interventions pursued

8.1 Perception of efficiency (cost-effectiveness) relating to use of SDC funds

'Efficiency' measures the outputs - qualitative and quantitative - in relation to the inputs. It is an economic term which signifies that the aid uses the least costly resources possible in order to achieve the desired results (OECD-DAC, 2000). This generally requires comparing alternative approaches to achieving the same outputs, to see whether the most efficient process has been adopted. Key questions include: *How cost-efficient were programme activities? Were objectives achieved on time? and How efficient was the programme implementation compared to alternatives?*

In the course of our interviews, the most prevalent perceptions were the following:

- **SDC** felt that its funds had been well spent on experiments exploring agro-met-based advisories, adaptive sustainable agriculture, DRR, gender empowerment and taking a landscape-level approach in the context of CCA. However, SDC also felt that its money was sometimes used too much for developmental rather than "genuine" adaptation/adaptive actions, or for implementation of activities on the ground rather than knowledge generation/dissemination and upscaling.

- **NABARD** was appreciative of the local level experiments on agro-met based advisories, DRR, health and nutrition and on livelihood diversification. However, NABARD also expressed the view that the design of the programme was too complex and that "learning" was expensive.

- **WOTR** considered that the SDC funding has been very effective for developing and testing adaptive actions and models. WOTR has not measured the impact of its knowledge management, because it is too early to assess how policy has been influenced. But they expressed the following: "we highly value the contribution of SDC for knowledge management at the qualitative level: this component has made a huge difference in terms of influence with the national agencies. It was great value for money. And the effects in the future will be even more important!"

Taking the perspective on the CCA project as an integrated experiment in systems innovation for climate resilient development, we consider that the investment by SDC may come to be seen as both highly efficient and highly effective. However, it is still too early to judge this properly. One proxy measure would be to compare this investment by SDC in financing systems innovation for climate resilient development with other examples internationally.

8.2 Extent to which the project managed to mobilise/ leverage additional funding support to climate adaptation

The most significant area where WOTR's experiments, knowledge products and policy dialogue have led to leveraging funding for outscaling of CCA interventions is with the IMD, which plans to work across 6000 blocks in India for scaling out agro-met advisories. While the IMD was already committed to this work before their engagement with WOTR, and while it is yet to be determined how this outscaling process will be designed, in the words of Dr. Chatopadhyay, IMD Pune Office: "the work of WOTR is very valuable because for IMD funding is not a problem, but the challenge is to give customized and timely information to the farmers. This is what WOTR helps us to do. WOTR plays a great role for India".

Besides this example, which demonstrates the recognition of WOTR's work in generating relevant knowledge to build the pre-conditions for scaling out, WOTR has managed to influence policy design and policy implementation in a number of different areas and at various levels (national, state or village level) as described in Section 4. Given that most of these initiatives are

still at an early stage of formulation and/or implementation, it is difficult to assess the value of the funding which has been/will be mobilized, but this could be the object of future work.

8.3 Financial sustainability of various interventions pursued

WOTR has only done limited work so far on the financial sustainability of adaptation actions, besides the exercise on economic evaluation and adaptation on watersheds conducted in collaboration with WRI[cxxiv]. WOTR is however aware of the need, in the future, to explore more thoroughly the financial sustainability of its adaptive measures on a bigger scale, such as:

* Costs of agro-met systems, taking into account the new technologies available.

* Contributions of rain-fed farmers to receiving the advisories.

* Carbon sequestration: aggregation of carbon capture together with ICRAF for possible CDM.

This question of financial sustainability would be an important step towards a better understanding, for SDC and WOTR, of the costs and long-term benefits of adaptive actions, and possibly also help to capture some unintended results of adaptation, also referred as "maladaptation".

9. Summary assessment

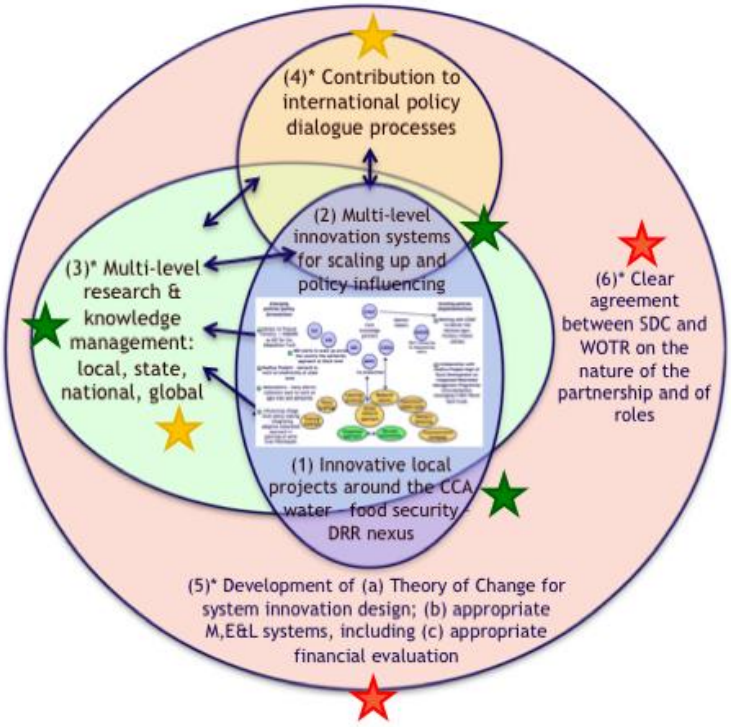
In summary, the CCA project has:

- Developed multiple local level CCA innovations, both technological and social. Several of these interventions stand out as particularly effective, in terms of what has been achieved and/or learned, and as reflected in a growing interest by knowledge/policy partners for upscaling. These include the system of agro-met-based advisories, interventions which contribute to adaptive and sustainable agriculture, water budgeting and water management, DRR, and work on governance, women's empowerment and gender mainstreaming.
- Tested these innovations in different agro-ecological and cultural contexts, thereby providing the basis not only for comparative knowledge and learning, but also for scaling up in three different states.
- Built capacity at the community and practitioner level on CCA and DRR, including local level institutional capacity for CCA/DRR planning. The Darewadi training centre has played a key role as a mechanism for outreach and capacity building.
- Pioneered an integrated approach to CCA and adaptive sustainable development at the village and village cluster level. This integrated approach is arguably a unique innovation for CCA within rural development in arid and semi-arid regions of India, albeit still at a relatively early stage of development.
- Pursued an approach to scaling up which focuses both on policy formulation and on policy implementation, and is supported both by key knowledge partners and by a rich portfolio of knowledge products and intermediation practices.
- In terms of policy formulation, built an important set of strategic partnerships at state and national level for the scaling-up of agro-met based advisories, in which IMD plays a key role. Other key relationships for policy formulation include those with the State Government in Maharashtra and with Biodiversity Boards at national and state levels.
- In terms of policy implementation, influenced policy and created a demand at the State level in Andhra Pradesh for the upscaling of adaptive actions. Other key relationships for policy implementation include engagement with the Neeranchal programme, supported by GoI and

the World Bank, and collaboration with ICRAF and CRIDA in the context of the National Mission on Sustainable Agriculture.

- Engaged in new knowledge partnerships at the global level, for example through CARIAA.
- Developed, overall, a unique approach to multi-level system innovation and systemic intermediation for climate resilient development, which demonstrates significant synergies with the vision expressed in SDC's GPCC (Figure 5).

Figure 5. Systems diagram summarising the GPCC framework and showing how well the CCA project matched each of the elements with the framework. Green stars (against elements (1), (2) & (3)) show a strong match; orange stars (against elements (3 – global) and (4)) indicate some room for improvement; red starts (against elements (5) & (6)) indicate need for considerable improvement



However, this ambitious experiment is still in its early stages, with longer term viability and sustainability still to be demonstrated. Many of the component experiments require further development both at the local level and systemically.

Furthermore, the collaboration between SDC and WOTR has revealed progressive tensions that require careful review. These tensions can be explained partly in terms a failure to jointly articulate and agree a shared theory of change for the CCA project and to develop an M, E & L system that reflects this theory of change, thus allowing for effective strategic steering and learning as well as ensuring accountability to sources of donor funding.

10. Main reflections and lessons emerging from the review and recommendations associated with these

In this review we have sought to present a balanced assessment of the SDC-WOTR collaboration in the context of the CCA project. This has highlighted an ambitious and unique experiment in multi-level system innovation for climate-resilient development, still in its early

stages, and with longer term viability and sustainability (i.e. resilience) an emergent feature. Key reflections and recommendations from this review are as follows:

(1) Climate change adaptation challenges many current development practices and requires a strong conceptual framing of climate resilient development pathways

The CCA project drew on a rich mix of conceptual framings of CCA, including the idea of development and adaptation 'deficits', a development-adaptation continuum, and framings of CCA as a process of adapting (and potentially transforming) current developmental pathways using integrated, adaptive and sensing/learning approaches. SDC Bern highlighted that a major learning for them is that "we should no longer address development and adaptation separately – this project really showed this, helping me to formulate a strong policy statement to the UNFCCC which contrasts with their current, siloed approaches"[CXXV]. While often challenging to the actors involved, there is now rich learning to draw on in the design of future CCA initiatives. Insights include the following:

- Adaptation and resilience involve processes of learning and innovation. Learning for adaptation should therefore:
  - be an integral part of the project/ programme strategy;
  - be built-in the project cycle, enabled accordingly *and* translated into action (i.e. implemented as well as recorded in a 'lessons learned' report);
  - log-frames can be a hindrance for learning unless their role is clear within a broader design, monitoring, evaluation and learning framework.
- When mainstreaming CCA into development initiatives, look at:
  - vulnerability to climate change of specific groups and regions;
  - available information on climate change from the short to the long term (ranging from local weather forecasts to long-term climate change scenarios);
  - prioritisation of adaptive measures to climate change (sustainable adaptive agriculture, water efficiency, etc.);
  - development pathways: which is the most climate change compatible? which foster better institutional learning?
- While there may be good policy/ financial reasons for maintaining a distinction between *development* and *adaptation*, from a field perspective their separation can be counterproductive, with learning approaches needing to focus instead on how to adapt and transform current development pathways.

Recommendation 1 (R1). In considering future options for investment in CCA, both SDC India and SDC Bern should undertake a critical review of how they understand innovation for climate resilient development, in terms of pathways and theories of change.

(2) The GPCC also requires stronger conceptual framing to ensure that policy is properly grounded in real, on-the-ground experience

A major learning for the GPCC has been the importance of properly grounding policy advocacy and policy dialogue in on-the-ground experience. This has important implications for the design of upscaling and policy dialogue processes, raising questions both about the timing of policy engagement in relation to on-the-ground experiments, and about the ways in which policy makers are enabled to learn from local experiments, be this through 'seeing is believing' study tours, through policy workshops or through credible and authoritative knowledge products.

As it is framed at multiple levels of engagement, the GPCC framework also suggests a resonance with the idea of multi-level innovation systems; here both the challenge and the

opportunity is for the GPCC to hone its theory of change of multi-level innovation systems, enabling it to decide which types of multi-level innovation system design it wishes to support and to showcase on the global stage. The fact that investment through the GPCC is targeted at China, India, South Africa and the Peru/Andean region, suggests that it could make a significant knowledge and/or policy impact globally, if it were to test a multi-level innovations systems design for CCA across these key countries/regions.

Recommendation 2 (R2). In framing the GPCC, SDC should further reflect on (a) how learning local innovations on the ground is key to informing the other levels of the framework and (b) how best to formulate a theory of change for GPCC as a multi-level innovation system.

(3) Effective climate adaptation requires investment in design

Climate change adaptation is not just about reframing development pathways but also about translating new conceptual frameworks into practice. This highlights the value of a proper design phase at the start of any new CCA initiative. This design phase should address:

-

(a) *Developing an explicit theory of change for innovation for climate change adaptation,* shared between project partners, and drawing on current framings both of innovation systems and of CCA. This should include explicit visualization of the dynamics implied by the theory of change, and assumptions underpinning these.
(b) *Selection and agreement of M&E tools*, providing a clear framework within which to review progress and thus to ensure effective strategic steering and learning as well as accountability.
(c) *Agreement of partners' roles* - both complementary and overlapping – for example that all will participate in a shared learning process – and should set this agreement out in an MOU. Roles should clearly reflect a shared ToC.
(d) *Scheduling of shared planning, reviewing and learning activities throughout the project life-cycle.* Partners should seek agreement at the outset of and throughout the project about the best combination and scheduling of different types of meetings to support the above.

Recommendation 3 (R3). In planning for future CCA initiatives, SDC and WOTR, whether working together or separately, should set aside a design period of at least six months to enable partners to seek agreement on a shared theory of change, how this is to be translated into a project design including partners' roles, how M&E & L will be undertaken, and for what purposes (strategic steering, learning, accountability).

(4) Effective climate adaptation requires investment in new capabilities

Recommendation 4 (R4). CCD/SDC India, SDC Bern and WOTR should each consider investing in building the capacity of their staff to:

- become more proficient in working with theories of change and M&E frameworks appropriate to the transformational challenges of innovation for CCA, drawing on international good practices and relevant networks of learning and support; working with dynamic conflict in CCA situations: both in noticing where conflict is developing and in learning how to manage it, not only inter-personally but also through improved programme design.
  work more reflexively and self-critically – both are increasingly recognised as vital skills in supporting effective adaptive management and change.

(5) Future investments – options for SDC India

The CCA project revealed a tension between WOTR, with its ambitious emphasis on holistic and integrated approaches based on the 'engine' of adaptive sustainable development, and SDC, with greater interest in smaller number of interventions, understood in more discrete terms. The latter may have also reflected limits in management capacity and the desire to draw stricter boundaries around the focus of the CCA work.

Recommendation 5 (R5). CCD/SDC India should consider a range of options for future investment in CCA projects. These could include:

- **Investment in highly targeted innovations for CCA.** Agro-met based advisories provide a good example. For example, what would it now take to develop a system of simple, effective, demand-driven, useable agro-met advisories, supported by locally credible climate information, in states that were not the focus of the CCA project? What would be the added value and how could SDC work with IMD and other partners in the outscaling/ upscaling process?

- **Investment in one or more carefully boundaried portfolios of innovation for CCA.** This would provide an opportunity for SDC to maximise the learning from the CCA project while still working within manageable boundaries. Consistent with the GPCC, the focus could be on a nexus of inter-related interventions, for example: water-agriculture-climate; water-agriculture-DRR-climate; water-agriculture-energy-climate.

- **Investment in one or more integrated innovation portfolios – working with multiple partners.** This is the most ambitions option and the one most similar to the CCA project. SDC could however consider new approaches to managing such a complex project – for example by putting out a call for proposals from consortia which include (a) multiple partners and (b) a coordinating partner experienced in managing complex, multi-level adaptation processes. The call could highlight the importance of policy processes which are grounded in strong, local-level experiments in innovation, as in the CCA project.

(6) Future investments – options for SDC's Global Programme Climate Change

There is much of value in the learning and lessons from the CCA project which can be used to shape options for SDC's GPCC beyond India.

Recommendation 6 (R6). SDC Bern should consider the following:

- **Showcasing internationally the value and learning from the CCA project.** As an ambitious and unique experiment in multi-level system innovation for climate-resilient development, the learning and lessons from the CCA project deserve to be shared, showcased and promoted internationally. Consideration should be given to presenting the findings from the review and other sources, using multi-media and innovative, story-telling approaches.
- **Learning from the CCA project – spreading to other countries.** At a more targeted level, lessons drawn from the CCA project, both on what should be done and what should be done differently, could be used to shape GPCC projects in other countries, particularly in other arid and semi-arid regions of the world, for example in Morocco. Careful consideration should be given to the design of a process that learns from the CCA project, transferring relevant design principles to a new context, rather than attempting to 'replicate'.
- **Drawing on lessons from the CCA project in the further development of the full GPCC portfolio.** Building on R2, and the recommendation to design the full GPCC as a multi-level innovation system, SDC Bern might consider strategic alliances with other

donors, such as DFID, who are also interested in multi-level innovation system design (and demonstrate an increasingly sophisticated use of theory of change and translation into knowledge and learning systems), as a means of building capacity and strengthening their approach to CCA in China, South Africa and the Peru/Andean region as well as in India.

(7) Future investments – options for WOTR

For WOTR, further investment in maintaining and strengthening the resilience of the complex system innovation for adaptive sustainable development in which they have invested in Maharashtra, Andhra Pradesh and Madhya Pradesh is highly dependent on continuing sources of funding. This presents a challenge for WOTR in considering how best to institute a resilient funding platform; we would recommend careful investment in ensuring that the funding platform is sufficiently robust to 'hold' the system innovation; this may, for example, involve diversification of funding, or it may involve a focus on a small number of core funders who are very clear about what it is they are being asked to support in terms of theory of change and their role as partners, particularly when it comes to acting as co-learners.

11. References (as referred to in the end notes and annexes)

Australian Public Service Commission (2007) *Tackling Wicked Problems: A public policy perspective.* APSC, Canberra.

Bajpai S (2013) *Simple, complicated, complex and chaotic: Adaptation to Climate Change (M&E).* Pune: WOTR, January 2013.

Bond (2012) *An introduction to the principles for assessing the quality of evidence.* London: Bond.

Bours D, McGinn C, Pringle P (2014a) *Guidance Note 1: Twelve Reasons why climate change adaptation M&E is challenging.* SEA Change CoP and UKCIP.

Bours D, McGinn C, Pringle P (2014b) *Guidance Note 3: Theory of Change approach to climate change adaptation programming.* SEA Change CoP and UKCIP.

Brooks N, Anderson S, Ayers J, Burton I, Tellam I (2011) *Working paper 1: Tracking adaptation and measuring development (TAMD).* International Institute for Environment and Development (IIED). Available from: www.seachangecop.org/node/118.

Brouder A (2012) *Oxfam discussion paper on resilience.* Internal discussion paper. Oxford: OGB.

CCD/SDC (2010) *Voices from the Grassroots.* Delhi: SDC.

CCD/SDC (2013a) CCA Project – Summary of discussions held at the meeting with WOTR on 13th May 2013 at CCD, New Delhi.

CCD/SDC (2013b) *Terms of Reference (ToRs): External Review of WOTR-SDC-NABARD partnership on Climate Change Adaptation.* Delhi: SDC India

Chapman J (2002) *System Failure,* London: Demos.

CDE (2009) *Adaptation to Climate Change in Maharashtra. The WOTR Climate Change Adaptation Project and the Maharashtra Adaptation Programme (MAP).* Delhi: SDC, January 2009

Cocking J, Jennings S (2013) *Resilience: an informal discussion paper.* Oxford: OGB, *for internal use only.*

Colvin J (2014) *Appreciation by the Global Climate Adaptation Partnership (GCAP) of the Terms of Reference for External Review of WOTR-SDC-NABARD partnership on Climate Change Adaptation.* Final proposal, 28th January 2014. Oxford: GCAP.

Colvin J, Abidi-Habib M (2013) Learning about transformational design in Pakistan's Climate Compatible Development Space. In: O'Brien K, Sygna L (eds.) *Proceedings of Transformation in a Changing Climate, 19-21 June 2013, Oslo, Norway. Pp. 105-115.* Trykket: University of Oslo.

Colvin J, Blackmore C, Collins KB, Chimbuya S, Dent M, Goss J, Ison RL, Roggero PP and Seddaiu G (2014a) In search of systemic innovation for sustainable development: a design praxis emerging from a decade of social learning inquiry. *Research Policy* 43 (4) 760-771

Colvin J, Lonsdale K (2012) *Characteristics of Resilience Building in Practice. Report for the Inter-agency Resilience Working Group.* Godalming: WWF, October 2012.

Colvin J, Scharfetter B, Vogel C (2014b) *How should South Africa's water resources be managed in a climate changing world? Perspectives on adaptation policy and practice – a handbook.* Report for project K5/1965. Pretoria: Water Research Commission.

D'Cruz M, Mathur M, D'Souza M (2014) *Assessment of Local Livelihoods – Clusters: Akole & Sangamner.* WOTR, Pune, January 2014.

DFID (2012) *Protecting Gains, Minimising Losses: Putting Resilience at the Heart of DFID's Development Work.* Policy Division Draft Discussion Paper. London: DFID, 2012.

DFID (2013) *Guide for applicants on the preparation of concept notes to apply for grants under the Building Resilience and Adaptation to Climate Extremes and Disasters Programme (BRACED).* London: DFID, September, 2013.

dlgn (Decentralisation and Local Government Programme) (2012) *Outcome Monitoring Tool: SDC Local Governance Programme in Rajshahi and Sunamhanj – Sharique.* Dhaka: Embassy of Switzerland.

Earle L (2002) *Lost in the matrix: The logframe and the local picture.* INTRAC's 4th Evaluation Conference. http://www.intrac.org/docs.php/790/Earle.pdf.

Earl S, Carden F, Patton MQ, Smutylo T (2001) *Outcome mapping: Building learning and reflection into development programs.* IDRC. Retrieved from http://www.idrc.ca/openebooks/959-3/

ESPA (2012) *Monitoring and evaluation within ESPA. Deliverable 1/5: Theory of Change.* Ecosystems Services for Poverty Alleviation (ESPA). Available from: www.seachangecop.org/node/2828

FitzGibbon J, Mensah KO (2012) Climate Change as a Wicked Problem : An Evaluation of the Institutional Context for Rural Water. *Sage Open.* DOI: 10.1177/2158244012448487

Fussel H-M, Klein R (2006) Climate change vulnerability assessments: An evolution of conceptual thinking. *Climatic Change* 75: 301–329.

Gasper D (1997) *'Logical Frameworks': A Critical Assessment.* Working Paper no.278, The Hague: Institute of Social Studies. From: http://hdl.handle.net/1765/19007

Gearty M, Hilary Bradbury-Huang H, Reason P (2013) Learning history in an open system: Creating histories for sustainable futures. *Management Learning.* Published online 10 October 2013, DOI: 10.1177/1350507613501735

Interagency Resilience Working Group (IRWG) (2012) *The Characteristics of Resilience Building: A discussion paper.* http://community.eldis.org/resiliencewg

Geels FW (2002) Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study, *Research Policy*, Vol. 31, Nos. 8–9, pp.1257–1274.

Geels FW, Schot J (2007) Typology of sociotechnical transition pathways, *Research Policy*, Vol. 36, No. 3, pp.399–417.

Government of India (GoI) (2008) *National Action Plan on Climate Change.* Delhi: Prime Minister's Council on Climate Change.

Gündel S, Hancock J, Anderson S (2001) *Scaling-up Strategies for Research in Natural Resources Management: A Comparative Review.* Chatham, UK: Natural Resources Institute.

Hall A, Dijkman J, Sulaiman V (2009) Rethinking investment in agricultural innovation. LINK News

Bulletin, September 2009.

Hall A, Janssen W, Pehu E, Rajalahti R (2006) Enhancing agricultural innovation: how to go beyond the strengthening of research systems. World Bank, Washington. Retrieved from: http://siteresources.worldbank.org/INTARD/Resources/Enhancing_Ag_Innovation.pdf.

Hall A, Rasheed Sulaiman V, Clark N, Yoganand B (2003) From measuring impact to learning institutional lessons: an innovation systems perspective on improving the management of international agricultural research, *Agricultural Systems*, Vol. 78, No. 2, pp. 213–241.

Hall A, Yoganand B, Sulaiman R, Raina R, Prasad S, Niak G, Clark N (eds) (2004) *Innovations in Innovation: reflections on partnership and learning.* ICRISAT, Patancheru, India and NCAP New Delhi, India.

Harvey B, Ensor J, Garside B, Woodend J, Naess LO, Carlile L (2013) *Social learning in practice: A review of lessons, impacts and tools for climate change.* CCAFS Working Paper No. 38, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Copenhagen, 2013.

Hedger MM, Mitchell T, Leavy J, Greeley M, Downie A, Horrocks L (2008) *Evaluation of adaptation to climate change from a development perspective.* Institute of Development Studies (IDS) / AEA Group. Available from: www.seachangecop.org/node/128.

Hoogma R, Kemp R, Schot J, Truffer B (2002) *Experimenting for Sustainable Transport: The Approach of Strategic Niche Management*, Spon Press, London.

IDRC (2001) *Outcome Mapping.* Retrieved March 8, 2014, from http://www.idrc.ca/en/ev-26586-201-1-DO_TOPIC.html

Ison RL (2008) Systems thinking and practice for action research, in P Reason and H Bradbury (Eds.): *Handbook of Action Research: Participative Inquiry and Practice*, pp.139–158, Sage, London.

Ison RL (2010) *Systems practice. How to act in a climate-change world.* London: Springer.

Ison RL, Collins K, Colvin J, Jiggins J, Roggero PP, Seddaiu G, Steyaert P, Toderi M, Zanolla C (2011) Sustainable catchment managing in a climate changing world: New integrative modalities for connecting policy makers, scientists and other stakeholders. *Water Resources Management (Special Issue)* 25(15), 3977-3992.

Jeans H with Colvin J (2013) *Key concepts in climate change: Learning to adapt and transform. Case studies.* Godalming: WWF.

Kilelu C, Klerkx, L, Leeuwis C, Hall A (2011) *Beyond Knowledge Brokerage: An exploratory study of innovation intermediaries in an evolving smallholder agricultural system in Kenya.* DFID Research into Use, Discussion paper 13.

Kingdon J, Thurber J (2010) *Agendas, Alternatives and Public Policies.* London: Longman.

KIT (Royal Tropical Institute) (2014) *Innovation for rural development.*

Klerkx L, Aarts N, Leeuwis C (2010) Adaptive management in agricultural innovation systems: the interactions between innovation networks and their environment, *Agricultural Systems*, Vol. 103, No. 6, pp.390–400.

Knickel K, Brunori G, Rand S, Proost J (2009) Towards a better conceptual framework for innovation processes in agriculture and rural development: from linear models to systemic approaches, *Journal of Agricultural Education and Extension*, Vol. 15, No. 2, pp.131–146.

Kunke R, Murthy R, D'Souza M (2014) *Drought: A litmus test for Watershed Development.* Pune: WOTR, March 2014.

Leach M, Scoones I, Stirling A (2010) *Dynamic Sustainabilities: Technology, Environment and Social Justice.* London: Earthscan.

Levine S, Ludi E, Jones L (2011) *Rethinking Support for Adaptive Capacity to Climate Change. The role of development interventions: Findings from Mozambique, Uganda and Ethiopia.* London: ODI.

Li J, Leeuwis C, van Bueren ETL, Song Y, Jiggins J (2012) Contribution of action researching to institutional innovation: a case study of access and benefit sharing (ABS) mechanisms in the participatory plant breeding (PPB) in Southwest China, *Int. J. Agricultural Resources, Governance and Ecology,* Vol. 9, Nos. 3/4, 204-227.

Mathur M, Awasthi S, Bajpai S (2014) *Carbon Neutral Village/ Cluster: Conceptual Framework for Envisioning Carbon Neutral Village/Cluster.* WOTR, Pune, January 2014.

Mathur M, D'Cruz M (2014) *CoDriVE – Livelihoods Assessment.* Pune: WOTR, February 2014.

Mathur M, D'Cruz M, Bajpai S (2014) *Local Exchange Systems – Designing Community Incentives: A Discussion on Alternate Economics to Strengthen Local Economy and Facilitate Sustainable Adaptation.* WOTR, Pune, February 2014.

McGray H, Hammil A, Bradley R (2007) *Weathering the Storm: Options for Framing Adaptation and Development.* Washington: World Resources Institute.

Morriss S, Massey C, Flett R, Alpass F, Sligo F (2006) Mediating technological learning in agricultural innovation systems, *Agricultural Systems*, Vol. 89, No. 1, pp.26–46.

Murray N (2013) Why DFID is now funding innovation scale-up. http://www.alnap.org/blog/84.aspx

Nederlof ES, Pyburn R (eds) (2012) *One Finger Cannot Lift a Rock: Facilitating Innovation Platforms to Trigger Institutional Change in West Africa.* Amsterdam, The Netherlands: Royal Tropical Institute (KIT) Publishers.

Newman K, Fisher C, Shaxson L (2012) Stimulating demand for research evidence: What role for capacity-building? *IDS Bulletin* 43(5), September 2012.O'Brien K (2013) The courage to change: adaptation from the inside-out. In Moser SC, Boykoff MT (eds.) (2013) *Successful Adaptation to Climate Change: Linking science and policy in a rapidly changing world.* London: Routledge.

OECD-DAC (2000) *DAC Criteria for Evaluating Development Assistance.* Paris: OECD.

Patton MQ (2011) *Developmental Evaluation: Applying Complexity Concepts to Enhance Innovation and Use (1st ed.).* The Guilford Press.

Pringle, P. (2011) *AdaptME Toolkit for monitoring and evaluation of adaptation activities.* UK Climate Impacts Programme (UKCIP). Available from: www.ukcip.org.uk/wordpress/wp-content/ PDFs/UKCIP-AdaptME.pdf and www.seachangecop.org/node/116.

Pringle P (2013) *Uncertainty in decision making processes: Challenges and opportunities in water and climate change.* Presentation at the conference on Too much, too little: The role of water in adaptation.

Rip A, Kemp R (1998) Technological change, in S Rayner and EL Malone (Eds.): *Human Choice and Climate Change: Resources and Technology*, Vol. 2, pp.327–399, Columbus, Battelle.

Roep D, Wiskerke JSC (2004) Reflecting on novelty production and niche management in agriculture, in JSC Wiskerke, JD van der Ploeg (Eds.): *Seeds of Transition: Essays on Novelty Production*, *Niches and Regimes in Agriculture*, pp.341–356, Van Gorcum, Assen.

Roth G, Bradbury H (2008) Learning History: An Action Research Practice in Support of Actionable Learning. In Reason P, Bradbury H (eds) *Handbook of Action Research.* 2nd Edition. London, Sage: 350-365;

Scharmer O (2008) *Theory U: Leading from the Future as it Emerges*. San Francisco, CA; Berrett-Koehler Publishers

SDC (2007) *Vision 2010 and beyond. SDC Partnership Programme with India.* Internal Working paper (confidential). Bern/Delhi: SDC South-Asia Division, June 2007.

SDC (2009a) WOTR-SDC partnership for Climate Change Adaptation Transition Phase (April 1, 2009 – March 31, 2013). Kreditantrag No. 7F-03445.02. Berne: SDC

SDC (2009b) *Swiss Cooperation Strategy South Caucasus 2008-2011: Outcome Monitoring Concept for the Domain Economic Development and Employment.* Tbilisi: SDC.

SDC (2013) *Strategic Framework of the Global Program Climate Change 2013-2017.* 3rd draft, 25th July 2013. SDC, for internal use.

SDC (2014) *SDC Global Programme Climate Change (GPCC). Updated Strategic Framework 2014 – 2017.* SDC, for internal use.

Sen A (2005) *The Argumentative Indian: Writings on Indian History, Culture and Identity*. London: Allen Lane.

Shaxson L with Bielak A, *et al.* (2012) *Expanding our understanding of K*(KT, KE, KTT, KMb, KB, KM, etc.) A concept paper emerging from the K* conference held in Hamilton, Ontario, Canada, April 2012.* Hamilton, ON: UNU-INWEH.

Siebentritt M, Halsey N, Stafford-Smith M (2014) *Regional Climate Change Adaptation Plan for the Eyre Peninsula.* Prepared for the Eyre Peninsula Integrated Climate Change Agreement Committee.

Tschakert P, Dietrich KA (2010) Anticipatory learning for climate change adaptation and resilience. *Ecology and Society*, 15(2): 11.

UNFCCC (2011) *Assessing the costs and benefits of adaptation options – an overview of approaches.* Bonn: UNFCCC

Uphoff N (1992) Learning from Gal Oya: possibilities for participatory development. See also: Uphoff CM *et al.* (2000). Demonstrated benefits from social capital: the productivity of farmer organizations in Gal Oya, Sri Lanka. *World Development,* 28(11) 1875–1890.

Van Mierlo B, Regeer B, van Amstel M, Arkesteijn M, Beekman V (2010) *Reflexive Monitoring in Action: a guide for monitoring system innovation projects.* Retrieved from http://www.transitiepraktijk.nl/files/RMAengDEFcor.pdf.

Vogel I (2012) *Review of the use of 'Theory of Change' in international development.* Review report for DFID. www.isabelvogel.co.uk. April 2012.

World Bank (2012) *Agricultural innovation systems: an investment sourcebook.* Washington: World Bank.

WOTR (2008) Meeting the challenges of globalization and climate change. WOTR 2020: A road map for the coming decade. Pune: WOTR, 2008.

WOTR (2009a) *WOTR-SDC Partnership Proposal.* Pune: WOTR. 11th February 2009

WOTR (2009b) *CCA project: Original colour coded logframe.* Pune: WOTR

WOTR (2011) *What are we in for? Rural dynamics in the context of Climate Change – a look at Ahmednagar district.* Pune: WOTR, February 2011.

WOTR (2013) CCA project progress report, April – September 2013. Pune: WOTR.

WOTR (2014a) *Annual Report 2012-2013.* Pune: WOTR.

WOTR (2014b) *Towards Resilient Agriculture in a Changing Climate Scenario – Building response capacity of smallholder farmers.* Pune: WOTR.

WOTR with SDC & NABARD (2010) *National Workshop on practical Climate Change Actions in Semi-Arid Areas, Pune 1-2 July, 2010;* Workshop report, Pune: WOTR

WOTR with SDC & NABARD (2011) *Climate Change Adaptation and Sustainable Development Pune, India Feb 24-25, 2011.* Workshop report, Pune: WOTR

WOTR with SDC & NABARD (2012) *"Connecting the Dots: Evolving practical strategies for Climate Resilient Development", 5th and 6th June 2012, Pune.* Workshop report, Pune: WOTR.

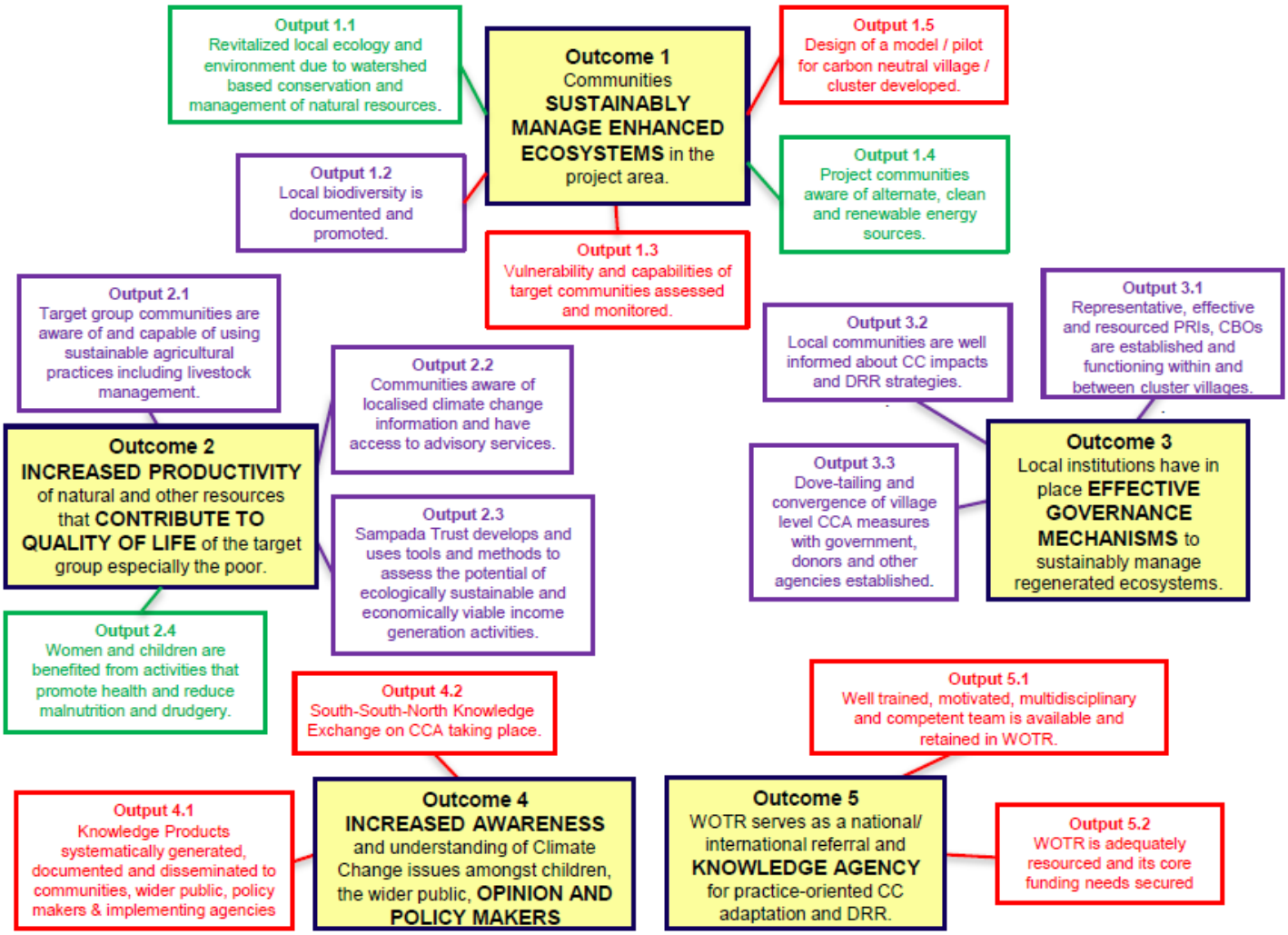
WRI (2012) *Watershed development in India: economic valuation and adaptation considerations.* Bangalore: WRI.

WWF (2013) *Learning for Adaptation: Tools for learning – learning histories.* WWF: Godalming and Kathmandu. January 2013.

Zade D (2014) *Diversified off farm and non- farm income generating activities created under CCA project – A Documentation Report for Sangamner and Akole block.* WOTR, Pune, January 2014.

Zade D, Rao KB, Bendapudi R, D'Souza M (2014) *Towards Resilient Agriculture in a Changing Climate Scenario.* Pune: WOTR, April 2014.

Annex 1: Diagram showing the main outcomes and outputs of the CCA project, and how these were funded (red – SDC only; green – NABARD only; purple – jointly funded).



Annex 2: Selection of project village clusters

(a) Focal communities at the start of the project

Akole Taluka lies in the offshoots of the Sahyadri range, is largely tribal, endowed with some forest cover and biomass and having annual rainfall ranging between 750-1200 mm. While comparatively well-endowed with natural resources, it is nevertheless relatively backward, comprises of a large number of poor and vulnerable communities and consists of large areas that are remote and far from public amenities and utilities. It is hilly and a large number of the population migrates in the summer in search of sustenance as agriculture, which is the mainstay of livelihood, is predominantly a kharif occupation. Malnutrition is a severe scourge. It is the feeder zone for many rivers that feed into the Pravara, Mula and Godavari rivers and the areas in the upper reaches of the catchment system have low ground water recharge and withdrawal potential.

The project area in the Akole Taluka consists of a Cluster (originally the 'Kohone Cluster'; **renamed the 'Akole cluster'**) in the upper reaches of the Mula River which is a tributary of the Godavari river comprising of 8 villages Kohone, Purushwadi, Wanjulshet, Pimpri, Khadki Budruk, Khadki Khurd, Ghoti and Wagdari, all of which form a contiguous zone of 3297 ha. covering over 1022 households (HH) and at least 5700 persons.

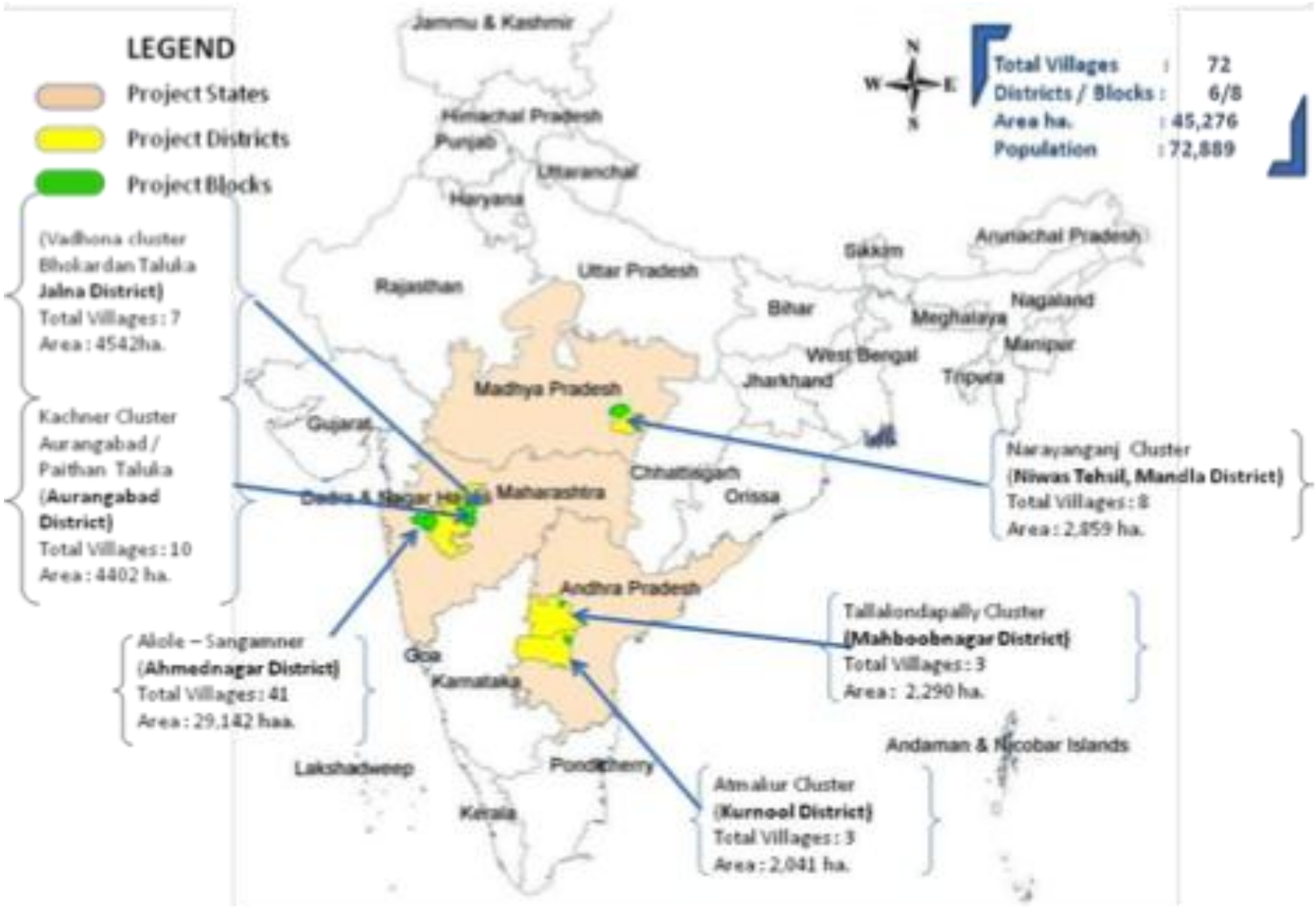
Sangamner Taluka on the other hand, lies in the rain-shadow belt of Maharashtra and consists of both an irrigated portion and a plateau region, which is rain fed, semi-arid and drought prone. Here, even though people are poor, they are more enterprising, willing to take risks and experiment, are better informed, politically more active and also better integrated into the local and regional economy resulting from better communication facilities, road connectivity and educational facilities. With a rainfall regime that varies from between 150 mm to 450 mm on average, and with drought regularly occurring during 3 years in a 5-year cycle, the region experiences acute water shortages and stress in the summer months, repeated crop failures, loss of cattle and livestock thus resulting in people having to migrate in search of a livelihood.

The project area in the Sangamner Taluka consists of 2 sub-clusters (referred to jointly as the **'Sangamner Pathar Cluster'**). The Wankute Sub-Cluster consists of 9 villages: Wankute, Chas, Pimpaldari, Kauthe Khurd, Kauthe Budruk, Malegaon Pathar, Borbanwadi, Bhojadari and Pemrewadi all of which form a contiguous zone of 8438 ha. covering over 2243 households (HH) and at least 11,976 persons. The Gunjalwadi Sub-Cluster, consists of 8 villages: Jawale Baleshwar, Gunjalwadi, Karjule Pathar, Sarole Pathar, Warudi Pathar, Sawargaon Gule, Mahalwadi and Khandgedara all of which form a contiguous zone of 8841 ha. covering over 1480 households (HH) and at least 8113 persons. In both these sub clusters, activities that are necessary to build resilience of the local community, reduce risk and foster adaptive behavioural responses will be undertaken, funds permitting.

(b) Additional villages added in 2011

In 2011 another 28 villages were added to the CCA project: (1) In Andhra Pradesh (3 in Mehaboobnagar and 3 in Kurnool districts); (2) In Madhya Pradesh 8 villages in Mandla district; (3) In Maharashtra (3 in Akole block; 1 in Sangamner block; Aurangabad district 10 villages). In these expansion villages, the major part of the activities were completed / or supported by various other funding institutions - public or private.

(c) Full extent of project village clusters after 2011



Annex 3: Short biographies of the review team

Dr John Colvin

John is a Principal with the Global Climate Adaptation Partnership (GCAP) and a Director of Emerald Network Ltd. He consults widely on integrated and adaptive approaches to sustainable planning and development and was until recently a Visiting Senior Research Fellow at the Open University, UK. A widely-regarded sustainability entrepreneur, John has a deep commitment to reflexive, collaborative and participative inquiry practices, and his core expertise lies in designing, facilitating and researching multi-level institutional learning processes, both as a policy instrument for innovation and as a means for implementing climate change adaptation. A former UK policy maker, he also has extensive experience of evaluation, policy, planning, governance and research issues in the fields of flood risk, water resources, ecosystem services, sustainable livelihoods and sustainable urban development. He has over 10 years' experience of working in international development, including in China, Colombia, Kenya, India, Nepal, Pakistan, South Africa and Tanzania.

John was previously Director of the Learning to Live with Climate Change programme at the Open University and of Watercourse, a six-year programme of capacity building for adaptive water governance in South Africa. He recently undertook a qualitative review for Oxfam GB of their Community-Based Disaster Risk Management and Livelihoods Programme in Pakistan, looking at the implications of this programme for resilience, adaptation and risk reduction programming. For further information see www.climateadaptation.cc/about-us/team/

Moho Chaturvedi

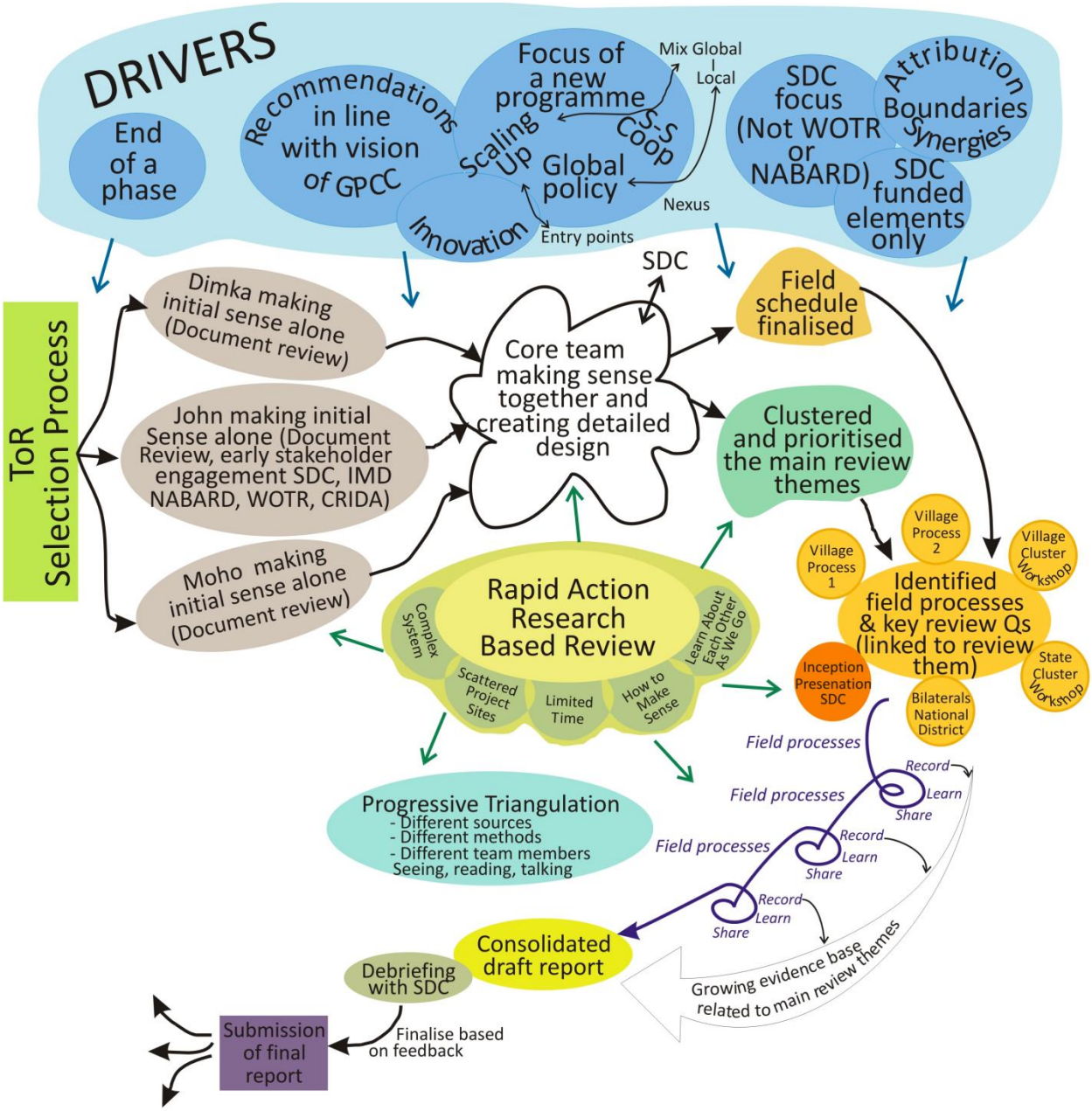
Moho Chaturvedi is an independent consultant with 19 years' work experience. She works on climate change, environment, development, infrastructure and disasters related issues. A major focus of her work has been in the water sector and includes water resources, water supply and sanitation, irrigation, drainage management and river and flood erosion control. She has also worked in the energy, health, transport, urban development and education sectors. Her work has included project planning and design, assessment, monitoring and evaluation. Moho has worked in South Asia, South East Asia and Africa with a variety of agencies, including multi-lateral and funding agencies, private consultancies, NGOs and government agencies. She has two master's degrees, one in Geography where she specialised in regional planning and a second in Environmental Assessment and Evaluation where the emphasis was on policy and regulatory frameworks.

Dimka Stantchev Skeie

Dimka Stantchev Skeie is a programme manager in the Global Programme Food Security (GPFS) at the Swiss Agency for Development and Cooperation (SDC). Dimka joined SDC in 2001 and worked for three years in an economic management support programme in the North of Mozambique. She then worked in several Divisions of SDC's Headquarters, in the area of natural resource management (Mongolia), rural development (West Africa), governance, human rights and institutional partnerships. Dimka also worked for 2 years at the CDE (Centre for Development and Environment, University of Bern), where she was part of the team working on climate change (trainings for SDC in Switzerland and Burkina Faso, appraisal of the WOTR climate change adaptation programme in India in 2008). Dimka holds a first degree in Political Science from the University of Lausanne, a master's degree in Management and implementation of development projects from the University of Manchester, a diploma in Economics and a master's degree in Development economics from the University of London.

Annex 4: Approach taken in this review

The diagram below seeks to capture the overall design of the review, as agreed at the inception meeting with CCD/SDC.



Emphasis was placed throughout the review on ensuring robust evidence, drawing on Bond's principles for ensuring quality of evidence[cxxvi]:

- *Voice & inclusion* – the perspectives of people living in poverty are included in the evidence to give a clear picture of who is affected by the project and how;
- *Appropriateness* – the evidence is generated through methods that are justifiable given the nature and purpose of the enquiry;
- *Triangulation* – the evidence has been generated using a mix of methods, data sources and perspectives;

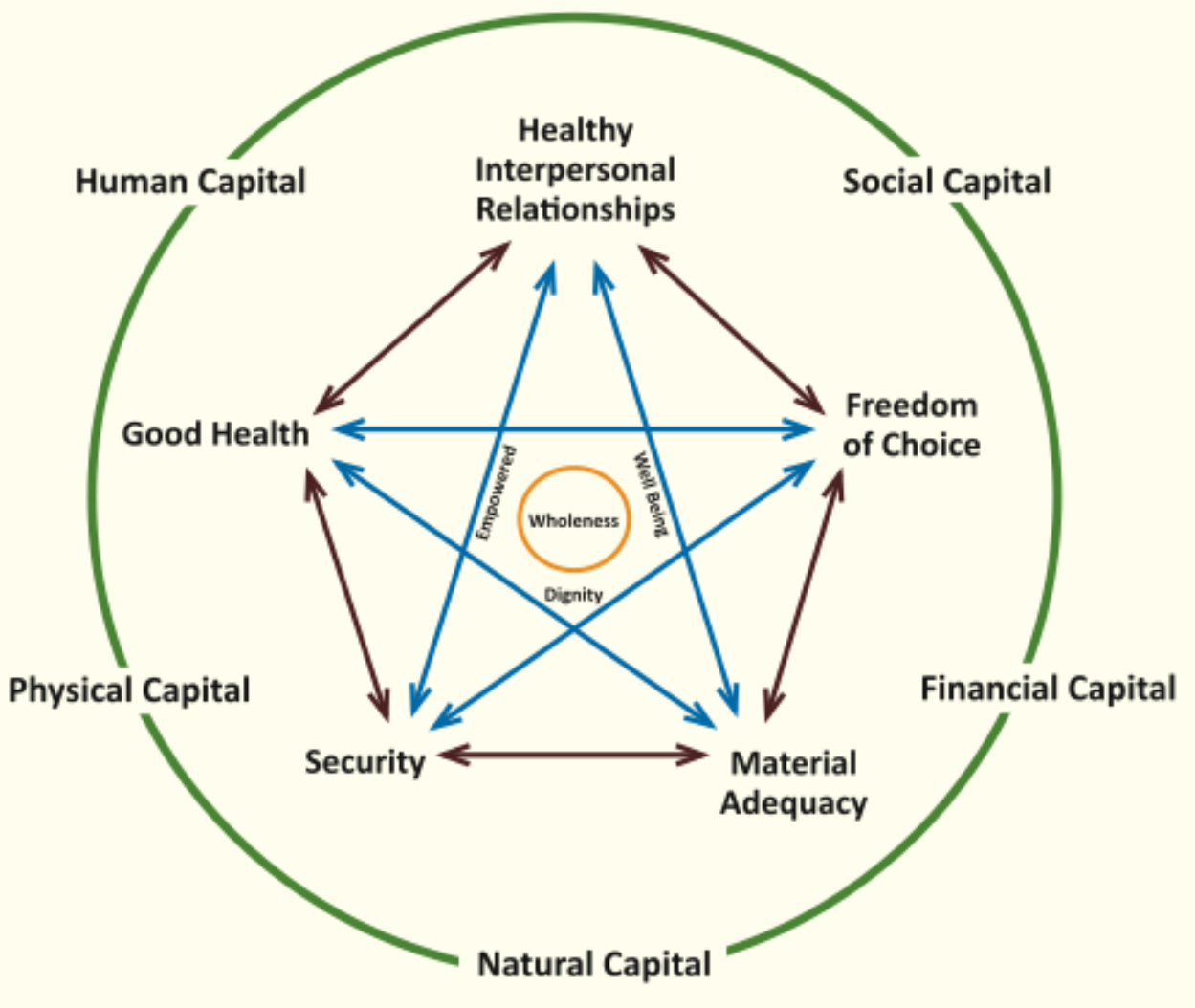
- *Contribution* – the evidence explores how change happens, the contribution of the intervention and factors outside the intervention in explaining change;
- *Transparency* – the evidence discloses the details of data sources and methods used, the results achieved and any limitations in data or in conclusions.

Following submission of the draft report, two further rounds of the review process were agreed in order better to inform the final report: a 'brown bag' lunch and a review meeting with SDC in Bern; and a number of additional interviews with members of SDC and their backstopping support.

Individuals, organizations and communities consulted during the review

Date	Meeting with	Team members
20th Feb	SDC (Janine Kuriger & Vish)	JC
	WOTR (Marcella D'Souza & Arjuna)	JC
	ICAR (Dr Alok Sikka)	JC
21st Feb	NABARD Mumbai: Business Initiative Division	JC
	NABARD Mumbai: Development Policy Division	JC
24th Feb	IMD (Dr Rathore; Dr Borink; Mr Baxla)	JC
26th Feb	SDC (Janine Kuriger & Vish)	JC, MC, DS
27th Feb	ICRAF (Dr. Virendra Pal Singh, Regional Representative for South Asia)	MC, DS
28th Feb	Sangamnner visit – Day 1 (villages)	JC, MC
1st Mar	Sangamnner visit – Day 2 (cluster workshop)	JC, MC
28th Feb	Jabalpur visit – Day 1 (villages)	DS
1st Mar	Jabalpur visit – Day 2 (cluster workshop)	DS
4th Mar	Akole visit (village and cluster workshop)	JC, MC, DS
5th Mar	Meeting with NABARD Pune	JC, DS
6th Mar	WOTR Pune office workshop	JC, MC, DS
7th Mar	Pune State level workshop	JC, MC, DS
11th Mar	Mahabubnagar visit (village)	JC
12th Mar	Government of Andhra Pradesh, Rural Development Department (Dr Suvarna)	JC
13th Mar	SDC (Janine Kuriger & Vish)	JC, MC
14th Mar	SDC – presentation to CCD team in Delhi	JC, MC
30th Mar	SDC (Bern) – brownbag lunch – presentation to GPCC followed by discussion	JC, DS
30th Mar	Discussion with Jean-Bernard, Yuka Greiler, Janine Kuriger and Othmar Schwank	JC, DS
28th May	Yuka Greiler – interview (by skype)	JC
2nd June	Vish – additional interview (by skype)	JC
4th June	Othmar Schwank – interview (by skype)	JC

Annex 5: Key mental models and framings used by WOTR for the CCA project - the 'engine' for adaptive sustainable development[cxxvii]

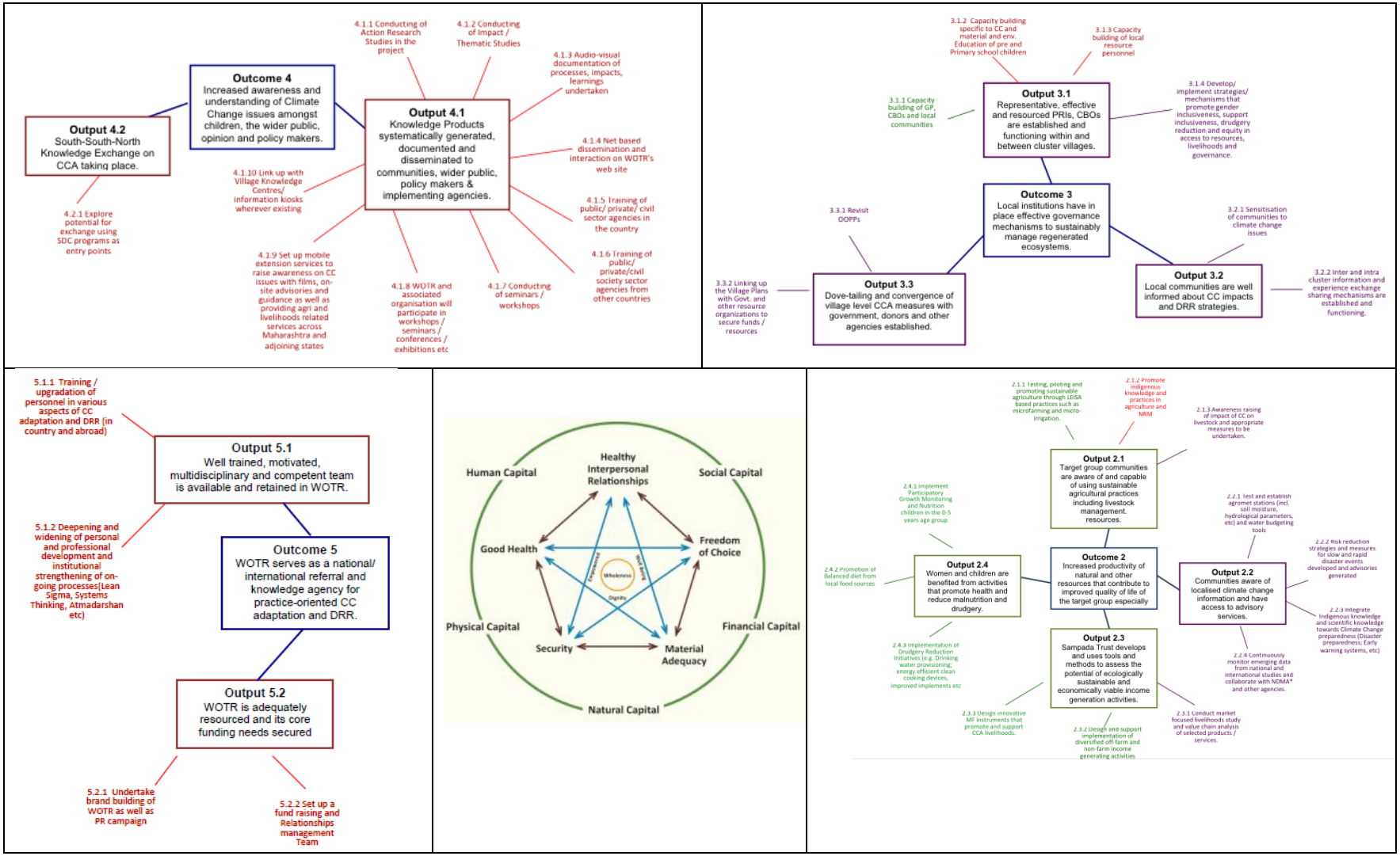


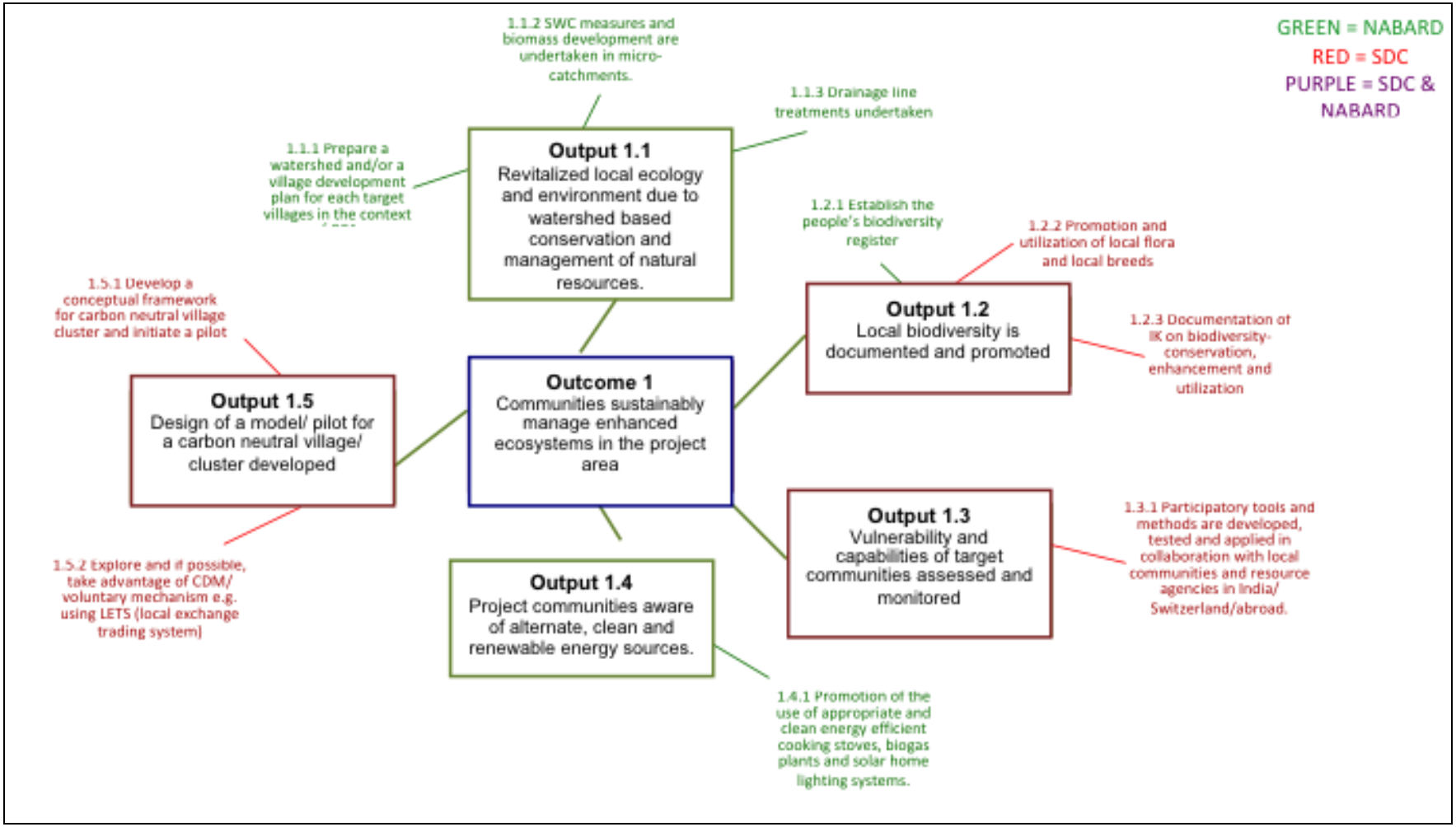
Legend: The outer circle, comprising of the five capitals, are the tangible frame within which human life unfolds. The five capitals – the physical, financial, social, human and natural – have to grow and develop simultaneously and harmoniously to have sustainable growth.

A set of five important conditions, essentially interconnected, are necessary – material adequacy (not merely 'increase'), security (freedom from fear of insufficiency, discrimination and conflict), freedom of choice, healthy interpersonal relationships and good health. These result in an empowered community that lives in dignity and that enjoys well-being.

In the centre is WHOLENESS – a body, mind, spirit integration – a harmony rooted in centredness; the space, within which, the individual and the community are one with the universe.

Annex 6: Correspondence between the five capitals model in the CCA project 'engine' and the five outcomes of the CCA project. *Source:* Derived from analysis of the original logframe.




GREEN = NABARD
RED = SDC
PURPLE = SDC & NABARD
1.1.2 SWC measures and biomass development are undertaken in micro-catchments.
1.1.3 Drainage line treatments undertaken
1.1.1 Prepare a watershed and/or a village development plan for each target villages in the context
Output 1.1
Revitalized local ecology and environment due to watershed based conservation and management of natural resources.
1.2.1 Establish the people's biodiversity register
1.2.2 Promotion and utilization of local flora and local breeds
Output 1.2
Local biodiversity is documented and promoted
1.2.3 Documentation of IK on biodiversity-conservation, enhancement and utilization
1.5.1 Develop a conceptual framework for carbon neutral village cluster and initiate a pilot
Output 1.5
Design of a model/ pilot for a carbon neutral village/ cluster developed
Outcome 1
Communities sustainably manage enhanced ecosystems in the project area
1.5.2 Explore and if possible, take advantage of CDM/ voluntary mechanism e.g. using LETS (local exchange trading system)
Output 1.4
Project communities aware of alternate, clean and renewable energy sources.
Output 1.3
Vulnerability and capabilities of target communities assessed and monitored
1.3.1 Participatory tools and methods are developed, tested and applied in collaboration with local communities and resource agencies in India/ Switzerland/abroad.
1.4.1 Promotion of the use of appropriate and clean energy efficient cooking stoves, biogas plants and solar home lighting systems.

Annex 7: Analysis of results of the CCA project in each of the key output/activity areas funded by SDC alone or by SDC and NABARD jointly

(i) Agro-met based advisories

Until recently, agro-met-based advisories in India were based on information at the District level only. WOTR has succeeded in bringing the weather forecasts and advisories down to village level. It is also one of only two interventions in India (the other being through an agricultural university, also involving WOTR) where block level[9] weather advisories are being piloted. Expectations in the original proposal were that the supply of real-time and accurate micro-meteorological data to farmers would have the following tangible and immediate benefits:

- More efficient use of resources resulting in higher yields and reduced losses following appropriate and timely response to (a) conditions that are favourable to pest attack, (b) conditions favourable to germination of seeds and (c) application of various remedial and prophylactic treatments
- Informed participatory and collective decisions about the land-use and crop patterns to stabilize the hydrological conditions within the watershed
- Improved response to water budgeting and mitigation of stress during the dry season (March to June)
- Better prospects of a second crop

Targets. This intervention, which is unique in India, where *village level* weather forecasts based on local ground data have been piloted, has exceeded two of its three delivery targets. By September 2013[cxxviii], 51 weather stations were installed (31 were initially targeted), in collaboration with the government-run agriculture meteorology department in Maharashtra. In terms of coverage, 1,445 farmers, or approximately 30% of the farmers in the project areas, now have access via SMS to the agro-met advisories and to crop planning advisories (the initial target was 15-20%), which makes a total of over 5,000 farmers benefitting from this intervention (see table below)

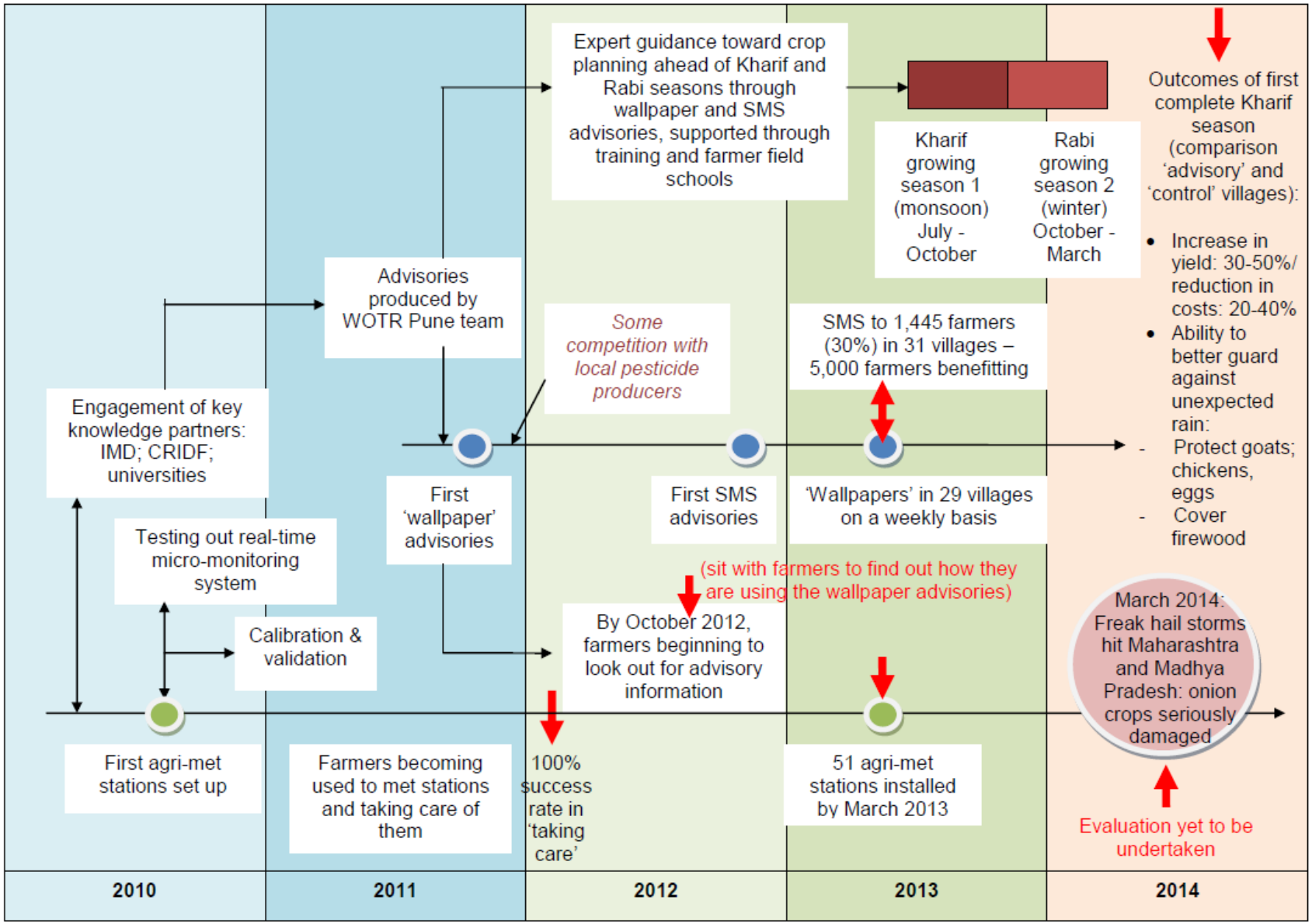
Indicator and targets – Activity 2.2.1	**Achievements, April 2012 – March 2013**[cxxix]
Indicator: Test and establish agro-met stations (including soil moisture, hydrological parameters etc.) *Targets:* • 31 Automated weather stations installed • 75 weather boards displayed in all villages • 15-20% of total farmer population making use of agro-met advisories to plan their crops and irrigation practices	• 51 Agro-met stations installed • Weather information displayed at prominent places in villages • 29 of the 51 Agro-met stations are online and advisories sent via SMS to 1,256 farmers in 31 villages (1,445 farmers, or approx. 30%, by December 2013)[cxxx], by which over 5,000 farmers are benefitting. • 'Wallpapers' put up in 29 villages on a weekly basis regularly since Nov. 2011 (total of 51 weather boards in December 2013).

Figure A7.1 shows the timeline of implementation for this activity. This shows (or represents):

- The time taken to set up an effective agro-met advisory system of this kind, not only on the technical side but also in terms of adaptation, acceptance, use and application by the farmers;

[9] A block is a district sub-division used for planning purposes and consists of a number of Gram Panchayats. Blocks represent compact areas for which effective plans are prepared & then implemented through the village Panchayats.

Figure 7.1 Learning history for the agro-met station/ advisory system in Ahmednagar district, Maharashtra (20th February 2014)



- The coordinated, multi-level approach required to support use of agro-met stations and advisories on the ground;
- The value of targeted M&E at key points in the development of the system (shown by red arrows in the figure);
- The importance of continuous improvement across the system on the basis of feedback and learning – key areas of ongoing improvement include moving the agro-met to a system that transmits the weather data via GPRS data packages, and improvement of the crop specific agro-advisories, from only being printed on paper, to being disseminated via SMS on mobile phones.
- The first real outcomes at the end of a four year period – the advisory system is now supporting changes in local agricultural practices among approx. 5,000 farmers in 31 villages (45 villages by end 2013), leading to increased yields (30-80% productivity gains on average)[cxxxi] at less cost (due to application of organic fertiliser rather than more expensive chemicals) (cost reductions of 20-40%)[cxxxii].

Resilience. The first real outcomes are being demonstrated only at the end of a four year investment period – with the advisory system now supporting changes in local agricultural practices among over 5,000 farmers in 45 villages, leading to increased yields (30-80% productivity gains on average) at less cost (reductions of 20-40%)[cxxxiii]. There is also some evidence that this system has supported better DRR/coping on a daily basis, guarding against the impact of unexpected rain on livestock and firewood. However, the innovation was also recently put through a severe test by the freak hail storms of March 2014[cxxxiv].

Learning. The time taken to set up an effective agro-met advisory system of this kind, not only on the technical side but also in terms of acceptance, use and application by farmers, demonstrates both the persistence and skill and the amount of ongoing learning and improvement required to innovate in this area. In Madhya Pradesh, the poor connectivity is an obstacle to the generation of local weather forecast and the dissemination of advisories via SMS. This technological issue is being addressed by WOTR. The comparative impact and cost in 'advisory' and 'control' villages is still being assessed. Indeed, this intervention is still at an early stage in the innovation cycle. While further investment has the potential to yield rich dividends, further work is also required to properly assess the value of this intervention to date.

Partners' perspectives. Even at this early stage, this works stands out as a leading area of innovation within the CCA project, as demonstrated in part by the level of interest being shown by others:

- IMD will shortly start block level weather advisories to 6,000 blocks in the country and WOTR will partner with IMD in order to upscale this model to the other blocks where the IMD is soon to start weather forecasts;
- Experimentation with agro-met stations in WOTR-targeted village clusters in Andhra Pradesh is now being supported by the state level Integrated Watershed Management Programme (IWMP) as part of their wider learning about CCA;
- WOTR's Agro-met intervention has been shortlisted by both the Maharashtra and Bihar Rural Livelihoods Innovation Fora. These fora, organized under the NRLM, constitute very prestigious awards at a national level;
- In 2013, WOTR's work with the weather advisories as well as the CoDriVE Livelihoods (CASDAAT + LM3) was highly appreciated by a group of World Bank consultants who in return, invited WOTR to present the interventions at the working group meetings of the National Rural Livelihood Project (NRLP) that is being funded by World Bank. This has the potential to upscale the interventions at a national level.

(ii) Sustainable adaptive agriculture, including System of Crop Intensification (SCI), composting and Gangamma Mandal

Sustainable adaptive agriculture plays a vital role in climate change adaptation. It pertains to raising soil fertility, improving water storage capacity, increasing water quality, crop diversification, raising people's capability to cope with risks and withstand natural calamities, and reducing energy consumption. It therefore increases resilience and contributes to disaster risk mitigation and CCA. In the CCA project, sustainable adaptive agriculture emerges as another, successful, core set of activities, closely integrated with the work on agro-met based advisories (designed to support more efficient use of resources resulting in higher yields, as well as reduced losses through timely response to conditions that are favorable to pest attack and to germination of seeds), and micro-irrigation and water budgeting (see below).

Targets. The objective is to promote organic fertilizers and low external inputs, increase land productivity as well as soil health, use of indigenous seeds, and reduce costs of cultivation. While some original targets were changed in the light of learning in this area, all unchanged and adjusted targets have been met (see table below).

Indicators and targets – Activities 2.1.1 (Testing, piloting and promoting sustainable agriculture)[cxxxv] and **2.1.2** (Promote indigenous knowledge and practices in agriculture and NRM)	**Achievements, April 2012 – March 2013**[cxxxvi]
Indicators/targets: • Establish at least 54 "Gangamma farms" in the project villages. Moreover, at least one micro-farm will be promoted and established in each of the project villages (at least 18 microfarms in all). • The number of farmers who have developed and expanded their own demo-plots. (This replaced the focus on micro-farming after this proved not as effective in implementation in this region). • Number and type of organic and appropriate measures adopted by farmers (manure, vermi-compost, organic farming practices, bio-pesticides, bio-fertilizers, etc.)	• 776 various demonstrations on sustainable agricultural practices • 24.6 ha. Horticulture developed • 241 organic compost units • 50 Farmers Clubs formed

Resilience. The changes reported above in increased yields (30-80% productivity gains on average) at less cost (reductions of 20-40%) among 5,000 farmers in 45 villages, are as much down to the interventions in sustainable adaptive agriculture as they are an outcome of the agro-met-based advisories. Experiments by farmers both in Madhya Pradesh and in the Akole and Sangamner clusters suggest for example that the use of organic compost when compared with chemical fertilizers results in improved soil quality, more healthy crops (weight and density) and better tasting food. Farmers in the review workshops in both states also reported this.

Learning. Three main achievements, in terms both of results and of learning, stand out from this area of work:

- ***Sustainable Micro-Farming.*** Initial experiments focused on an approach to sustainable micro-farming known as Gangama Mandal. Overall these experiments were not successful in the uptake of the Gangama Mandal in the Akole and Sangamner clusters. From the perspective of WOTR, the experiment was however useful in that it was learnt that while micro farming is an effective way of increasing productivity, it is also a labour intensive occupation, requiring dedication and will for experimentation, together with intensive monitoring and feedback system so as to make necessary adjustments. By contrast, SDC Delhi had strong reservations about the lack of scientific rigour of this experiment at the planning and design stage and advised WOTR against proceeding with it[cxxxvii].

- ***"System of Crop Intensification" (SCI)*** was then tried as an alternative to sustainable micro-farming. Although many farmers were initially cautious, increasing numbers in all village clusters have come to realize tangible benefits from applying adaptive sustainable agricultural practices, with a total of 776 SCI demonstration plots now established across all village clusters, and with capacity building for the farmers involved through peer-to-peer exchanges and farmer field schools on weekly basis (more than 50 farmers clubs now formed), and through 'learning by doing' (experimentation). The interest in SCI approaches was very apparent in the feedback given by farmers during the review workshops in Akole and Sangamner and in field conversations in Madhya and Andhra Pradesh. However, as with the work on agro-met-based advisories, this work is still at an early stage of development, with the dynamics of these early experiments still being worked through.
- ***Organic composting.*** A key learning from the CCA project is that the commonly held belief that there is insufficient bio-mass for composting in dryland areas is not necessarily always true. The CCA project has therefore been able successfully to promote utilization *of trichoderma viride* for composting that converts locally available biomass within a couple of months into useful organic compost.

Partners' perspectives. The experiments of WOTR at the grass-roots level have attracted the attention of some key National and State institutions, some of which have already established a partnership with WOTR:

- The State Agricultural University in Maharashtra (MPKV) collaborates with WOTR on the agro-met-based advisories and is tracking progress regarding the use of bio-pesticides and growth promoters.
- CRIDA (Central Institute for Dryland Agriculture) has been involved in developing weather based crop management calendar with a focus on adaptation oriented agricultural practice. A weather-based contingency crop plan has been prepared in collaboration with MPKV for Sangamner block, which may facilitate the uptake of good practices into national programmes. CRIDA is looking at WOTR as a key partner to make field-based research for adaptive agriculture.
- ICRAF regards WOTR as a key partner for the policy process around agro-forestry and adaptation. The regional office of the World Agroforestry Centre (ICRAF) in Delhi, which will play a pivotal role in the design of India's agroforestry mission (which includes a strong CCA focus), has been impressed by the work undertaken by WOTR on sustainable adaptive agriculture through the CCA project. It sees WOTR as playing an important role not only in implementation but also in the feedback it can offer into evidence-based policy making. It commented that "WOTR and other NGOs have an important role to play in plugging gaps in areas where government is currently unable to go"[cxxxviii].

(iii) Water budgeting and water management

Optimizing output per drop of water and sharing water equitably are essential elements of adaptation in a context of climate variability, erratic rainfall and possible drought. Water budgeting helps communities to understand water availability and to plan its optimal use in relation to their needs (households, livestock, cultivation), using various methods of irrigation and appropriate cropping patterns.

Targets. Water resource management techniques (such as micro-irrigation, promotion of water management, water budgeting) have been applied to date in 83 locations/farms within the CCA project villages and 38 villages have accepted water-budgeting plans – far exceeding the original targets set. As a result of water budgeting trainings, many farmers have shifted from flood to drip irrigation.

Indicator and targets – Activities 1.3.1 (water budgeting) and 2.1.1 (micro-irrigation)[cxxxix]	Achievements to December 2013[cxl]
Targets: • Protocols and tools for water-budgeting developed • 20 villages have accepted water-budgeting plans • 20 villages (Sangamner only) that consider the outputs from water budgeting exercise in planning crops and irrigation exercises • At least 8 wells/ irrigation schemes/irrigation systems will be promoted for the poorest enterprising farmers, subject to groundwater availability. Large-scale promotion of low cost irrigation systems will also be widely promoted.	• 38 villages have accepted water-budgeting plans • Wasundhara sevaks have been trained, but no villages have yet considered the outputs from water budgeting exercise in planning crops and irrigation exercises • 83 water resource management techniques (e.g., micro-irrigation, promotion of water management) undertaken[cxli] • Many farmers have shifted from flood- to drip-irrigation; water budgeting trainings are a likely driving factor for this change.

Resilience. Despite regular water scarcity, wasteful use of water when available was a common feature across all project areas at the outset of the CCA project (and at the outset of earlier work in some micro-watersheds). The water budgeting exercise has helped communities to understand the implications of the different patterns of water use that were prevalent and that were likely to continue, if behavior patterns remained unchanged. However, it was only when this exercise was linked to establishing micro-irrigation systems such as drips and sprinklers that significant impacts began to be observed.

Learning. This set of interventions demonstrates a further area where the CCA project has introduced a significant local innovation, based on learning how best to link understanding of water budgeting practices with the introduction of micro-irrigation systems and crop planning. As with other innovations discussed above, this process is still in the early stages; while farmers have seen both conceptually and in practice the link between water budgeting and micro-irrigation, there have been delays in translating water budgeting into crop planning, in part because of delays in starting the NABARD-funded elements of the program. It will be very interesting to see over the next year the extent to which farmers are able to translate water budgets into crop plans that they are prepared to use as the basis for planting.

Partner's perspectives.

- The experiences of WOTR have been widely reflected at local and State levels in the press.
- The "Ground Water Management Act –GVM" enacted by the GoMI mandates the component of community mobilization as described in the protocols prepared with WOTR support.

(iv) DRR

WOTR's concept of DRR is strongly linked to Community Based Disaster Management (CBDM), and is seen as a cross-cutting theme of the CCA project. For WOTR, community participation and community ownership in disaster risk reduction is complementary to the crucial role that local institutions have to play in mobilizing these communities in various situations and stages of a crisis to reduce vulnerabilities and minimize losses.

Target: Climate-based DRR has been integrated at the village level though WOTR's CBDM approach. As a part of CBDM, WOTR has initiated three components, namely, Village CBDM plan, Hazard mapping and Seasonal Activity Calendars. This has been successfully implemented in 8 villages of Madhya Pradesh and 23 villages of Maharashtra. Along with this,

3D models ('visual integrator') were created for 4 villages in Maharashtra and one consolidated model for 8 villages in Madhya Pradesh. In these latter cases, disasters were linked into the village planning process though discussions around the visual integrator, to visualize and build required village level management actions and plans in case of any disasters. In terms of seasonal activity calendars, one is created for each of the summer, monsoon and winter seasons, in each case indicating where most people of the village will be in case of a disaster. These time schedules can be used either to gather the people to manage disasters or for rescue operations. Each village level disaster plan is then integrated into the GoI-UNDP Disaster Risk Management Programme's village level protocols. In terms of coping mechanisms, WOTR/Sampada Trust explored a number of options, approaching four major insurance companies (HDFC- ERGO, IFFCO TOKYO, BAJAJ ALLIANZ and ROYAL SUNDARAM) to work out the possibility of provision of weather insurance products in the Akole and Sangamner blocks. One of these insurance companies (HDFC ERGO) sent insurance quotes for Onion and Tomato crops, but subsequently backed off and did not respond to queries. Unofficially they informed us that they were not sure of the viability of the scheme and hence decided not to implement it. They also indicated that the experience of other insurance companies in this regard was not encouraging – all this was off the record. As a result, the CCA project was not able to introduce weather based insurance products. Instead, it has worked on empowering villagers, via VDC, to ask for compensation to the GoMI after a disaster.

Indicator - Activity 2.2.2 - Risk reduction strategies and measures for slow and rapid onset disaster events developed and advisories generated); **Activity 2.2.3** - Integrate indigenous knowledge and scientific knowledge towards climate change preparedness (disaster preparedness; early warning systems, etc.)	**Achievements, April 2012 – March 2013**[cxlii]
Targets: 1. Local Disaster management plans exist and put in place; 2. Disaster Management Committees at village level are in place 3. No. of advisories on water use, crop planning and management; pest management, etc., issued 4. No. and type of DRR instruments e.g. insurance instruments promoted	• In 8 villages in Madhya Pradesh DRR hotspots are marked and maps are displayed • DRR hotspots are marked and displayed in 9 villages in Maharashtra • 20 DRR plans • 12 DRR activities promoted

Resilience. The CBDM approach seems well understood and appreciated by the villagers, as reflected by what was articulated by a woman in Madhya Pradesh, "We prepare the 3D model, a map based on DRR, and this map helps us to communicate with the government what the hazard and disaster risks are." The weather and agro-advisories also play an important role in the management of climate change-related immediate disasters. The availability of weather information a few days in advance has often been found useful to save harvested crops and manage livestock in case of excess heat.

Overall, our interviews with communities revealed that weather related hazards are still a challenge to manage. In Madhya Pradesh for example, while rain and hail was a major concern this year (see newspaper article), frost had previously resulted in much destruction of standing crops. In Maharashtra an estimated 800,000 hectares of agricultural land spread across 28 districts were affected in March 2014 either by heavy rain or by severe hailstorms, according to the Agriculture Commissioner of Maharashtra[cxliii]. Equally, not only standing crops in the field but also some crops of the next season, like mangoes which were starting to bloom, could be impacted with such dramatic climate changes.

Learning: At this stage DRR plans include more than climate related disasters, and the differentiation between climate-related disasters and other hazards such as earthquake is not always clear at the community level. Nonetheless, there seems to be a clear demand to have greater understanding and information on key climate related disasters like heat waves, droughts, hailstorm and floods in the villages. There is still a need to understand better the links between climate change and DRR at the village, and probable responses for them. It also comes out clearly that there is a need for the diversification of a rural livelihoods portfolio for risk reduction at the village level, given the possible unexpected weather events like the unseasonal rain and hail seen recently.

Partners' perspectives:

- As mentioned under "Sustainable adaptive agriculture", the IMD, the Central Institute for Dryland Agriculture (CRIDA) and The State Agricultural University in Maharashtra (Mahatma Phule Krishi Vidyapeeth -MPKV) have prepared, together with WOTR, a contingency crop plan for the farmers of Sangamner block, so that they have alternatives and management advice to handle adverse weather events such as drought, flood, heat wave, cold wave, etc. to make informed decision for addressing the variability.
- The Panchayats seem generally quite interested in linking the disaster management plans for villages (prepared by the community itself) to the government block level disaster management plan. Hence the PRI (Panchayat Raj Institution) can play a role of leadership in disaster management at all stages, and DRR can be seen as a good entry point to integrate more CCA and DDR at the local level.

(v) Livestock management (funded primarily by NABARD and not discussed in the main review)

Indicator – Activity 2.1.3 - Awareness raising of impact of climate change on livestock and appropriate measures to be undertaken	**Achievements, April 2012 – March 2013**[cxliv]
Targets: • Establishing link between local VAS & villages for regular animal health camps to reduce loss from animal mortality & morbidity • Trend of changing livestock production systems in watersheds is being tracked – and indicators for vulnerability & threshold limits are being identified. • Introducing low –input sustainable output production system in livestock starting with promotion of back yard poultry.	• WOTR has facilitated 82 animal health camps and also includes vaccination for native backyard poultry (BYP) under supervision of local Animal Husbandry department • In Andhra Pradesh, 90 BYP shelters had been distributed by December 2013[cxlv]

This was funded mainly by NABARD for the Sangamner (Ahmednagar) villages. Due to delays with the start of the NABARD component, progress on this item was slow. In the extension areas (Andhra Pradesh, Madhya Pradesh and Aurangabad) SDC funds were used for activities such as livestock health camps, promotion of back yard poultry (BYP), livestock shows and exposure visits. A brief report was produced in early 2014[cxlvi].

The report highlights inter alia the value of BYP for nutritional and financial security of women and children. For example, work with BYP in Andhra Pradesh has successfully challenged preconceived notions of BYP or native poultry birds as having poor production potential. What goes unnoticed is that industrial-production systems using exotic and cross-breeds may give faster returns but are also high risk options – with risk getting enhanced with increasing climate variability. Using night cages, women have been able to reduce losses of chicks and adult birds due to predation. Earlier each family used to spend an average of Rs.450/- on chicken in a

month; now due to availability at home chicken consumption has increased and purchase from market has reduced to minimum. They felt at least Rs.500/- to 1000/- is saved per family per month.

(vi) Biodiversity

In WOTR's approach, the conservation of biodiversity plays a key role for mitigating the impacts of climate change at the local level, as it helps to protect the natural processes and services provided by ecosystems. Thus biodiversity is key in enhancing the resilience of ecosystems (e.g. absorption of torrential rains) and in building the adaptive capacities of communities, who rely on locally available flora and fauna for food, water, energy, health and livelihoods.

Targets: After having introduced biodiversity considerations in watershed development, WOTR has managed to develop a methodology to establish effectively the BPRs (in spite of the existence of the Biodiversity Act in place since 2002, none of the villages where WOTR worked had already established a Biodiversity register). WOTR has been establishing PBRs in 37 villages, and to date 1 PBR has been fully completed. WOTR has also supported the formation of Biodiversity Management Committees (BMC), as per the Biodiversity Act (2002). 19 BMC resolutions have been made and submitted to the Maharashtra State Biodiversity Board, the government body heading the biodiversity programmes of the State, with the capacity to support financially BMCs to develop BPRs. In terms of awareness raising, WOTR has conducted several course for sensitizing local youth towards the biodiversity conservation.

<table>
<tr><td>Activities:
Activity 1.2.1: Establish the People's Biodiversity Register (PBR)
Activity 1.2.2: Promotion and utilization of local flora and local breeds
Activity 1.2.3: Documentation of IK on biodiversity conservation, enhancement and utilization (number of IK systems documented)</td><td rowspan="2">Achievements, April 2012 – March 2013[cxlvii]
People's Biodiversity Registers have been established in 31 villages: 23 villages in Sangamner (Maharashtra) and 8 villages in Aurangabad (Maharashtra), Madhya Pradesh and Andhra Pradesh.
50 species of local flora and breeds have been promoted in villages in Aurangabad (Maharashtra), Madhya Pradesh and Andhra Pradesh.
1 system of IK biodiversity conservation has been documented.</td></tr>
<tr><td>Indicators and targets (when available):
- N° of villages that have a PBR: 20 People's Biodiversity Registers established
- N° of IK systems documented</td></tr>
</table>

Resilience: It is still too early to assess whether interventions in biodiversity have contributed to build resilience on the ground, but certainly the PBR experiment has shown how it can build/ rekindle interest in local biodiversity. This can be illustrated by the fact that after having followed the WOTR's training workshop and contributed to establishing their PBRs, some village youths have given up hunting and exploitative collection of honey and other non-timber forest produce. Villagers are currently documenting local varieties of rice through BPR processes that were replaced with advent of hybrid ones and this is the first step towards its conservation. A farmer in Sangamner has started a nursery which has about 50,000 indigenous plants and there are signs of growing interest in the switch from chemical to organic based pesticides in many villages.

Learning: Integrating biodiversity understanding and analysis in all activities is yet to come to fruition. Biodiversity thinking needs to be linked to the agricultural portfolio and is still a weak link, as can be illustrated by cases where WOTR clearly chose to work with cash crops (onion,

pomegranates) as a way of demonstrating and building ownership of SCI linked to local markets. Seed bank experiments are still at an early stage. Overall, we feel that WOTR could define more clearly its approach in the Biodiversity area, including the integration of biodiversity into planning for sustainable use of natural resources and agro-biodiversity at the local level.

Partners' perspectives:

- The GoMI is very interested in WOTR's experience and methodology in establishing the PBR, as it sees this area as a challenge.
- WOTR's unique and innovative methods for adopting biodiversity registers also led to 6 Biodiversity Management Committees (BMCs) being awarded Rs. 1,15,000 rupees per village by the Maharashtra State Biodiversity Board.
- The WOTR biodiversity position paper was released during a side event at the Convention on Biodiversity. Dr. Asad Rahmani, Director, Bombay Natural History Society and Mr. Sunil Kumar of RBS released the position paper.

(vii) Alternate Energy

WOTR's approach in alternate energy follows two objectives: to reduce carbon emissions and to increase the efficiency of renewable energy to address the significant unmet energy needs of the rural communities for cooking, drinking water and irrigation, whilst safeguarding their health and the environment.

Targets: Funded by NABARD, the promotion of alternate energy has, in spite of a slow start due to delay in funding approval, delivered above or against targets in the following areas: energy efficient cooking, where improved hot water chullahs have been designed and successfully tested, solar homelights and the installation of solar street lights for community use, and the installation of solar parabolic cookers. The activity which has not been successful is implementation of communal biogas, mostly due to a lack of social acceptance.

Regarding the SDC funded component, focusing on the design of a model/pilot for carbon neutral villages, WOTR has concluded a number of studies, amongst which is a "Conceptual framework for envisioning carbon neutral village/cluster", based on its experiments on the ground.

Activities	**Achievements, April 2012 – March 2013**[cxlviii]
Activity 1.4.1 (NABARD funded): Promotion of the use of appropriate and clean energy efficient coking stoves, biogas plants and solar home lighting systems. Activity 1.5.1 Develop a framework for low carbon economic growth (farm + off farm livelihood) in cluster of villages-pilot. Activity 1.5.2 Explore and if possible, take advantage of CDM/ voluntary mechanism e.g. using LETS (Local Exchange Trading System).	3,204 households have participated in alternate energy/clean energy programs 1 draft concept note for assessing the carbon footprint of a cluster of villages has been developed
Indicators and targets (when available): 40% of households have participated in alternate energy/ clean energy programs	

Resilience: The most striking effect in terms of resilience can be seen with the use of hot water chullah, which has been estimated to reduce fuel-wood consumption by 40% (1000 kgs of

wood-fuel per household per village per year). In addition to reducing the amount of wood used (and possibly protecting biodiversity and reducing carbon footprint), this has also led to reducing the drudgery of women in collecting this wood, and has protected their as well as their children's health (through a significant reduction of smoke indoors).

Learning: This has been an area where the results have been mixed. While with devices such as the energy efficient cooking stoves, WOTR has had good success and plans to continue testing innovations, with others such as home lights and parabolic cookers, the results have been average. The main learning from these activities is that ownership, maintenance and incentives for localized product development are very critical in the sustainability of these activities. Also, the economic viability of these activities should be further assessed, as they have a good potential to contribute to climate adaptation in terms of making the communities more resilient, environmentally, socially, and economically.

Partners' perspectives:

- NABARD is critical of some achievements of WOTR in this area, in particular regarding the lack of success in implementing community biogas plants, considering that WOTR had not been able to motivate the communities to use community plants, whilst acknowledging that the communities are not ready. NABARD also raised a concern regarding the financial sustainability of the alternate energy programme component.
- SDC expressed some critical views regarding the involvement of WOTR in issues focusing on nutrition and women and children's health (funded by NABARD).

(viii) Sustainable Livelihoods

For WOTR, communities will be more resilient and adaptive to climate change if they diversify their livelihood opportunities by strengthening local demand-supply chains, whilst keeping in balance within the 5 capitals, rather than becoming increasingly dependent on external market forces, which may not respond to local demands and needs. In this vein, WOTR has supported the introduction of non-farm income generating activities to reduce the reliance on agriculture and better absorb the weather related economic shocks, as well as to provide a source of income for investment in adaptive measures at the local level.

Target: New livelihood opportunities have been promoted, such as honey production and sales of local, indigenous rice varieties and eco-tourism. Beekeeping, which was initiated with 40 farmers in 4 villages of the Akole and Sangamner blocks looks promising, as is the work on market linkages ('Organic Buyers-Producers Meet') in Andhra Pradesh – 70 farmers and 8 buyers participated. There has also been some good work on Backyard Poultry in Andhra Pradesh with some useful learning.

Activity	**Achievements,**
Activity 2.3.1 Conduct market focussed livelihoods study and value chain analysis of selected. Activity 2.3.2 Design and support implementation of diversified off-farm and non-farm income generating activities Activity 2.3.3 Design innovative MF instruments that promote and support CCA livelihoods. Indicators: - A comprehensive Livelihood assessment and market study conducted in each...	**April 2012 – March 2013**[cxlix] - 60 bee keeping and honey harvesting units - 242 various livelihood activities including Backyard Poultry, calf rearing, buffalo, cow, fisheries, painting, Pico machine, centring unit, photo studio, tea stall, grocery shops, bangle store, tailoring, carpenter, motor rewinding, welding and fabrication - 3 livelihoods trainings conducted.

- N° of IGAS established and are economically viable - Type of instruments and n° of clients	

Resilience: Although limited in extent, non-farm livelihoods like painting, Pico machine, centring unit (for house construction), photo studio, tea stall, grocery shops, bangle store, tailoring, carpenter, motor rewinding, welding and fabrication, biogas construction, repair and maintenance, and solar lamp assembly[cl] have both increased the skill of local populations engaged in the activities and diversified livelihoods available to women and the landless. As all these activities are still at a very early stage of implementation, and their link with resilience and climate change adaptation is an indirect one, it is difficult to tell whether they have contributed to building resilience at this stage. Yet, during the workshops and field visits the engagement and enthusiasm of local communities to take up these income generating activities came over strongly.

Learning: Overall the selection of non-farm activities struck the review team as being somewhat random, and the design of innovative microfinance instruments that promote and support CCA livelihoods unclear. Hence this area of intervention is probably one of the weaker ones.

Partners' perspectives:

- NABARD was appreciative of the livelihoods interventions developed by WOTR. NABARD also stressed the importance of seeing business coming out of the communities, on the basis of loans and not grants.
- SDC was more critical of the work on livelihoods diversification and reflected on whether the award of ready-made orders from WOTR was appropriate, or simply created a dependency. WOTR, however, had (i) consciously taken a decision to give as much of the money that came into the project back to the households involved in the project; (ii) wanted the local communities to know that their own village members were capable, following training, of doing as good a job as previous service providers neighbouring towns (with WOTR checking the quality of the work delivered); and (iii), in line with the emphasis within the CCA project on the development of money multipliers and local exchange trading systems within the local economies of village clusters as a strategy for increasing resilience (research jointly funded by SDC and NABARD)[cli], wanted to bring livelihoods from neighbouring towns into the villages.
- SDC was also critical of the appropriateness of investment in new livelihoods which were linked primarily to climate-sensitive sectors, such as bee keeping/ honey harvesting and poultry keeping, as a strategy for building resilience. For WOTR, however, a broad portfolio of livelihoods diversification is required for resilience building[clii]. Because of a continuing focus on agriculture for many households, albeit with fundamentally different underpinnings (as adaptive sustainable agriculture), many livelihoods will continue to be linked to agriculture, food security and agro-biodiversity, either directly (as in bee keeping/ honey harvesting and poultry keeping), or indirectly, as in farm-linked livelihoods (for example some fabrication and welding work). In addition, many non-farm livelihoods should, as SDC suggests, be developed in less climate-sensitive sectors, which is what the CCA project has been promoting. Examples include: painting; tailoring; Pico machinery for stitching clothes; centring unit for house construction; photo studio; tea stall; grocery shops; bangle store; carpentry; motor rewinding; masonry for biogas plants; and energy service centres (for the sale and repairs of solar lights and other energy products)[cliii].

(ix) Local capacity building, including governance, gender mainstreaming and women's empowerment

Capacity building was an integral part of the CCA project design and part of the delivery mechanism for various adaptation actions at the village level. While direct capacity building activities were undertaken though training at the village level and for other organizations and government agencies at the WOTR training centre in Darewadi, capacity building also occurred though exposure to activities within the cluster and villages, and through networking and distribution of knowledge products. Overall, the CCA project has made a significant contribution to capacity building, in particular in terms of understanding what climate change is, experimenting with ways to deal with climate change, and initiating the integration of climate adaptive measures into existing governance and planning systems.

Capacity to understand what is going on with climate (e.g. both conceptually and through agro-met/advisory system) and how to deal with this:

It came out clearly from our discussions with the villagers, the Community Based Organisations, and government officials that people really appreciated to have a better understanding of what climate change means, and to start building mechanisms on how to better cope with it. However, we have also observed a number of challenges related to building capacity at the local level. Firstly, and not surprisingly, it takes a long time to deal with such complex issues as adaptation to climate change and DDR. The Gram Panchayat level feedback in Sangamner illustrates this well "CCA is a complex topic, people still need to deepen their understanding and we need to increase the length of the project in order to do this. For example, we need to learn more about water, crop and land use planning, groundwater recharge and crop water requirement". Another challenge is related to the design and management of training workshops and activities taking place at the village level, which sometimes seem to have overwhelmed the villagers in terms of their time schedule and availability. Hence this indicate that there is a need for a longer and less intense project, keeping in mind local communities' demand on time and a more realistic schedule – some projects only started 2 years ago.

The WOTR training centre in Darewadi is a very interesting and powerful instrument for CCA capacity building amongst various types of actors, and it has a good potential for scaling up and out scaling capacity building activities, because it touches so many different groups and individuals at different levels. As of today, it has provided training on a range of themes including watershed management and CCA to more than 400 organizations from 27 Indian states, and to participants from 28 different countries worldwide[cliv]. The training centre enables the delivery of innovative training modules developed through the CCA project, such as (i) Livelihoods in the context of climate change, (ii) Co-drive vulnerability assessment tool, (iii) Visual integrator model, and (iv) Local money multiplier. The Training center was highly rated by participants of the Sangamner Cluster evaluation workshop.

Besides specific trainings at the village and cluster levels, the CCA project has contributed to capacity building amongst CCA practitioners (partners, agencies) as a result of active networking for the dissemination of its CCA knowledge products, such as the People's Biodiversity Manual, Water Budgeting Manual, Co-drive Community Driven Vulnerability Evaluation handbook, Co-drive Visual Indicator for Climate Change Adaptation in India handbook and the Co-drive Livelihoods Assessment tool.

Learning on CCA is also a very important component of WOTR's organizational strategy and culture, and numerous exchanges between the Pune office and the field teams in the process of developing tools and interventions have greatly enhanced the in-house capacity to understand climate change and deal with it. A lesson learnt is that it takes a few years to create awareness on anthropogenic climate change at the community level, and only then can adaptation be properly discussed and taken up. Suggestions in the field indicate a time line of about 7 years being more appropriate for such a project.

Practical capacity to experiment with new things (e.g. preparedness to give SRI a go) and to adapt these experiments by going through a cyclic and adaptive planning process (e.g. water budgeting crop planning) – and subsequently, recognising that this is what you have been doing and will continue to do:

As described in more detail in section 3 above, the introduction of various new and/or improved technologies or systems has been very instrumental in building capacity at the village level. Whilst introducing a series of on-farm improved methods to develop adaptive agriculture, water efficiency, alternate energy use and biodiversity conservation, WOTR has by the same token increased the participation of farmers in the whole cycle of innovation (testing, adjusting, and dissemination). This capacity to actively participate in the experiments is most developed at the following levels: i) WOTR helps farmers to become aware of the "old" way of doing things and how this compares with results/challenges obtained with new experiments on their plots; ii) WOTR helps farmers to integrate these experiments within a planning and monitoring system, which is linked with climate variables (agro-met advisories); iii) WOTR makes accessible to farmers support and innovative knowledge to experiment on the ground, whilst establishing linkages with research institutes or universities to integrate the results of these local experiments, including farmer's perceptions, within the broader research agenda. Although this is at an initial stage, mostly relying on the contribution of Dr. Mwani (a retired agricultural university professor working for WOTR), we feel that it has all the "gems" for linking on-site research with more established research on CCA agriculture. At a general level, we feel that a very important effect of the increased capacity which has been built amongst farmers is the gradual establishment of an "adaptive management" culture, where farmers are gradually becoming more empowered to access relevant information on CCA, test and use them under different conditions, and feed the learning and research community on CCA with their findings.

Gender inclusiveness in terms of access to resources, livelihoods and governance was a key aspect of the CCA project (see below) and capacity of women has been built along those lines. Regarding the capacity of women in adaptive agriculture and water efficiency, it is difficult to assess the extent to which women were involved systematically in these experiments, but it came out clearly during our interviews that the introduction of new ways of doing things at the village level is much appreciated by women, as it substantially increased their capacity to diversify agricultural products and consumption (horticulture), to increase their income (cash crops), and to build knowledge on nutrition and for monitoring the growth of their children. This is the area where the most striking results can be observed, since the results at December 2013 show that the incidence of malnourished children has been reduced by 34% percent (the target was 30% reduction on malnourished children) and the incidence in anemia among women was reduced by 19% (the target was 10%). In the words of a woman interviewed in Madhya Pradesh "Before we did not even know that a child was weak. Now we know. Now we have the knowledge."

Local institutional capacity to plan for DRR and CCA: Governance and women's empowerment

The CCA programme design was very much reliant on local governance and capacity building at multiple levels, in particular in the village clusters, to support the implementation of CCA interventions. Hence the CCA project has supported the creation and sometimes revitalization of local level institutions like Self Help Groups (SHGs) and Village Development Committees (VDCs). The creation of Women's SHGs has been particularly successful, given that the initial target was to create 84 of them, and by the end of December 2013, 562 women's groups were formed. Discussions in villages showed an appreciation for the formation of these groups, which has led to greater unity among the women, reliance upon one another, and an exchange of information. Women's SHGs also report improved coherence among themselves on what they

plan to do in the group, and their increased confidence to face government officials if required, due to capacity building undertaken by WOTR. The SHGs have also been useful for focusing on improved child and women's health and nutrition, on approaches to childcare and on sex/ relationship education for teenagers. Further benefits to women have been in the areas of drudgery reduction through introduction of biogas, household water tanks and filters and hot water stoves for cooking (chullah). However, some women also suggested that the project should be of a longer duration to further strengthen the groups to give them long term sustainability.

Women's empowerment	**Achievements by December 2013**[clvii]
Output 2.4 Women and children are benefited from activities that promote health and reduce malnutrition and drudgery[clv]; **Activity 3.1.4** Develop/ implement (institutional) strategies/ mechanisms that promote gender inclusiveness, support inclusiveness, drudgery reduction and equity in access to resources, livelihoods and governance[clvi]	• 1,817 children enrolled in growth monitoring • 34% decrease in malnourished children • 19% decrease in anaemia among women • 562 women's groups formed
Targets: • At least 750 children (80% of the population of children 0-5 years age group) enrolled in growth monitoring and nutrition program • 30% decrease in malnourished children • 10% decrease in anaemia among women • 84 women's SHGs formed	

Regarding Village Development Committees (VDCs), nearly 50 VDCs were formed, slightly above the initial target of 43. In Madhya Pradesh CBO strengthening and empowerment resulted in VDCs being able to approach the state government for compensation in the case of crop failure, something they were unable to do earlier. Panchayat Samities too have become more organized and are being called upon more frequently due to their improved capacities, and greater awareness among the people.

Emphasis on equity can also be seen on the wealth ranking approach used to identify members of VDCs. 43 wealth ranking exercises had been conducted by March 2013 (20 were initially planned).

Governance	**Achievements, April 2012 – March 2013**[clx]
Outcome 3 – Local institutions have in place effective governance mechanisms to sustainably manage regenerated ecosystems[clviii] **Activity 3.1.1** Capacity building of Gram Panchayat, CBOs and local communities[clix]	
• 20 village envisioning exercises conducted • 20 wealth ranking exercises • 43 Village Development Committees (VDCs) and 43 Samyukt Mahila Samiti[clxi] formed	• 20 village envisioning exercises conducted • 43 wealth ranking exercises conducted • 49 VDCs and 55 Samyukt Mahila Samiti s formed

Finally, the responsiveness of the CCA project to cultural specificities should also be recognized. All local stakeholders spoken to during the evaluation mentioned that governance and local accountability of the project was good. From our field visits we noted how the project pays considerable attention to cultural specificities and how these interact with the project

design and implementation, which is also a good indicator of accountability, helping to create a system responsive to local needs. For example, the approach to working in tribal areas of Madhya Pradesh has been based upon local needs and sharing mechanisms as culturally appropriate to the Gond Baiga tribe of the area, and quite different for example to the non-tribal areas of Sangamner.

Annex 8: What is meant by 'resilience'? Perspectives from DFID and Oxfam GB

DFID defines resilience as "the long- term capacity of a system or process to deal with change and continue to develop". In this view, building climate resilience requires strengthening the ability of households, communities and countries to anticipate, absorb, accommodate and/or recover from climate extremes (Box A6.1). This means where possible preventing a climate event becoming a disaster by avoiding or mitigating the impacts, and enabling countries and communities to recover quickly.

Box A8.1: What is Climate Resilience?[clxii]

Resilience is the ability of a system to bounce back from stresses and shocks. Climate resilience can be defined as "the long-term capacity of a system or process to deal with extreme weather events and changes in climate and continue to develop".

The concept of resilience, including climate resilience, adds an additional dimension to development thinking. It builds on other approaches such as disaster risk reduction and, livelihoods. It emphasises uncertainty and estimating the level of future risks in complex processes beset by uncertainty. Hence, by definition, building climate resilience is not an exact science.

Climate resilience can be viewed as a set of principles; and a developmental outcome. There is no template for building resilience. So it is essential to define who or what needs to be made resilient and against what kind of future change or shock. The indicators of climate resilience are, therefore, specific to the situation, rather than generic.

Combining DRR and adaptation approaches to build resilience[clxiii]

DFID sees resilience as a framework for bringing together both DRR and adaptation approaches, as follows:

- DRR is an approach that has evolved from humanitarian relief, to go beyond emergency responses to a planning approach to reduce the risk of disasters occurring and the impact when they do occur. DRR provides a framework to build resilience to climate extremes, through measures including; identifying the risk, transferring the risk (for example re-insurance), avoiding the risk (for example early warnings), and reducing the risk (for example preparedness of infrastructure).
- Disaster risk reduction shares some key characteristics with approaches to building resilience: (1) it is a holistic framework for assessing national systems, communities and individuals, (2) it places an emphasis on capacities to manage hazards or disturbances, (3) it incorporates options for dealing with uncertainty, surprises and changes and (4) it is proactive. A system that is effective in managing risk is likely to become more resilient to shocks and stresses.
- Climate extremes differ from the traditional hazards that DRR addresses in some important aspects. Unlike some other hazards (e.g. earthquakes) we know the risks posed by climate extremes are going to increase over the longer term, on the other hand there is considerable uncertainty as to exactly how these changes will manifest and managing climate risks requires being prepared for surprises – for example the one in a hundred year flood happening every ten years. Therefore a flexible approach that can incorporate new information as it is generated is important as well as investment in improved forecasting and knowledge of what works, to reduce uncertainty and enable choice and capacity to respond. There is a need for coherence with climate change adaptation interventions, such as resilient agricultural development, that seek to keep development on track in the face of climate change, and for a joined up approach and understanding between communities of practice on DRR and climate change resilience.
- *Responses:* The response to the risks posed by climate extremes may take the form of

moving people out of harm's way (early warning systems and evacuation plans), shelter/physical protection (sea walls community infrastructure, environmental protection, building regulations), ensuring that essential services, food and water remain available during and after a crisis so that the poor don't have to sell their assets (social protection, insurance, food stocks), promoting resilient livelihoods (livelihood diversification, drought resistant crops), ensuring that information knowledge is available to plan for these actions (climate and weather forecasting and the capacity to assess the risks systematically) and helping communities to recover as quickly and effectively as possible.

- Strengthening existing production systems that already successfully operate under conditions of environmental variability and unpredictability is important. This will need to build on existing strategies which combine production systems currently being pursued by some households, and addressing the factors that undermine their ability to help build climate resilient development.

Oxfam GB (OGB) approach resilience in ways that both overlap and differ from the approach taken by DFID. Over the past two years OGB have introduced resilience as a cross-cutting theme underlying everything that they do. This emerged from a policy decision to build bridges between short and longer term approaches, e.g. between humanitarian and development action and between disaster preparedness and climate adaptation. Thus: "The humanitarian sector provides protection and support in times of emergency, while the long term sector attempts to build security through improved livelihoods work, women's economic leadership and work on governance, among other issues"[clxiv]. The concept of resilience is then deployed to help build these bridges: "Resilience is not a fixed end-state, but a dynamic set of conditions and processes that enable individuals and communities to maintain the capacity to improve their wellbeing despite adversity. Oxfam's ambition is to build on and bring together approaches from both our humanitarian and long-term development in a more holistic way, so that the poorest and most vulnerable are able themselves to keep pace with rapidly growing and evolving types of risk"[clxv] (Figure A8.1).

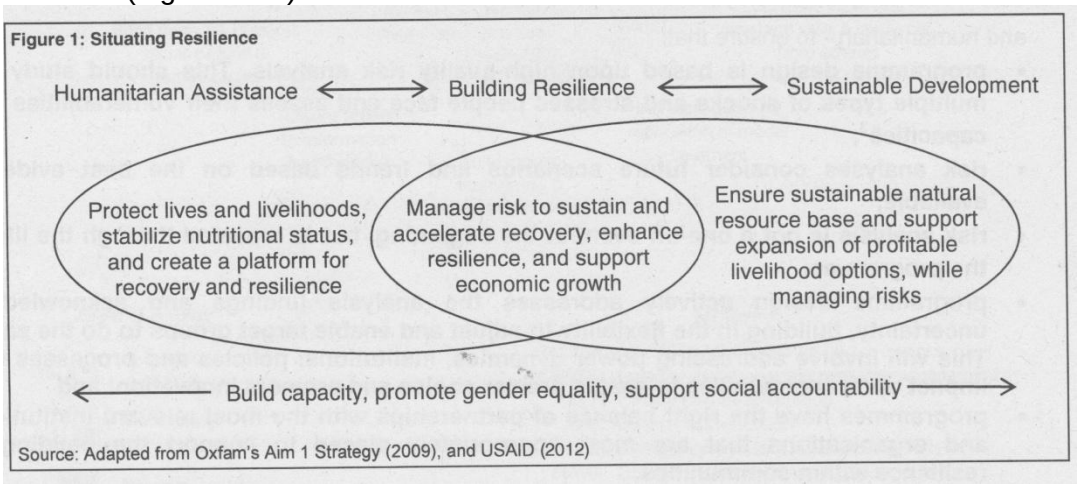


Figure A8.1. Situating Resilience within OGB

A more recent discussion paper notes that besides OGB using the term 'resilience' to describe the bridging of the humanitarian and development programme approaches, it is also using the term in two other ways:

(i) 'Resilience' as an outcome for people living in poverty, using a working definition that places a strong emphasis on inequality, power and shared risk which makes it more ambitious and 'transformational' than many other definitions (Box A8.2);

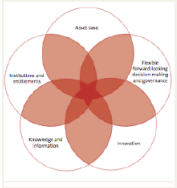
(ii) 'Resilience' as the competencies, behaviours and structures required to achieve better programming – in other words, resilience as an Organisational Development approach[clxvi]; (Cocking and Jennings, 2013);

Box A8.2. Working definition of 'resilience' as an outcome for people living in poverty (OI working group)[clxvii]

Resilience is the ability of women and men to realise their rights and improve their wellbeing despite shocks, stresses and uncertainty. The poorer and more marginalized and less able to claim basic rights a person or group is, the less resilient they are likely to be. Resilience is not a fixed state, but is a dynamic set of conditions and processes that enable individuals, communities and states to maintain the capacity to improve their wellbeing despite adversity. Oxfam adopts a rights based approach to resilience grounded in social justice and equality.

In parallel with these discussion papers, OGB has also been seeking to operationalize resilience in practice. One approach it has taken is through the collaborative ACCRA (Africa Climate Change Resilience Alliance) project[clxviii], which has sought to understand key dimensions of local adaptive capacity (Figure A8.2).

The Africa Climate Change Resilience Alliance (ACCRA) model



Asset base	**Availability of key assets that allow the system to respond to evolving circumstances**
Institutions & entitlements	**Existence of an appropriate and evolving institutional environment that allows fair access and entitlement to key assets and capitals**
Knowledge & information	**The system has the ability to collect, analyse and disseminate knowledge and information in support of adaptation activities**
Innovation	**The system creates an enabling environment to foster innovation, experimentation and the ability to explore niche solutions in order to take advantage of new opportunities**
Flexible forward-looking decision-making and governance	**The system is able to anticipate, incorporate and respond to changes with regard to its governance structures and future planning**

Figure A8.2. Dimensions of local adaptive capacity in the ACCRA model[clxix]

In a more recent collaboration – as a member of the Inter-Agency Resilience Working Group (IRWG) - Oxfam GB has worked with 16 other UK-based INGOs to develop a shared model of resilience (Figure A8.3); like ACCRA, this is based on five characteristics, which the IRWG is now seeking to operationalize[clxx].

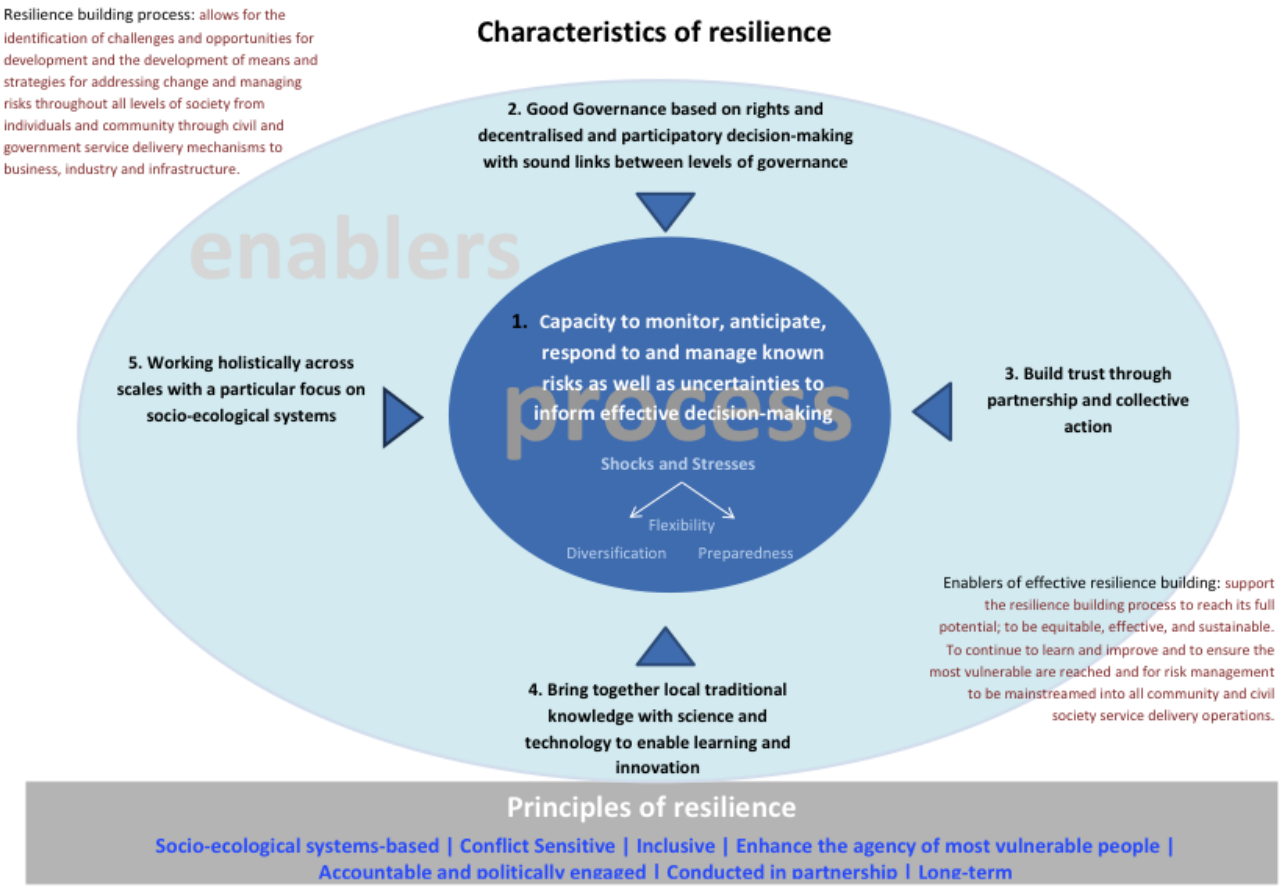


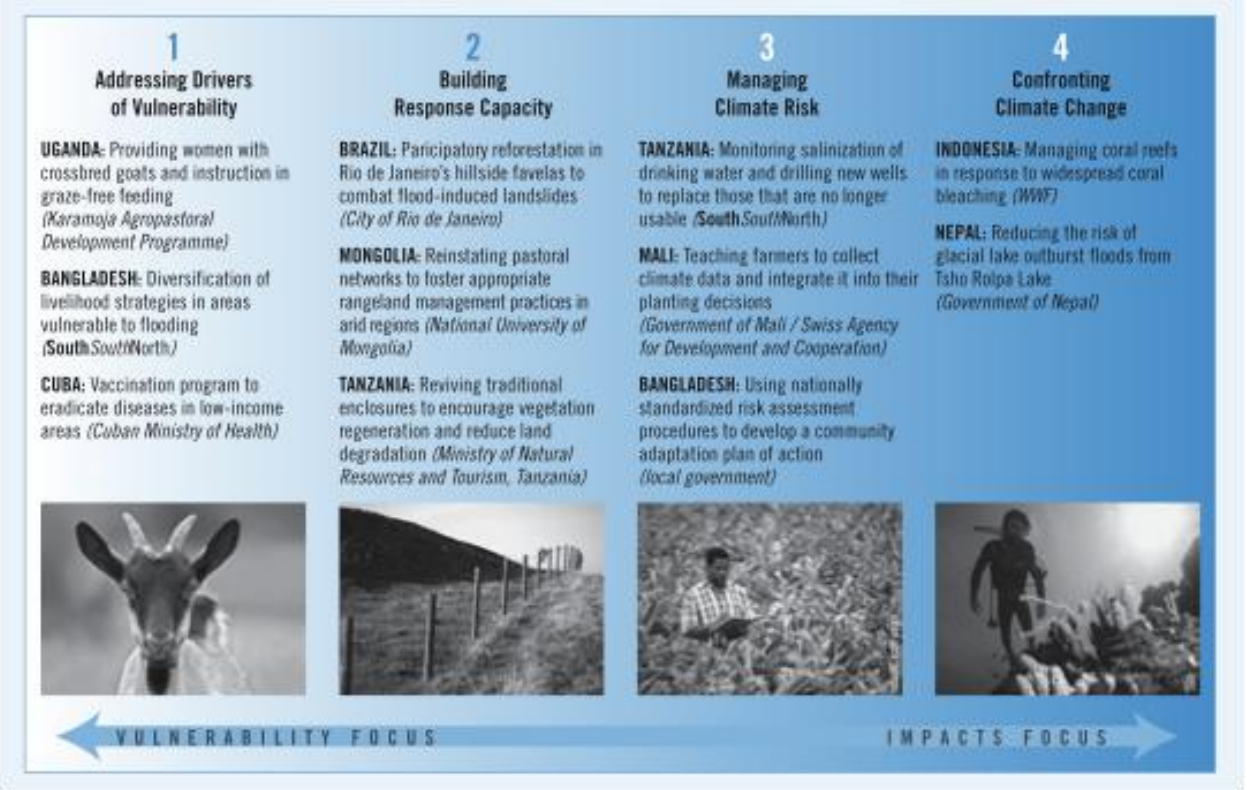
Figure A8.3. The IRWG model of Resilience (*Source: IRWG, 2012*)[clxxi]

Annex 9: 'Weathering the Storm': Framing adaptation and development

The continuum approach in 'Weathering the Storm' is set out as follows:

Figure A9.1: A continuum of adaptation activities - From development to climate change[clxxii]

1. Addressing the Drivers of Vulnerability	2. Building Response Capacity	3. Managing Climate Risk	4. Confronting Climate Change
At the development end of the spectrum, activities reduce poverty and address other fundamental shortages of capability that make people vulnerable to harm. Very little attention to specific climate change impacts is paid during these interventions, although they help to buffer households and communities against climate trends or shocks. Sample activities include efforts to improve livelihoods, literacy, and women's rights, and even projects that address HIV/AIDS.	Adaptation activities focus on building robust systems for problem solving. These capacity-building efforts lay the foundation for more targeted actions, and overlap substantially with many institution- building and technological approaches familiar to the development community. Examples include the development of robust communications and planning processes, and the improvement of mapping, weather monitoring, and natural resource management practices.	Climate information is incorporated into decisions to reduce negative effects on resources and livelihoods, accommodating the fact that often the effects of climate change are not easily distinguished from the effects of hazards within the historic range of climate variability. Examples include disaster-response planning activities, drought-resistant crops, and efforts to "climate-proof" physical infrastructure.	Actions focus almost exclusively on addressing impacts associated with climate change, typically targeting climate risks that are clearly outside historic climate variability, and with little bearing on risks that stem from anything other than anthropogenic climate change. Examples include communities that relocate in response to sea level rise, and responses to glacial melting.



What the authors of this report have to say about the left hand end of the continuum, 'addressing drivers of vulnerability', is of particular interest in the context of this review and the questions that were raised about the relevance of developmental activities (Box A7.1):

Box A7.1 Addressing the Drivers of Vulnerability

At the left end of the spectrum, activities are fundamentally about bolstering human development. These activities focus on reducing poverty and addressing other fundamental shortages of capability that make people vulnerable to harm, regardless of whether the stressors that can lead to harm are related to climate change. Example activities include livelihood diversification efforts, literacy promotion, women's rights initiatives, and even projects that address HIV/AIDS.

Very little, if any, attention to the specifics of climate change is paid during these interventions; these activities buffer households and communities from the effects of climate change simply because they buffer them from nearly all sources of harm. Many of these activities are capacity-building activities that strengthen individuals' abilities to take action. One capability often fostered is the ability to "cope," or take short-term action to ward off immediate risk from climatic events (e.g., taking shelter to survive a storm, or saving enough food to survive a drought).

Often, poverty and other core reasons for vulnerability must be dealt with before more impact-oriented adaptation efforts can be effective. In other cases, however, vulnerability-oriented efforts can be conducted concurrently with more impacts-oriented initiatives. In our data set, 65 percent of the examples that we have characterized as addressing the drivers of vulnerability also included activities that more directly focused on impacts associated with climate change.

However, because climate change effects are not taken into account, some interventions at the left of the continuum run the risk of maladaptation. For example, while diversifying agricultural livelihoods typically reduces vulnerability and strengthens resilience, diversification efforts that introduce crop varieties that cannot withstand increased drought conditions could undermine development gains over the longer term if droughts become more frequent. Likewise, while coping capacity can be critical for surviving short-term dangers, repeated coping may undermine long-term adaptation.

Annex 10: A continuum based on the timescale of climate-related risks under consideration. *Source:* GCAP (2014)[clxxiii]

What climate information is useful? This is a central concern for almost all climate adaptation plans and projects. The matrix below suggests a cascade of the nature of the evidence and the application of climate information in a continuum of adaptation.

	Good Development	Reduce current vulnerability and manage existing disaster risks	Increase medium-term resilience	Transformative pathways for climate protection
No strong trend in climate conditions or hazards	✓	❑	❑	❑
Extreme events are significant risks	✓	✓	❑	❑
Current trend toward increasing risks	✓	✓	✓	❑
Current trends are consistent with envelopes of future climate change	✓	✓	✓	✓
Medium term scenarios of climate change are consistent and indicate major risks in the future	✓	✓	✓	✓

The logic follows from the value of information in making decisions. If there is no real trend in the current climate, then you have the luxury of **building in adaptive capacity through good development**. For instance, efficient use of resources is always a good thing to do. If climatic hazards are a problem, then good development is not enough and you should work hard to **reduce current vulnerability and manage existing disaster risks.** This stage is widely recommended and should be considered a necessary benchmark for adaptation.

Going further is a sound strategy if you have more information, even if there is a lot of uncertainty. Many regions are seeing an increase in weather-related disasters, a combination of the geophysical hazard and exposure in vulnerable enterprises. If so, there should be a mandate for **increasing resilience over the medium term**. Again, this is a common recommendation and probably warranted in many places for some hazards and adaptation strategies.

The last phase in the continuum is the significant challenge **of transforming development pathways to achieve climate protection (and other social and economic goals).** This should not be the starting point, as urgent actions are needed to deal with the shorter term prospects. However, where the trends and available evidence point to significant future impacts, then transformation must be part of the planning.

A quick scan should provide sufficient insight to locate the priority for adaptation.

The matrix would then suggest where climate information is lacking and the benefit of additional data and analysis. For instance:

- If long term scenarios are scary but data is sparse, then a better monitoring system to track these outcomes is advisable. This would lay the basis for managing those risks as the trends appear.

- If the focus is on urgent disaster risk management, then it is highly unlikely that a large effort on downscaled climate models for the 2050s will change the urgent strategy.

Unpacking the value of seasonal climate outlooks is related to this cascade but requires more particular analysis of vulnerability and decision-making.

Annex 11: International good practice? Comparison of adaptation options targeted in the CCA project with the identification of climate resilience actions for agriculture in Ethiopia. *Source:* GCAP (2013)[clxxiv]

Pillar	**Options identified for climate resilience actions for agriculture in Ethiopia**	**Adaptation options targeted in the CCA project**
Build adaptive capacity	Use of climate-resilience information, research and enhanced co-ordination	Yes
	Meteorological data, and agro-meteorological forecasting and applications	Yes
	Institutional strengthening and capacity building	Yes
	Agricultural research and development	Yes
	Enhanced extension services	Yes
Crop and livestock improvement	Small-scale irrigation	Yes
	Water infrastructure, allocation and transfers	Yes
	SWC water harvesting	?
	SWC cover crops	?
	Shade grown coffee	
	Irrigated sugar	
	Crop switching and new varieties	Yes
	Fertilizer use (intensification of production)	Yes
	Farm management and technology	
	Pests and disease (including post-harvest losses)	
	Improved animal health (tracking diseases and pests)	
	Herd diversification	Yes
	Fodder and feed development	
Sustainable land management	Soil management	Yes
	Conservation agriculture	Yes
	Soil and water conservation	Yes
	Conservation and rehabilitation	Yes
	Promoting biodiversity in agriculture	Yes
	Payment for ecosystem services	
	Land planning	Yes
	Using forests for adaptation	Yes
	Resilience for forests	Yes
	Rangeland rehabilitation and management	
	Design of resilient roads and standards	
Disaster risk management	Risk insurance (weather-based)	
	Support of vulnerable households through structural measures	

	Safety nets	
	Asset creation and protection	Yes
	Access to credit	
	Disaster risk management planning	Yes
	Early warning and preparedness	Yes
	Livelihood diversification	Yes
	Resettlement/migration	

Annex 12: Supporting adaptation and resilience? In what ways were the local-level interventions of the CCA project different from 'development-as-usual'?

(a) Consistency with the CCA project's Co-DRIVE framework[10]

		Financial capital	Human capital	Natural capital	Physical capital	Social capital
	Vulnerability Index:	**Stable (4)**	**Danger (1)**	**Risk (2)**	**Risk (2)**	**Alert (3)**
Joint	**Sustainable adaptive agriculture – SCI**		Build knowledge and awareness of sustainable farming practices including traditional cropping patterns and storage practices.	Diversify agricultural production with a balance between food crops and water-intensive cash crops. Promote indigenous varieties wherever possible.	Establish a Farmer Service Centre that attends to agricultural and allied needs, storage houses and community grain banks.	
Joint	**Sustainable adaptive agriculture – Organic composting**					
Joint	**Sustainable adaptive agriculture – Livestock management**		Capacity building for increased productivity of indigenous cattle and buffaloes.	Diversify livestock production. Promote indigenous varieties wherever possible.		
Joint	**Agro-met-based advisories**			Provide locale-specific agro-advisories.		
SDC/ Joint	**Water budgeting and water management**		Capacity building in crop-water budget-based agricultural production.	Improve soil and water conservation measures. Revive small irrigation sources. Promote suitable water-efficient technologies with a focus on small & marginal farmers.	Establish soil and water conservation structures.	
Joint	**Disaster Risk Reduction (DRR)**		Develop the skills and knowledge			

[10] Example using the VA for Chandradana Village cluster, Mahboobnagar District, Andhra Pradesh (*source:* Co-DRIVE VA handbook)

			needed to cope with any extreme events which affect livelihoods and market forces.			
Joint	**Biodiversity (PBRs)**			Promote local biodiversity tree species to enhance tree cover, biomass and soil moisture and provide alternative livelihoods, inputs to agriculture and food security.		
NABARD	**Alternate and renewable energy**					
Joint/ SDC	**Sustainable livelihoods linked to local economies and local exchange trading systems**	Invest in viable alternative livelihoods – focus on the needs of village clusters. Loans and/or grants may be required. Focus on women, small & marginal farmers and the landless.	Capacity building in collective enterprise development.		Establish assets for non-farm livelihood activities.	Capacity building in collective enterprise development.
NABARD	**Nutrition and women and children's health**					
Joint	**Village Development Committees**					
Joint	**Women's self-help groups (SHGs)**					Strengthen SHGs located in hamlets and enhance their capacity to access schemes from existing village organisations.
Joint	**Capacity building on climate change issues**					

(b) Consistency with a combination of frameworks, drawing both on Weathering the Storm and on ACCRA's five dimensions of local adaptive capacity

Consistent with 'Weathering the Storm' criterion for Adaptation – Building Response Capacity (Adaptation activities focus on building robust systems for problem solving. These capacity-building efforts lay the foundation for more targeted actions, and overlap substantially with many institution- building and technological approaches familiar to the development community. Examples include the development of robust communications and planning processes, and the improvement of mapping, weather monitoring, and natural resource management practices.)

1. Agro-met-based advisories
2. Sustainable adaptive agriculture – Organic composting
3. Biodiversity (PBRs)
4. Alternate energy – hot water chullah

Consistent with 'Weathering the Storm' criterion for Adaptation – Managing Climate Risk (Climate information is incorporated into decisions to reduce negative effects on resources and livelihoods, accommodating the fact that often the effects of climate change are not easily distinguished from the effects of hazards within the historic range of climate variability. Examples include disaster-response planning activities, drought-resistant crops, and efforts to "climate-proof" physical infrastructure.) *(Also consistent with GCAP criterion for Adaptation - Reduce current climate-related vulnerabilities and manage existing disaster risks)*

5. Water budgeting and water management
6. Disaster Risk Reduction (DRR)

Consistent with ACCRA criterion for Resilience – Asset base (availability of key assets that allow the system to respond to evolving circumstances)

7. Sustainable adaptive agriculture – SCI
8. Sustainable livelihoods linked with money multipliers within local economies and local exchange trading systems as a strategy for increasing resilience
9. Nutrition and women and children's health

Consistent with ACCRA criterion for Resilience – Institutions & entitlements (existence of an appropriate and evolving institutional environment that allows fair access and entitlement to key assets and capitals)

10. Village Development Committees
11. Women's self-help groups (SHGs)

Consistent with ACCRA criterion for Resilience – Knowledge & information (the system has the ability to collect, analyse and disseminate knowledge and information in support of adaptation activities)

12. Agro-met-based advisories
13. Capacity building on climate change issues
14. Contribution of village clusters to action research (although villagers don't directly undertake the action research themselves)

Consistent with ACCRA criterion for Resilience – Innovation (the system creates an enabling environment to foster innovation, experimentation and the ability to explore niche solutions in order to take advantage of new opportunities)

15. Integrated approach to adaptive sustainable development is gradually creating an enabling environment within the village clusters, with many of the experiments currently being co-constructed between WOTR and the villages.
16. The work with women's SHGs may also be laying the ground for a more enabling environment for experimentation.

Consistent with ACCRA criterion for Resilience – Flexible, forward looking decision making (the system is able to anticipate, incorporate and respond to changes with regard to its governance structures and future planning)

17. Sustainable adaptive agriculture - gradual establishment of an “adaptive management” culture (still in its early stages)

Annex 13: Qualitative assessment of the innovative nature of local level CCA project interventions, based on stakeholder feedback

	Feedback from the communities involved (see Annex 14)	**State specific feedback**	**National feedback**	**International feedback**	**WOTR feedback**
Agro-met based advisories	Experienced as innovative locally	Seen as uniquely innovative and, as a result, supported by the state government of Maharashtra, Andhra Pradesh and Madhya Pradesh through and other than the IWMP Shortlisted by both the Maharashtra (1st in Class in Technology Innovation) and Bihar Rural Livelihoods Innovation for a (Finalist in Agriculture Development)	Village level advisories considered to be unique in India; only one of two interventions in India where block level advisories are being piloted. This experience has contributed to and significantly influenced the IMD's efforts to roll out Block level advisories in 6000 Blocks of the country – a beginning is being made in about 200 Blocks in 2014 (ref. IMD's letter)	Highly appreciated by a group of World Bank consultants in 2013	This has been a unique technical and social challenge – delivering farmer and locale specific advisories on a regular basis in remote areas. The advisories offered by other providers are generic in nature and use district level weather forecasts - ours use village level forecasts provided by the IMD.
Sustainable adaptive agriculture: SCI and organic composting	Experienced as innovative locally	The State Agriculture University in Maharashtra (MPKV) is closely involved in this component and is tracking progress regarding use of bio-pesticides and growth promoters	Variants of the SCI are being experimented with in various parts of the country and is increasingly attracting the attention of research institutions. Several states have "organic missions" to promote the use of these inputs/ additives. This approach is being seen as particularly relevant for rainfed agriculture. CRIDA has been involved in developing weather based crop management calendars which focus on environmentally friendly, adaptation oriented agricultural practices. A weather-based Contingency crop plan in collaboration with CRIDA and the State Agri University for Sangamner block has been prepared. This ensures cross learning and	The World Bank Consultants noted above also highly appreciated this aspect. SwissRe is also funding a project in Akole that seeks to extend this approach.	This approach holds a lot of promise as interim studies are showing significant productivity gains as well as reduction in cost of cultivation. Farmers are increasingly adopting the practices promoted because the produce is also healthier and looks better. Contingency Crop Planning will help the farmers be prepared to cope with unseasonal or extreme weather, reduce risk and to an extent , "climate-proof" their farming efforts.

			facilitates uptake of good practices into national programs.		
Water budgeting, micro-irrigation and crop planning	Experienced as innovative locally	The GOM has enacted a new law called the "Ground Water Management Act -GWM" which mandates exactly these components. Thus WOTR have led the demand (and innovation) curve in testing and validating approaches, technologies and protocols that can mobilise rural communities in this direction. GWM is a crucial adaptive measure.	WOTR's experiences in this regard have been reflected in the local/ state level press (printed television). Besides, successful experiences are documented and shared widely.	The World Bank Consultants also highly appreciated this aspect.	It is necessary to test the tool in other areas to increase its representativeness and also downscale it to the farm plot level - currently it caters to water budgeting at the village level.
DRR	Experienced as innovative locally	A dialogue between District authorities and WOTR has been initiated in order to bridge the gap between village and district authorities.	As a part of a course conducted by National Institute of Disaster Management (NIDM), Government of India, WOTR submitted a block level model (Akole and Sangamner) of CBDM which was appreciated by the course participants and NIDM authorities.	In May 2013, WOTR representatives shared their learnings of CBDM in a conference organized by the World Overview of Conservation Approaches and Techniques (WOCAT). The idea of integrating CBDM and the 3D model was appreciated by organizers as well as participants from 18 countries.	The CBDM activity combined with the 3D model allowed Wasundhara Sevak (village youth) to visualize the disaster risks before they occurred. This helped them to bring the community members around the model to discuss various issues related to physical and climatological hazards. Activities such as village DRR plan helped the Wasundhara sevaks to bridge the gap between village and government administrators.
Biodiversity	Experienced as innovative locally	The Maharashtra State Biodiversity Board (MSBB) of Maharashtra State has acknowledged WOTR's PBR initiative in 25 villages. In order to support the programme MSBB provided financial assistance to 5 villages. Children's Biodiversity Register - A field guide (Marathi version) has been approved by MSBB. It will be disseminated through the channel	Children's Biodiversity Register – A field guide was discussed as a concept and a product at Ministry of Environment and Forests meeting on National Nature Camping Programme (NNCP). This was appreciated in the meeting by Government Authorities. WOTR proposed to create Hindi and English versions of the field guide for	In October 2012, WOTR was represented in the Conference of Parties – 11, Hyderabad, India. Two youths from WOTR project villages exhibited their work under People's Biodiversity Register (Registers, Seed Collection, Paintings). More than 4000 people from India and abroad visited WOTR stall. On 15th October, WOTR released its Position Paper on biodiversity	WOTR initiated a concept of Biodiversity Concerns in Watershed Development. This concept was appreciated by the team of engineers who are actively involved in WSD. Interventions such as Fish Ladders, Water tanks for wildlife, Biodiversity hotspot protection have been successfully established. Initiative of cultural reconnection,

		of National Green Corps, Govt. on India (NGC)- in Maharashtra alone, 8000 schools are part of this program..	NNCP programme.	in a Side Event organized by Royal Bank of Scotland (RBS). During this, two village youth shared their experiences with working on People's Biodiversity Register, which was appreciated by the participants.	through PBR has motivated several Wasundhara Sevaks. Some of them started documenting natural and cultural history through paintings, articles, collection of seeds and motivating village youths. Some WOTR staff are now well aware of the importance of ecosystem services and raise issues related to Biodiversity concerns in respective villages and Gramsabhas.
Livestock management	Experienced as innovative locally	-	-	-	Promotion of back-yard poultry for nutrition and financial security of women, as well as livestock shows for promoting indigenous cattle were very popular
Alternate energy	Experienced as innovative locally	Indian Institute of Technology, Mumbai, invited and made WOTR their partners in Maharashtra for their Million Solar Urja Lamp project through Localisation of Solar Energy. WOTR is currently partnering to do 60,000 lights in Sangamner and Akole blocks with potential for further expansion.	Ministry for New and Renewable Energy invited WOTR to participate in a discussion on Strategy for upscaling of Box and Dish type solar cookers.	-	The solar water pumps being installed are an important contribution towards decentralizing energy sources as well as towards mitigation efforts.
Women's and children's health	Experienced as innovative by local women and highlighted as something important by them The block level ICDS supervisor and local anganwadi staff also appreciate the approach and coordination with them.	The uniqueness of WOTR's growth monitoring approach i.e. of participatorily assessing the nutrition and growth status of children and presenting it to the village for reflection and dialogue to trigger positive change has been noted by Block authorities who are variously adopting it in the ICDS program at the village level. The inter-group	-	-	Taking up child health as an issue of the whole village and personal interactions play a major role in changing the nutritional status of children. This Growth Monitoring tool can be used for assessment of food and nutritional security as children are a vulnerable group

		competitions are new as compared to the individual competitions.			
Women's empowerment	Experienced as innovative locally and has generated a lot of interest of the women and the village as a whole	-	-	-	Activities have brought the women together, reduced burden, contributed to food security, health and nutrition, participatory decision-making, ICDS and anganwadi linkages.
Governance	Experienced as innovative locally	Early on WOTR introduced between 30-50% reservation for women in Village Development Committees. This practice is now mandatory in major govt. programs. The Wasundhara Approach which promotes effective representation of various social and marginalized groups has helped institutionalize this process and also link up such CBOs with the PRI system			WOTR's approach has been focused on the way people are motivated and organized. For instance, schools are taking responsibility for drinking water and sanitation systems. WOTR has also helped people link up with government schemes pertaining to agriculture, water resources development and other quality of life improving measures.
Vulnerability Tools - CoDriVE-PD, CoDriVE-LA.	Experienced as innovative locally	Strong interest has been expressed by both the GOM and the GoAP, with the latter asking WOTR to undertake vulnerability mapping in 2 IWMP mega-watersheds in Andhra Pradesh.	Well appreciated by the participants during National Training programmes. Interest shown for field application and training in CoDriVE-LA by Meghalaya Basin Development Society for an IFAD funded Livelihoods Improvement Project for the Himalayas.	Highly appreciated by a group of World Bank consultants in 2013 and during the World Bank meeting at Delhi.	Software to support these two tools as well as for the PBR tool, which would allow "crowd sourcing", is being developed and will be released shortly.

Annex 14: Feedback from the Sangamner cluster review workshop about what was 'new or different' about the CCA project.

Feedback from the Women's group:

- "New things we learnt including the cycle hoe (reducing drudgery), organic farming, agro-advisories, health management and child management through SHGs, using PBRs so that future generations know the natural resources we had and we learnt things that parents could tell teenaged boys and girls. Evaporation pans are new for us"
- The understanding to improve family nutrition levels, reduce water stagnation from the bathroom and plant kitchen gardens was new and useful.

Feedback from the plenary session:

- Focus on organic farming: women came together, talked and strengthened themselves.
- The future is only for those who can manage water
- Because climate change is increasing poverty, therefore we need to focus more and more on water efficiency
- The value of agro-met planning
- This programme was different because CCA is multi-dimensional and comprehensive. This is different from sectoral government programmes.
- The switch from chemical to organic based pesticides, which therefore protect biodiversity.
- The programme focuses both on living and the unseen (like pollution).
- The programme brought all people together, men, women and children together. This does not happen in other projects.
- This is an integrated development programme based upon the idea that water gives life. The results will help the defense of the nation.
- PBRs give us knowledge of indigenous resources and to value them again.

Annex 15: Investment in Exposure Dialogue Programmes during the period of the CCA project

During the period of the CCA project, investment in EDPs has been of two types:

(i) There is the traditional EDP instrument that WOTR has been running for many years. These sessions (7 to 9 days on average) involve village stays, sessions on development programmes in India including watershed development, and an overview of WOTR's Climate Change Adaptation work. 12 such traditional EDP sessions have taken place since mid-2009. Participants include some elite NGOs (national and international), international aid agencies like Andheri Hilfe Bonn, members from DePaul University and IRHA (international rainwater harvesting alliance).

(ii) To get the attention of many Indian policy makers and opinion leaders, WOTR also attempted a shorter version of the same (2 to 3 days), with a considerable success. Notable participants included Dr. Suvarna (Andhra Pradesh state government); various Maharashtra state government officials; officers from national level government programmes like IWMP, PPCP and ATMA; NABARD officers; corporates like Reliance, HSBC, Jindal, HCC; senior officials from ICRISAT; universities like IIT, TISS, and NGOs like FES, CARD, PRADAN. There have been about 220 such visits in total over the past 5 years. Funding for these was from various sources - self-funded, project funded, external etc. - depending on the circumstance and objectives concerned.

The following diagrams give a brief breakdown of attendance across both types of EDP:

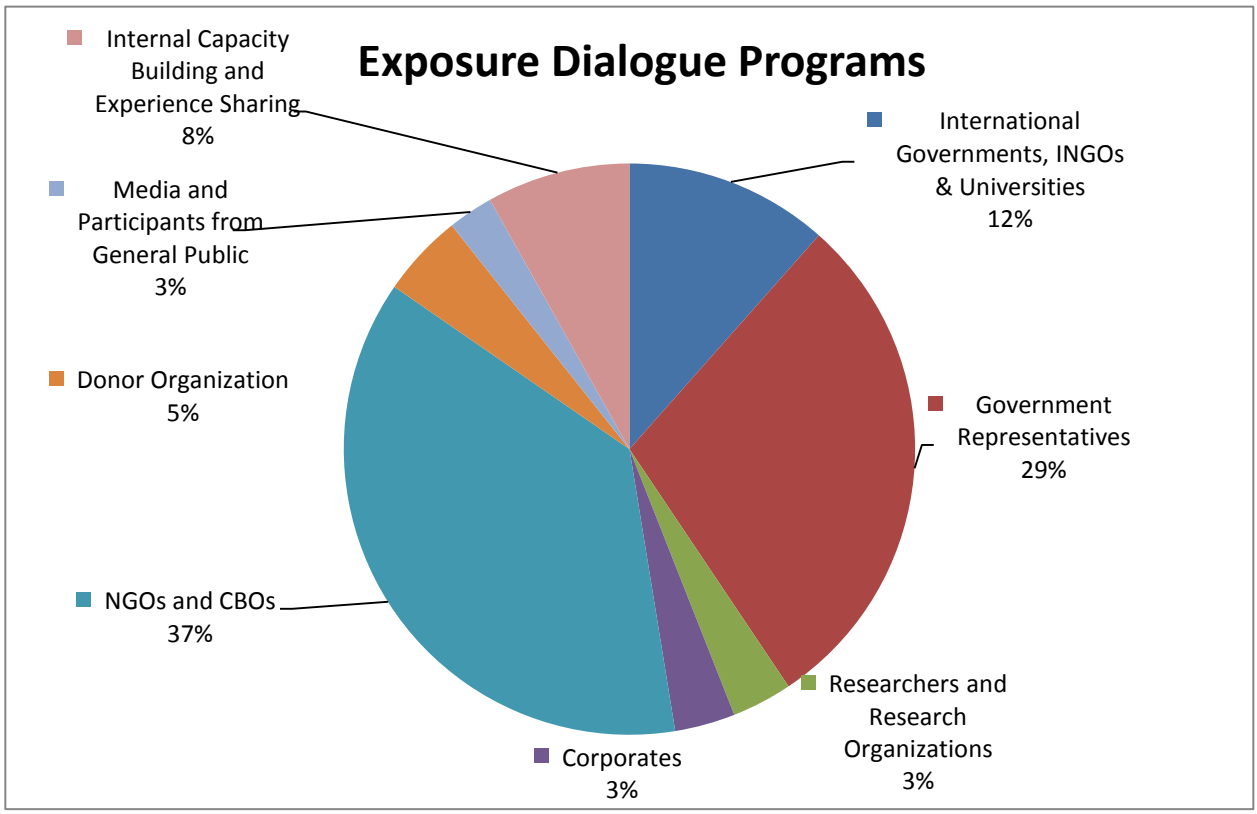


Figure 1: Exposure Dialogue Programs conducted by WOTR

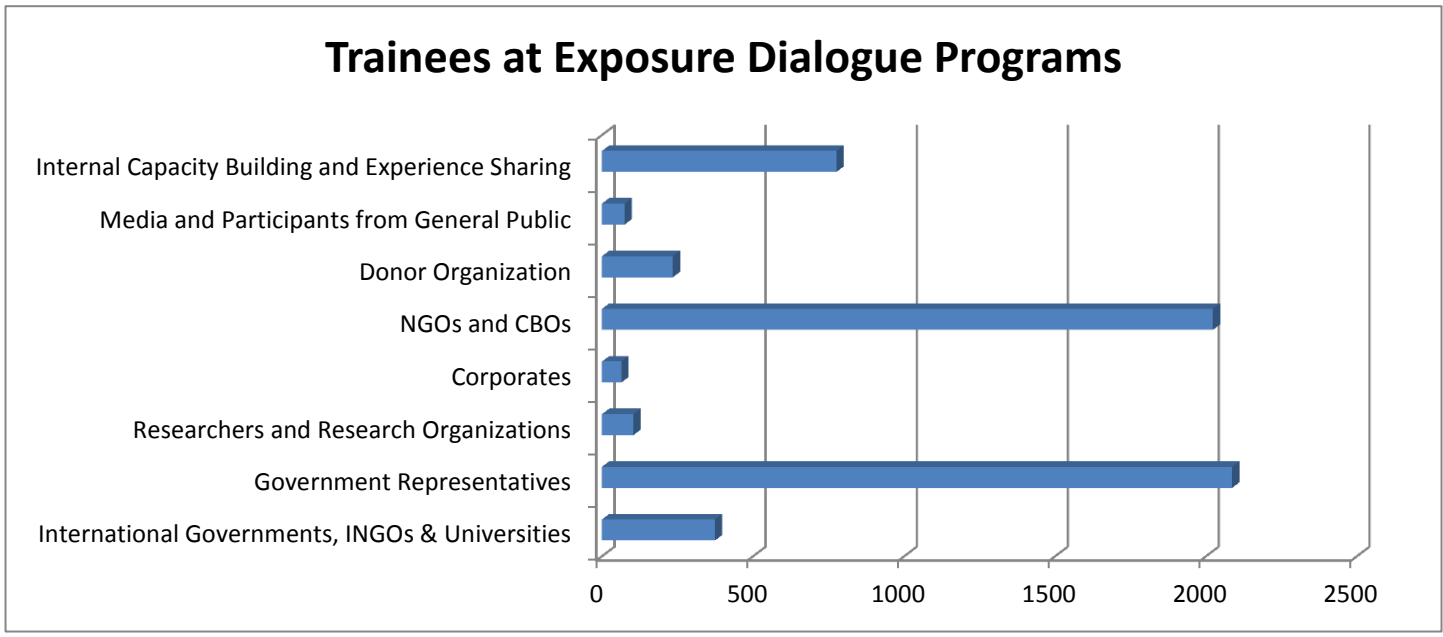
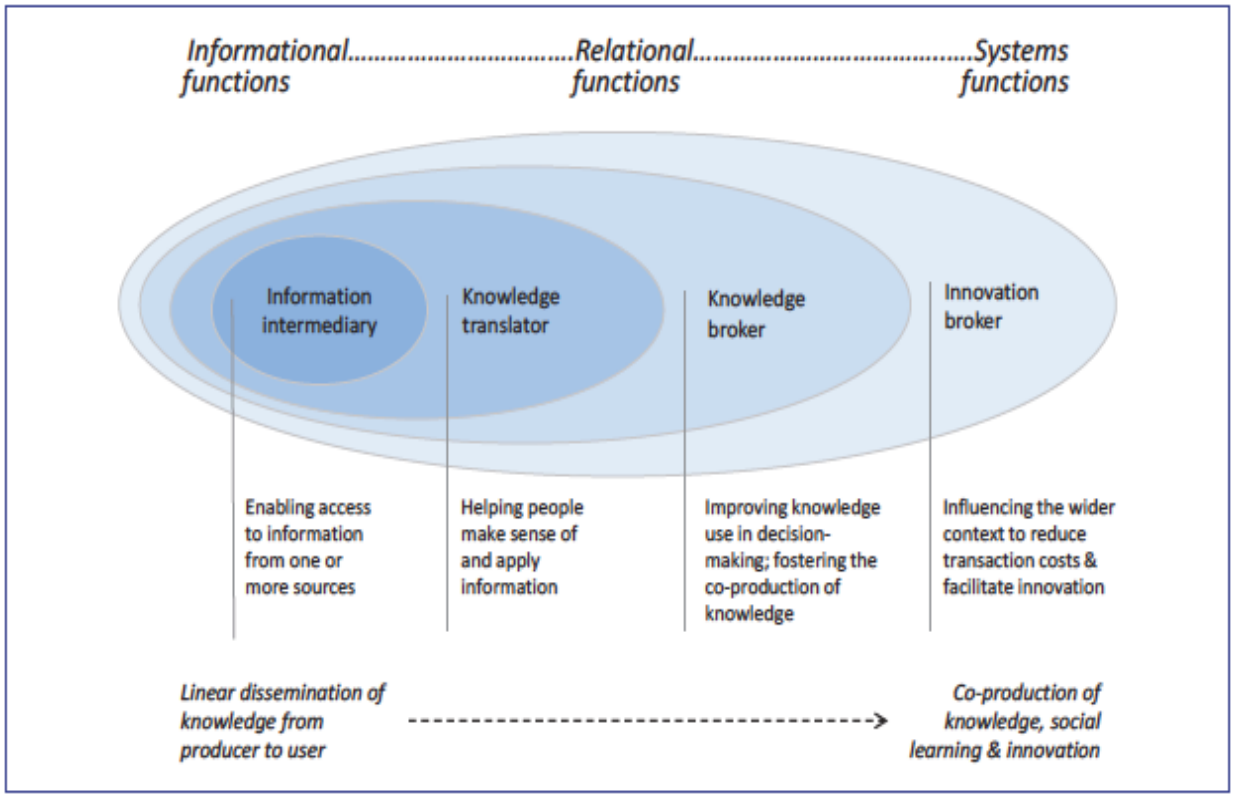


Figure 2: Number of Participants at Exposure Dialogue Programs

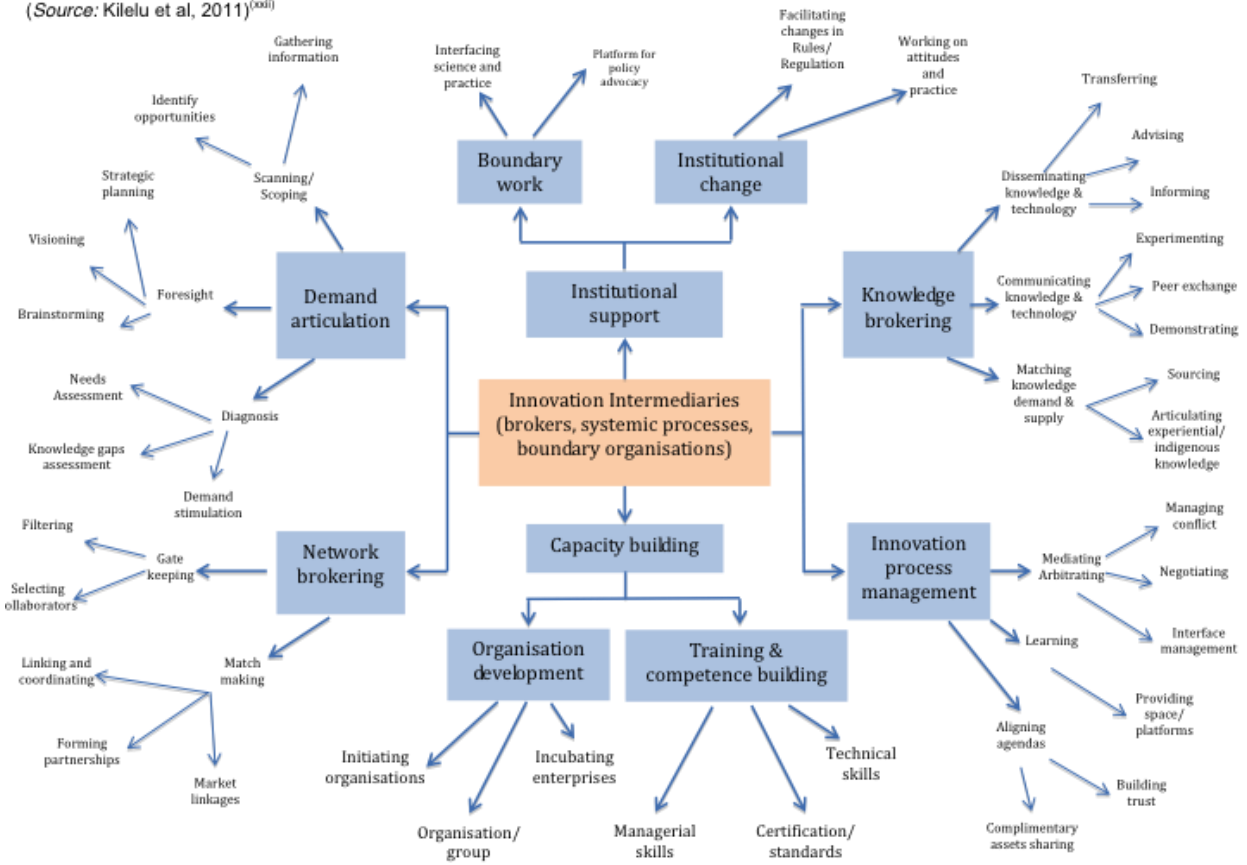
Annex 16: The 'K*' framework[clxxv] for conceptualising the different roles that may be involved in managing knowledge and understanding in a scaling up portfolio
(which may involve multiple pathways of change)



This diagram highlights the different roles that intermediaries can play in connecting research demand and research supply and in shaping both of these[clxxvi]. Collectively referred to as K*, these roles range from supporting one-way flows of information (infomediaries and knowledge translators) to supporting two-way knowledge flows, leading to knowledge co-production and the development of innovation systems (knowledge brokers and innovation brokers). The skills required of the latter two roles is further unpacked in the diagram overleaf.

Moreover, the gathering, synthesis, appraisal and use of research evidence and rigorous data by policy-makers, practitioners and/or intermediaries is as much a function of research demand ('user pull') as it is of research supply ('knowledge producer push')[clxxvii]. The motivation to access, evaluate and use research can be shaped by a number of factors, including whether there is a culture of enquiry and how this is developed though institutions such as higher education; what influence wider societal values and beliefs have on use of research; and the extent to which it is socially acceptable to challenge power structures[clxxviii]. Attitudes towards the institution of policymaking itself, and what and who should drive it will also shape the role of research in these processes. Furthermore, organisational culture may not be static; crisis or change may lead to short-lived 'policy windows' during which the organisation is temporarily more receptive to research uptake[clxxix].

Figure 3.1 Range of Innovation Intermediary Functions
(*Source:* Kilelu et al, 2011)[xxii]



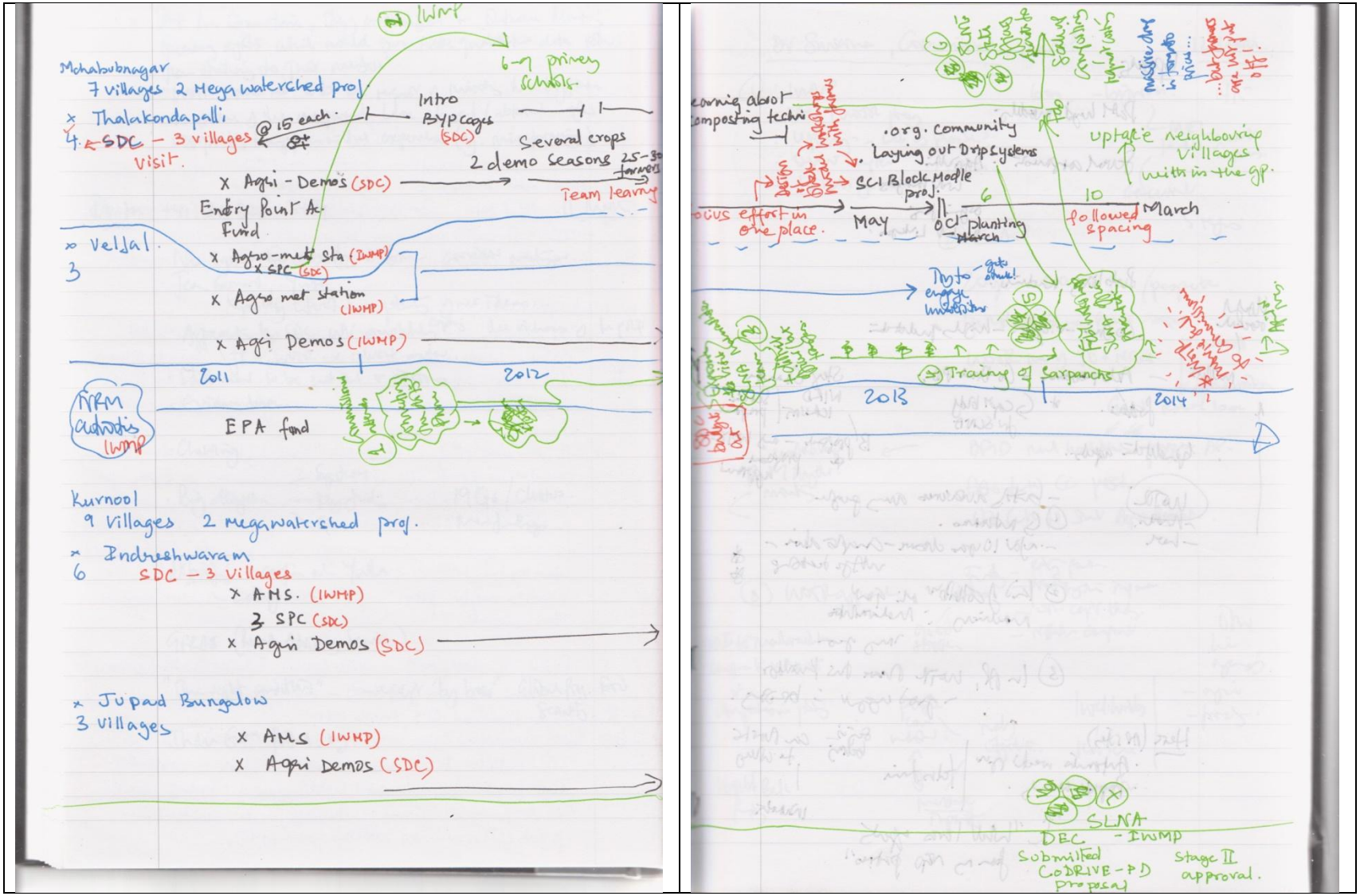
Annex 17: Correspondence between the National Missions on Water, Enhanced Energy Efficiency, "Green India" and Strategic Knowledge for Climate Change, CCA project activities and the potential for policy engagement and upscaling. *Source:* CCA project OMS report, April – September 2013[11]

National Missions	Corresponding work under CCA project
The **National Water Mission** includes activities such as integrated water resource management, improving efficiency of irrigation systems, rehabilitation of systems, expanding irrigation systems, increasing storage capacity, recharging of under-ground water sources, promotion of drips, sprinklers etc.	*Activity Contributions:* Water-budgeting, Ground and surface water management, farm-ponds, improving water use efficiency (drip and sprinkler systems, crop-planning based on crop water requirements and the water-budgets, group irrigation systems) , drainage line treatments, area treatments, Study on Farm Ponds as a mal-adaptation response, etc. *Partners:* Ground Water Survey and Development Agency (GSDA), Govt. of Maharashtra (GOM); Dept. of Agriculture (GOM), NABARD, ETH (Swiss Institute of Technology)-Zurich. *Policy and Upscaling Contribution/ Potential:* All the above have great potential for implementation of the Maharashtra Ground Water Management Act as well as elsewhere in the country where water as a constraint for livelihoods and domestic use is being experienced.
The **National Solar Mission** and the **National Mission for Enhanced Energy Efficiency** includes activities for improvements in energy efficiency, shift to energy efficient appliances and those relying on alternate/renewable sources of energy , support livelihoods related to these sectors	*Activity Contributions:* Energy efficient cooking stoves (hot-water chullah), treadle pumps, solar pumps, Solar homelights, solar parabolics, solar streetlights, energy service centers (Urja kendras), bio-gas plants, etc.; pilot on energy-water nexus using remote technology for real-time monitoring of electricity use and pumping efficiency in order to optimise use and extraction rates, in collaboration with a private company (Datamatrix) *Partners:* Private agencies, Indian Institute of Technology (IIT-B), Datamatrix (private company), NABARD *Policy and Upscaling Contribution/ Potential:* The Urja Kendras have potential for providing "green livelihoods" for the poor; the Datamatrix technology has huge conservation and productivity implications for electricity-water- agriculture in India.
The **National Mission for a Green India** includes activities to enhance ecosystem services, conservation of bio-diversity, afforestation activities, work on degraded forest lands through JFMCs, etc.	*Activity Contributions:* Biodiversity work –People's Biodiversity Registers (PBRs -includes one for children/ schools) for documentation of local biodiversity, promotion of local flora (nurseries with indigenous species), afforestation activities (plantations), Wasundhara Guidelines that include ban on tree-cutting and free grazing etc. *Partners:* Maharashtra State Biodiversity Board, National Green Corp (Maharashtra), Social Forestry Dept., Bharati Vidyapeeth Institute for Environment, Education and Research (BVIEER), NABARD *Policy and Upscaling Contribution/ Potential:* The PBR s are a do-able methodology that can help implement the Biodiversity Conservation Act, 2002 that facilitates local control over biotic resources
The **National Mission on Strategic Knowledge for Climate Change** includes activities such as research and technology development and collaboration through mechanisms including open source platforms. Research will include socio-	*Activity Contributions* - Thematic studies, cluster level studies, manuals, tools for vulnerability assessment, policy briefs, dissemination workshops – state and national level, various exposure and dialogue programmes, trainings for both national and international participants, participation in various prestigious national and international events, forums, dissemination of knowledge products across popular e-networks, etc.; Knowledge collaborations (MOUs) and engagement with prestigious

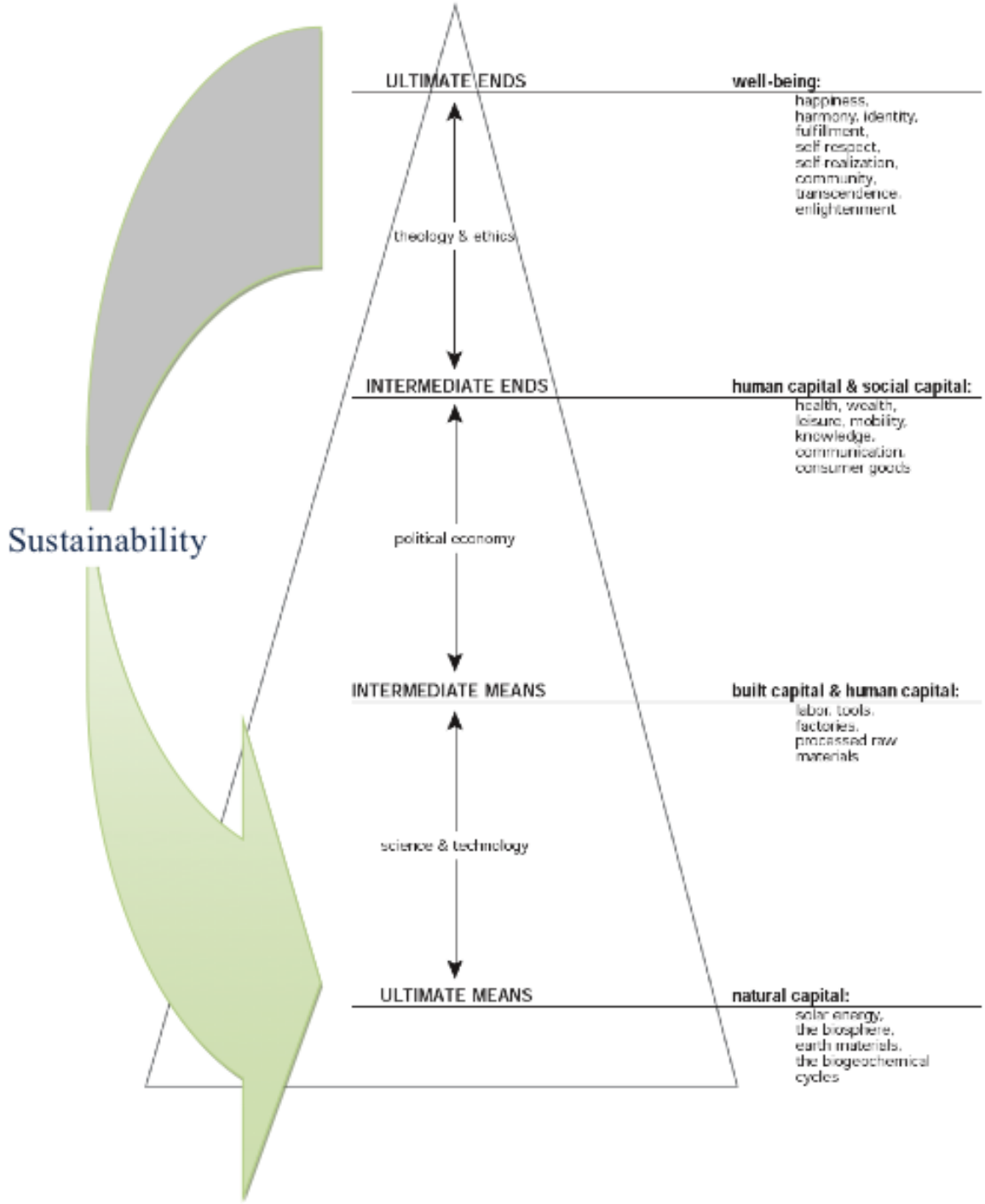
11

economic impacts of climate change on health, livelihoods, support for innovative adaptation measures, dissemination of knowledge and policy advocacy.	international/ national/ state institutions that are also involved in the implementation of related national Missions (WRI, CRIDA, ICRAF, IMD, INFRAS (Othmar Schwank), Meteodat, etc.) *Partners:* CRIDA, ICRAF, IMD, MPKV (State Agri Univ), BVIEER, WRI, INFRAS, Meteodat, NABARD *Policy and Upscaling Contribution/ Potential:* Experiences gained and joint publications are fed into the scientific, technology and policy communities involved in the related Missions thus contributing to their better implementation

Annex 18: Chart of the CCA project activities in Andhra Pradesh, highlighting policy-influencing pathways with the Government of Andhra Pradesh (Rural Development Department).



Annex 19: Key mental models and framings used by WOTR for the CCA project (ii) Modified Daly's triangle used to explain WOTR's strategic understanding[clxxx]



Annex 20: Twelve reasons why CCA M&E is challenging. *Source:* Bours *et al.* (2014a)[clxxxi]

1 **Adaptation is not an objective or endpoint.** Rather, it is an evolving process of continual adjustment which, if successful, will enable socio-economic or environmental goals to be achieved despite a changing climate context. Recognising adaptation as a process highlights the importance of M&E approaches that assess overall strategy. M&E can shape future CCA efforts by identifying what is and is not working well, and why.

2 **Long time-frames stretch far beyond common programme cycles.** Climate change is an ongoing, long-term process which will unfold over many years. Significant time lags can exist between interventions and measurable impacts. This poses a dilemma for evaluators, because it will not usually be possible to fully assess the impact of an adaptation programme on climate change vulnerability until considerable time has passed.

Possible strategies. One, view adaptation as an iterative, formative process, and use M&E as a means of checking progress against changing conditions. Use process indicators to determine whether progress is on track, even if impacts cannot be determined yet. Secondly, consider flexibility as a measure of success: use M&E processes to assess how an adaptation intervention can cope with unknowns or non-linear change. This is particularly important for long-term projects where there is a risk of becoming 'locked in' to a potentially maladaptive response.

3 **Uncertainties are inherent when implementing CCA interventions.** The 'cascade of uncertainties' associated with climate change presents a significant challenge to evaluators. Future social and political priorities are even more unpredictable, and will also have profound influence. It is therefore important to keep in mind that climate itself is only one of a range of issues that affect vulnerability to climate change.

Possible strategies. M&E approaches need to acknowledge that many uncertainties are inherent in CCA, and that we cannot fully predict the complex and cascading feedback loops and tipping points that will occur. Adaptation should be approached as an emergent and ever-changing process. To this end, it is imperative that programmes are designed to be flexible and make use of well-designed M&E approaches to track progress. M&E can help you to manage uncertainties by: Establishing baselines so it is possible to track contextual changes; Ensuring that the evaluation process examines the assumptions that underpin a programme as well as emergent conditions that suggest that the strategy may need to be updated; Using flexibility as an important success measure for the intervention (see 'long timescales' challenge).

4 **Measuring avoided impacts.** If our adaptation efforts are designed to reduce the adverse impacts of climate change, how can we judge how much worse it would have been without our intervention? Conversely, if a programme is designed to improve a provincial government's disaster management capacity, what if there is no disaster during the timeframe of the project? How then to approach the evaluation? These issues are not unique to adaptation M&E: indeed, establishing a counterfactual (i.e. what would have happened in the absence of an intervention) is a fairly common M&E challenge. However, long timescales and uncertainties can make it harder to build up a credible picture of what may have happened (or will happen) without CCA efforts.

Possible strategies. There is now a body of disaster risk reduction (DRR) literature concerning how to measure and evaluate avoided hazards. However, establishing a counterfactual may not always be appropriate. In some cases, it may be better to consider the intervention as one of many 'adaptation pathways'. The job of the evaluator is then to assess progress along the chosen pathway (as defined in a Theory of Change) in the context of a dynamic set of social, economic and environmental conditions[clxxxii]. It is also important to reflect upon the objectives of the intervention, and to bear in mind that 'holding steady' may itself be the goal. Brooks et al. (2011), for example, argue that in many cases successful adaptation simply keeps development 'on track.' Maintaining a community's water security may be an impressive accomplishment if desertification is

encroaching[clxxxiii]. This contrasts sharply with most development programming which seeks to demonstrate improvement.

5 **Diversity of key concepts and definitions.** Adaptation can refer to actions taken (UNFCCC), the process by which adaptation is reached (UNDP, UKCIP), and the outcome of a process that leads to a reduction in risk (UKCIP). Furthermore, CCA activities might focus on building adaptive capacity (the ability of a system or group to adjust) rather than adaptation actions, or commonly a combination of both. Some CCA interventions may only focus on negative consequences and vulnerabilities, while others also take into account how to harness beneficial opportunities (NCCARF). Resilience is another common term and refers to the ability to thrive amidst disturbances in a social or natural system. There are important, and sometimes subtle, distinctions between various terms that are used, and these influence what exactly is being evaluated.

Possible strategies. Familiarise yourself with the key terms, and consider what the implications are for your M&E framework. It is critical to define concepts clearly at the outset, and to use them consistently and correctly. Otherwise, there may be confusion about what exactly is being measured or assessed.

6 **Tracking a 'moving target'.** In a more straightforward development context, we would gather baseline data prior to project implementation, and use that as a benchmark to measure achievements. But when it comes to climate change, we have to recognise that natural and socio-ecological systems undergo continuous change over time and so the use of a fixed baseline may lose some validity. With overall conditions deteriorating or in flux, the baseline data itself may not always be a sound point of reference. This is called the 'shifting baseline' problem.

Possible strategies: The programme itself – not just its metrics – will need flexibility to adapt to an evolving climatic context. Simply comparing 'before' and 'after' may be insufficient to evaluate the impact of a programme if the overall context itself is dynamic. Baseline data are useful, but an evaluation should be approached with a wider perspective. Be clear about the purpose of the evaluation at the outset (e.g. accountability, knowledge generation); professional judgement should be used to consider whether and how the 'before' and 'after' reflects programme outcomes compared to broader contextual dynamics. It is also important that evaluators question original assumptions behind a programme strategy: what seemed appropriate in 2010 might not be by 2020.

7 **Climate change is global – but adaptation is local.** Adaptation programming should reflect conditions in situ, whether on a national, sub-national, or local level. Efforts to build resilience and promote adaptation to the effects of climate change will vary radically from place to place, even within the same country. This means that M&E frameworks will often be required to operate at multiple scales in order to capture the factors which shape adaptation success. The effectiveness of an adaptation programme in the agricultural sector may be shaped by the local cultural practices as well as national or regional governance structures.

Possible strategies: It is imperative that programme strategies be tailored appropriately; there is no one size fits all. CCA strategies must be nested in the specificities at hand, and grounded in socio-economic, governance, and natural environmental contexts. Be wary of generic approaches and recommendations, and instead prioritise local knowledge and circumstances.

8 **Adaptation spans multiple scales and sectors.** Adaptation encompasses diverse programming strategies, populations, and locales. While it tends to be a local process, progress towards it is often examined at much higher levels, and often across portfolios. It can be very difficult to compare or aggregate results in an effective way because of the eclectic range of sectors, the differential availability of data, and because what it appropriate in one site might not be for another. One consequence of this is that the kind of data that is useful for global policy and comparative research is either difficult to come by or simply not very relevant to evaluating smaller-scale initiatives – and vice versa. The myriad of ways to address 'vulnerability' or 'adaptive capacity' does not lend itself to a unified M&E framework.

Possible strategies: Recognise that CCA represents a highly diverse set of interventions, and 'let go' of expectations that there are (or should be) clear-cut universal indicators or measures. The diversity and complexity of CCA programming makes it poorly-suited to standardisation. What sets CCA apart from other development programmes is not the sector nor the scale, but rather the underlying analysis of how an endeavour fits into a much larger and emergent change process. Much of climate change adaptation programming promotes, or at least is consistent with, sound development practice. While CCA does not necessarily require a discreet body of stand-alone programming, it does call for programmes to be embedded in coherent analysis of both climate change itself and its concomitant adaptation processes. The desire to aggregate can also reflect an over-dependence on quantifiable indicators which, while useful for some purposes, cannot be expected to provide a nuanced picture of adaptation progress.

9 **Assessing attribution vs contribution.** Development agencies usually seek to demonstrate that they have brought about a specific, attributable change: to reduce incidence of malaria by improving prevention measures, for example; or to increase the primary school enrolment rates of girls. Doing so demonstrates accountability, justifies their raison d'être and, often, secures further funding. CCA, however, is inherently complex, long-term, and transects programming sectors and levels of intervention. This can become a problem when agencies wish to attribute outcomes directly to investments. It can be almost impossible to untangle the range of interconnected factors that shape a long-term impact or outcome; CCA defies simple cause and effect analyses. Moreover, we may not even understand whether the outcome will be achieved (or whether it is meaningful) for years to come.

Possible strategies. Instead of seeking to attribute CCA interventions to outcomes, it is usually better to present how a programme or project contributes to broader climate change adaptation goals. Doing so entails an evaluation framework which illustrates the contributing factors and the relationships between them. Such an approach also facilitates evaluations that document lessons learned. More donors are encouraging grantees to make balanced claims about their impact, and reporting that emphasises contribution over attribution helps ground achievements more realistically.

10 **There is no one set of indicators or M&E approaches.** Adaptation is contextually specific, thus requiring tailored approaches. What sets CCA indicators apart is whether they combine into a suite that appropriately frames progress towards adaptation and resilience. Bear in mind that the complexities and uncertainties inherent in climate change are better-served with a broader range of indicators than is usually called for in more straightforward development interventions. Because adaptation is not an outcome that can be achieved in the near term, the medley of indicators chosen for a CCA programme would probably have more emphasis on process and output indicators than would otherwise be expected.

11 **Causing harm: the 'maladaptation' problem.** Hedger *et al.* (2008) explain that, "if done badly, [adaptation] interventions can actually exacerbate the effects of climate change. This is termed maladaptation" (p. 29)[clxxxiv]. An example might be measures to protect coastal infrastructure that are effective in the short term, but actually compromise environmental integrity in the long run. Harmful, unintended consequences are not unique to climate change adaptation and can be difficult to avoid because CCA is a new and complex field of practice.

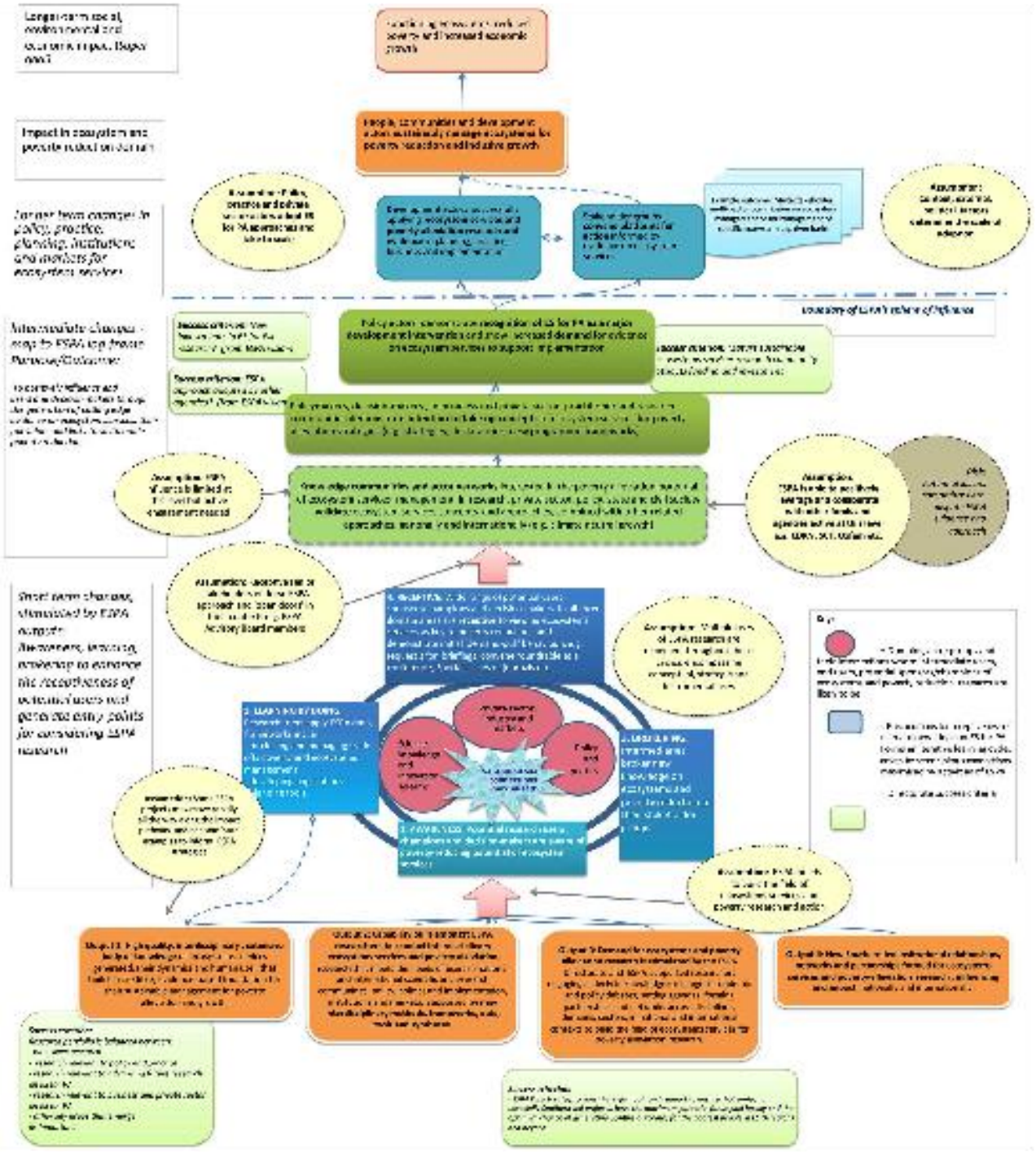
Possible strategies. The risk of maladaptation can be reduced by using M&E for learning, reflection, and improvement of ever-evolving strategies. If M&E is prioritised as a key element of project design, then those investing in CCA efforts are more likely to be able to identify and respond to emerging or unintended problems or risks. Engaging a wide range of stakeholders in the M&E process can also help, as you are acknowledging that adaptation can mean different things to different people. This means you have a greater chance of identifying cases where an intervention may be positive for one group but maladaptive for another.

12 **Conflicting purposes and fit: when 'sustainable development' and adaptation are not inter-changeable.** Climate change is attracting greater international attention, including donor funding. This has led to concerns that CCA may become superficial 'window dressing' with which to attract

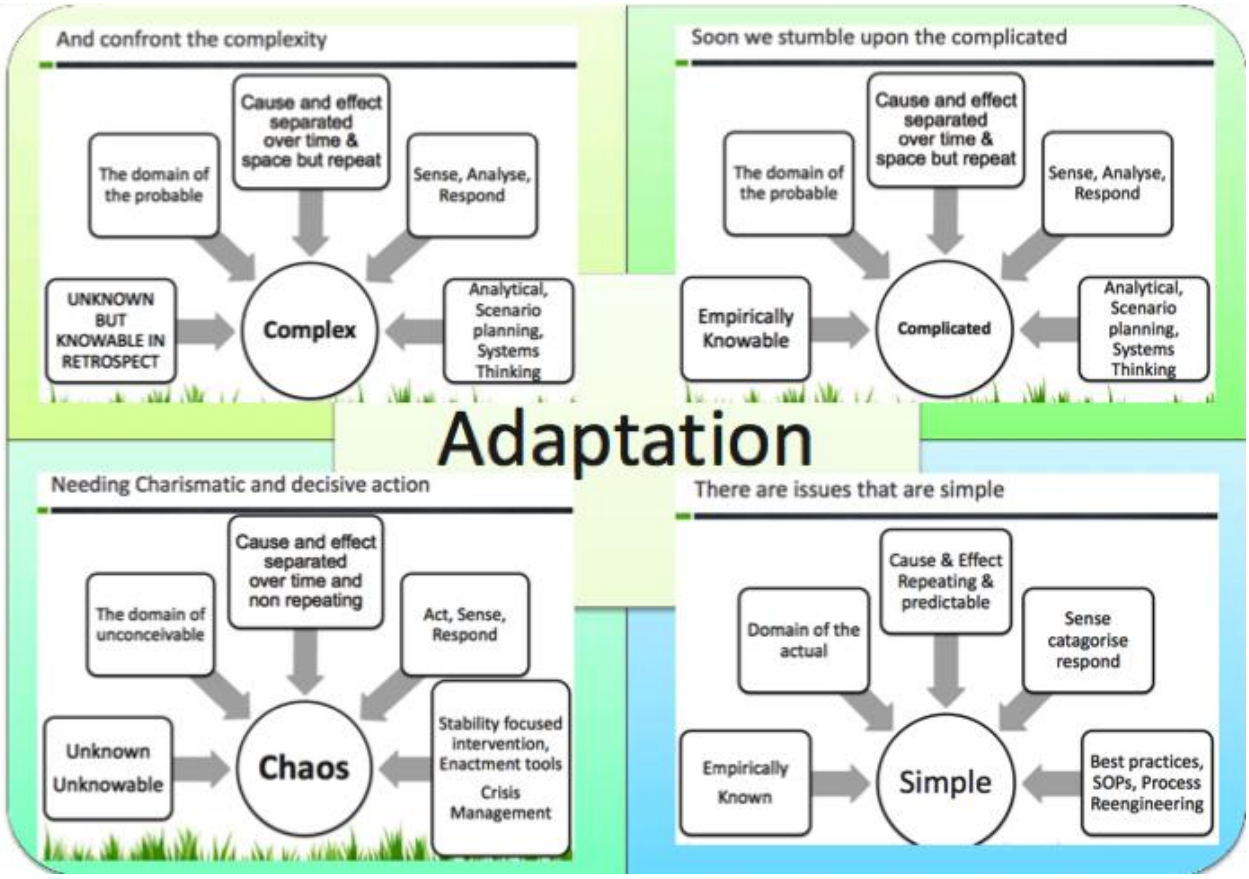
funding for projects which, however valuable in other respects, do not meaningfully contribute to CCA. It may also be the case that very good adaptation strategies may not particularly enhance other development aims in the short term. Drought-resistant crop strains, for example, may be hardier overall but result in lower average yields if rain is plentiful.

Possible strategies: Adaptation programmes should be grounded in a coherent analysis of vulnerabilities to climate change, with strategies that are designed to promote resilience to it. While programme activities may indeed resemble other development programmes, adaptation would be nested in an underlying analysis of the long-term and dynamic complexities that underpin climate change. This would be embedded within the M&E framework itself, and evaluators would play a critical role in ensuring that the programme's strategy is sound from a CCA perspective. To enable this, many experts are now recommending a Theory of Change (ToC) approach.

Annex 21: Example of a dynamic Theory of Change taking into account climate change adaptation. *Source:* Bours *et al.* (2014b)[clxxxv] based on ESPA (2012)[clxxxvi]



Annex 22: Theory of change framework developed for the CCA project during 2012.
Source: Bajpai (2013)[clxxxvii]



Annex 23: Outline M&E framework developed to support the CCA project during 2012.
Source: Bajpai (2013)[clxxxviii]

Contextualized Diagnostics

Simple	Compiicated	Complex	Chaos
We can teach people how to do things very quickly and ensure compliance	We have learnt how to solve this problem and are now in a stable situation	Every time we think we have solved the problem it returns in a different form	This is a new situation in which we no previous experience and have no reflective time
We control the space and can determine behaviour	***We have been here before and any deviations are readily understood***	***Minor, troublesome events occur but are easily rationalised***	***Something completely unexpected at this time***
Any diagnostic is a simple check against predetermined criteria	**Diagnostics can be separated from intervention**	**Diagnostics are interventions – they influence the patterns**	**There is no time or need for any diagnostic**

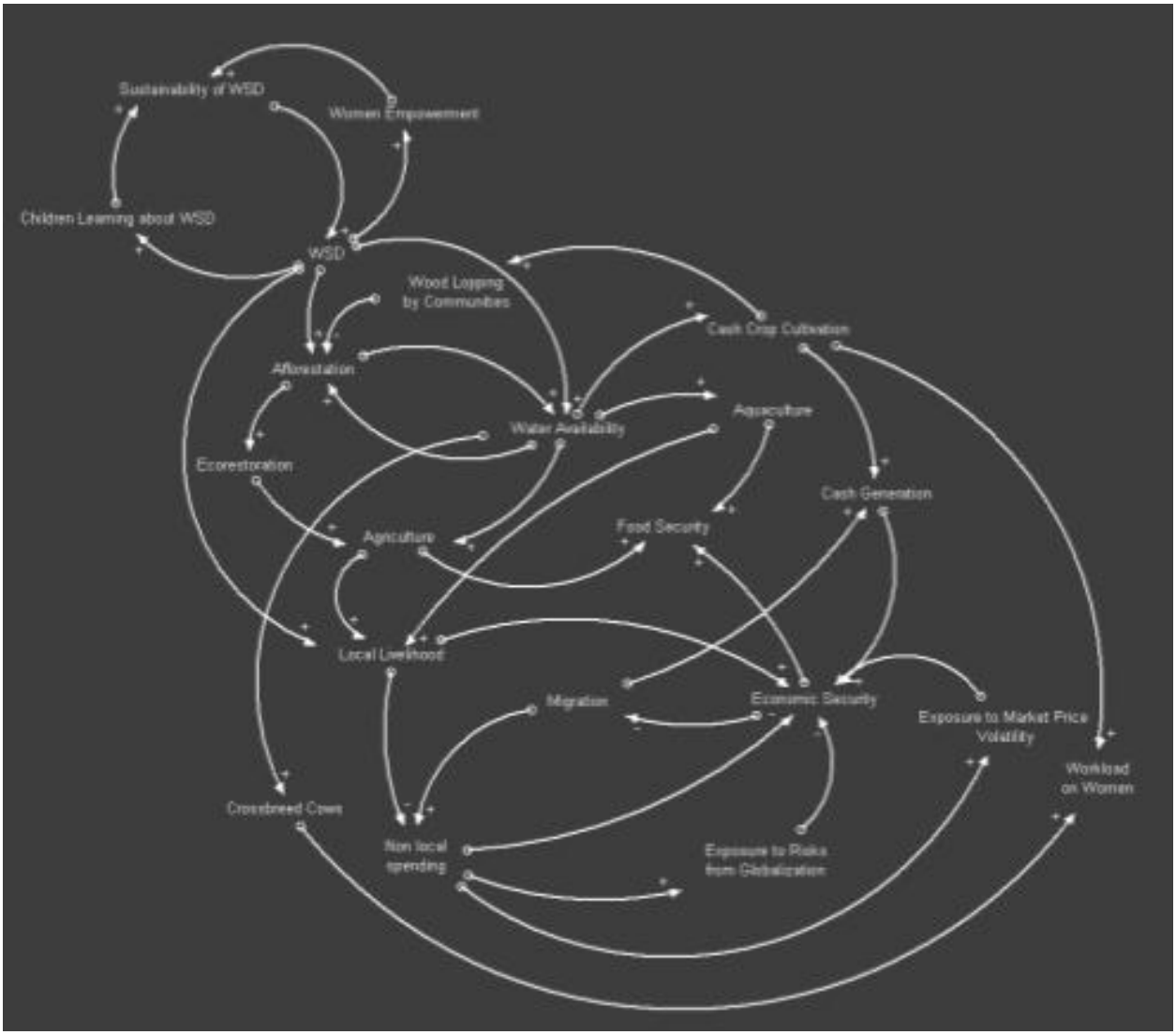
Contextualised Interventions

Simple	Complicated	Complex	Chaos
Standard process with review cycle & clear measures	Analytical techniques to determine facts and option range	**Multiple small and diverse interventions to create options**	Single or multi point attractor(s) to stabilise situation
Establish indicators to prevent catastrophic failure	*Create ritual/cyclical process to prevent entrainment of expertise*	*Always have an exit strategy to the ordered domains for exploitation*	*Avoid creating long term dependency on single attractor*
SENSE – CATEGORISE - RESPOND	SENSE – ANALYSE - RESPOND	PROBE – SENSE - RESPOND	ACT – SENSE - RESPOND

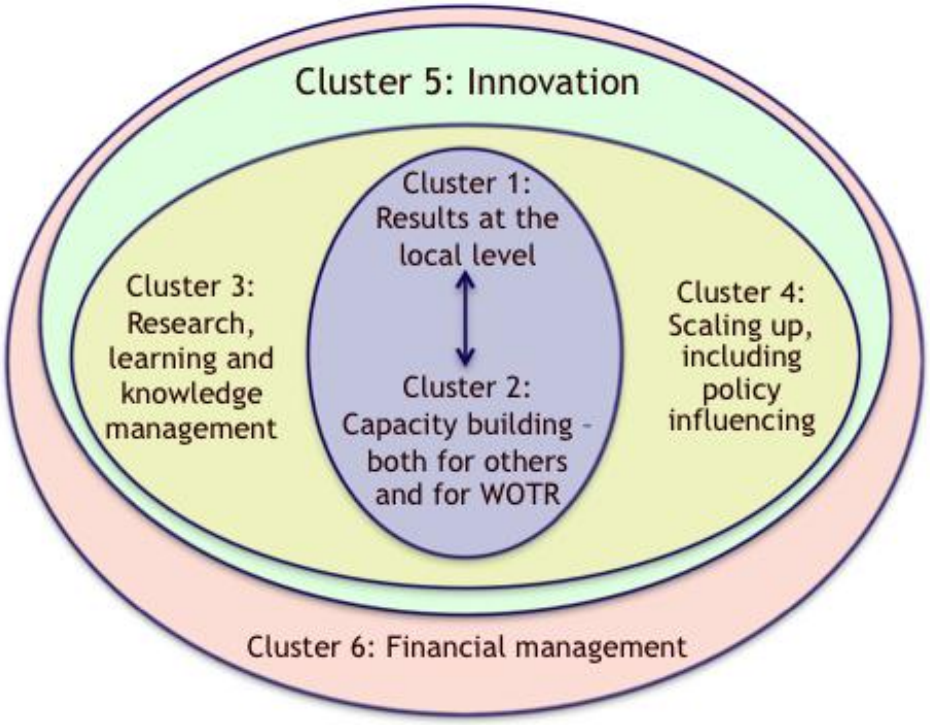
Contextualised Tools for M&E

Simple	Complicated	Complex	Chaos
LFA	LFA		
P3DM + GIS	P3DM + GIS	P3DM + GIS	P3DM + GIS
LM3	LM3	LM3	
CASDAAT	CASDAAT	CSDAAT	
VAT	VAT	VAT	
INDICATORS DESIRABLE	INDICATIONS + INDICATORS	INDICATIONS OF SUCCESS & FAILURES	STRONG ENLIGHTENED LEADERSHIP!!!
EMPERICAL VALIDATION	EMPERICAL + ANECDOTAL VALIDATION	QUICK & FUZZY SENSEMAKING THRU	
BEST PRACTICES DOCUMENTED & REPLICATED	GOOD PRACTICES DOCUMENTED & UPSCALED	CELEBRATE SUCCES (AMPLIFY), LEARN FROM FAILURES	GET IT BACK TO COMPLEX

Annex 24: Systems diagram illustrating the interconnectedness ('integration') of interventions within a village cluster. *Source:* WOTR (2011)[clxxxix]



Annex 25: An approach to mapping the components of the CCA project, considered in this review, as an 'innovation system', using systems diagramming. The diagram shows different levels of the innovation system, with local level innovations (purple background) nested within upscaling activities (yellow background), in turn nested within a broader innovation framing (green background), contained within the financing arrangements for the project (pink background).

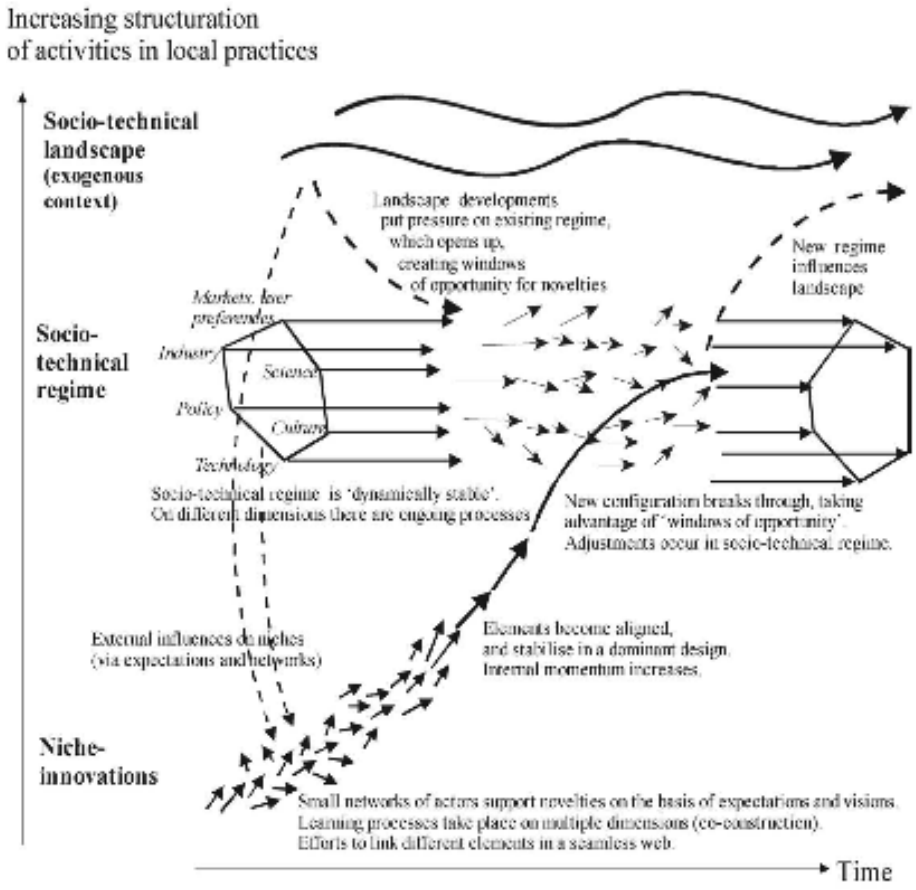


Annex 26: Examples of different framings of innovation systems

(a) The evolution of agricultural innovation systems[cxc]

	1980s: National agricultural research system	1990s: Agricultural knowledge and information system	2000s: Agricultural innovation systems
Guiding agenda	Scientific	→	Developmental
Relationships	Narrow, hierarchical	Starting to broaden	Diverse, consultative
Partners	Scientists in public agencies	More attention to links between research, education and extension and farmers' demands	Various combinations of scientists, entrepreneurs, farmers, development workers and policy actors from public and private sectors
Role of partners	Fixed – predetermined by institutional roles within the research system	→	Flexible – determined by the nature of the task, skills and national context
Research priority setting	Fixed by scientists	Based on farmers' demand for new technologies	Consensual by stakeholders
Work plans	Fixed at project outset		Flexible, iterative
Responsibility for achieving impact	Other agencies dedicated to extension and technology promotion	→	Scientists and their partners in task networks

(b) Multi-level perspective on transitions[cxci]



Annex 27: Press cutting describing the hailstorm in Madhya Pradesh in late February 2014

2 TIMES REGION

Hailstorm in MP a national calamity: Chouhan

CM Announces ₹2000 crore Compensation For Farmers

TIMES NEWS NETWORK

Bhopal: Chief minister Shivraj Singh Chouhan on Friday described the unseasonal rains and hailstorm that ravaged the state as a national calamity and announced a Rs 2,000-crore compensation package for farmers. Chouhan conducted an early morning emergency video conferencing with district collectors and ordered instant survey of crop damage.

He also announced a compensation of Rs 15,000 per hectare of land hit by the catastrophe. Three emergency helplines have been set up to receive complaints from farmers where the survey team hasn't reached. Revenue minister Rampal Singh has been given the responsibility to head the survey team.

"This is an unnatural crisis where some districts have been repeatedly ravaged by hailstorms three to four times since Tuesday," the chief minister said.

"At least 40 of 61 districts are affected by rainfall and hailstorms. More than 9,800 villages are wrecked and crops have been damaged more than 60% to 70%. We have decided to divert budgetary allocations for infrastructure and developmental projects to relief work. Development can wait, but we must stand by our farmers in their hour of crisis," Chouhan said.

WHAT IS LEFT? A farmer looks at the damage caused to wheat crops in a field after hailstorm on the outskirts of Bhopal on Thursday PTI

Not just commissioners and collectors, the chief minister issued orders to revenue, panchayats, rural development and agriculture departments to join in the survey so that no farmers is not left out of the survey and compensation package. All cabinet ministers have been asked to visit rural areas to assess damage. Relief distribution will commence straightaway, Chouhan said.

While there are reports of two farmer suicides, the chief minister appealed to the agrarian sector to repose faith on the government. "I appeal to farmers that it is a difficult time, but we will take every affected person out of this situation," he said.

Farmers who suffered 50% and more damage to crops will get 100% compensation while those who suffered more than 25% crop damage will also get compensated.

Families of five persons who lost their lives in the rain will be paid compensation of Rs 1.5 lakh. Farmers will be compensated for loss of cattle at Rs 16,500 per adult cow or buffalo, Rs 10,000 will be paid for a dead calf, Rs 1,650 for a goat killed in the rains, Rs 40 for a chicken and Rs 20 per small chick. Chouhan claimed his government will not only pay damages for the standing wheat, gram and pulses harvest destroyed, but also for fruits and vegetable trees and plants. A fruit tree lost will get Rs 35,000 while an orange bush damaged will be paid at Rs 600.

The state government has already stalled the instalments payments of agricultural loans taken by the affected farmers, it has agreed to pay the interest on loans till situation normalises after the next kharif crop. District collectors have been asked to take punitive action against moneylenders.

For the next eight months, each affected farmer family will get rice and wheat at Rs 1 per kg. The government will also pay Rs 25,000 to family where a daughter is getting married in the next one year.

Attacking UPA-Centre's crop insurance scheme for farmers, chief minister Chouhan argued the entire police was "defective". "According to the scheme provisions, compensation will be distributed to farmers only if 60 per cent crops have been damaged in a tehsil."

Mahakaushal reels under rain, areas blacked out

TIMES NEWS NETWORK

Jabalpur: With predictions of continued rainfall and hailstorm, situation in Mahakaushal remained grim for sixth consecutive day. Jabalpur division, lashed by rain, witnessed 23.41 mm of rainfall on Thursday night alone. While city area grappled with prolonged blackout, administration had to order last-minute cancellation of the *Aao Banaye Apna Madhya Pradesh Sammelan*, which was to be inaugurated by chief minister Shivraj Singh Chouhan on Friday.

Though the venue was readied to receive chief minister and the pandal was erected on Wednesday, rain for next two consecutive days turned the Wright Town Stadium muddy and waterlogged in most parts.

Soggy pandals put up at the venue collapsed one by one, adding to panic among local officials. Finally, after consulting meteorological office, they apprised the CM office, that eventually lead to the programme's cancelation.

If untimely rainfall played havoc; with civic life in the city areas here, adjacent districts suffered worse. The fifth hailstorm within this week shattered all hopes of farmers, particularly in Narsinghpur and Seoni. In fact, alleging apathy on part of government officials, who they alleged did not bother to visit the area to assess crop damage despite tall claims, Seoni farmers threatened to stage a sit in at the district headquarter.

'500 villages affected in Jabalpur division'

Talking to TOI on Friday, divisional commissioner Jabalpur Deepak Khandekar said, that as per the ground surveys carried out by official teams, 500 villages have taken the worst hit of the rains and thunderstorm reported in the division on February 23, 24, 25, 26 and 27. Seoni, he said is assessed to be the worst affected, where damage to crop is as extensive as 100%. Teams are already out in the fields for a reality check, he said. TNN

According to an informal estimate, Thursday night's hailstorm wreaked havoc in Narsinghpur as well, where pulses, gram and wheat crops suffred 100% damage. The district recorded 13.2 mm rains on Thursday night. Restive farmers in Gadarwara, Ghat Piparia, Salichedi and Barela, complained of zero compensation after a cloudburst in October-November last year. They have blocked the highway to highlight their plight.

Nearly 1.8 lakh hectare of agricultural area is reported to be affected in Balaghat district, where hailstones, reportedly weighed anything between 100 to 250 gm. Situation was no better in Dindori and Katni which also witnessed incessant rainfall and hailstorm.

Even as Friday saw a little sunshine, weather worsened towards the evening. Met sources do not rule out storm and shower during the next 48 hours in the division, leading to worries in agriculture sector. Situation in Chhidwara, where heavy rains were reported on Friday is causing much concern and till late evening there was no let up.

General's BU thesis zeroes in on Wakhan to stop terror

More forc

12. End notes

[i] WOTR (2013), p. 5

[ii] SDC 'hybrid evaluations' are conducted by a mixed evaluation team composed of an external consultant and in-house SDC peers. See http://www.sdc.admin.ch/en/Home/Effectiveness/Evaluations

[iii] OECD-DAC (2000)

[iv] GoI (2008)

[v] McGray H *et al.,* (2007)

[vi] OECD-DAC (2000) *op.cit.*

[vii] Climate Change and Development Division, Embassy of Switzerland in India

[viii] GoI (2008) *op.cit.*

[ix] SDC (2009a)

[x] SDC (2009a) *op.cit.,* Annex 2a.

[xi] Source: SDC (2009a) *op.cit.*

[xii] In the project logframe (WOTR, 2009b) this outcome is expressed differently, as follows: "Increased awareness and understanding of Climate Change issues amongst children, the wider public, opinion and policy makers."

[xiii] Kunke R *et.al.* (2014)

[xiv] WOTR (2009a)

[xv] As specified in CCD/SDC (2013b), page 3.

[xvi] See Annex 20, section 5

[xvii] The term 'praxis' refers to 'theory-based action'. In the field of development including of CCA, a focus on theory of change means that, in principle, all good development/CCA activity should now be 'praxis'.

[xviii] See e.g. Fussel & Klein (2006); Colvin et al (2014b).

[xix] In the 10 villages in the Akole and Sangamner clusters of Ahmednagar district (Maharashtra), where watershed development activities had been previously completed, adaptation actions were selected so that they built on and extended previous work in an integrated fashion, giving equal weight to activities within each of the five 'capitals' of the WOTR engine. A similar approach was adopted in a further 15 villages in Akole and Sangamner clusters, which had not been previously involved in participatory watershed development activities. Starting in 2009, the full integrated suite of adaptation actions was introduced, alongside the basic components of watershed development and community mobilization.

[xx] In the 24 new villages brought into the project in 2011 (10 in Aurangabad, Maharashtra; 8 in Madhya Pradesh and 6 in Andhra Pradesh) a different approach was adopted. Since the effective project period was only 2 years this necessitated that WOTR tried out selected adaptation innovations in areas where they had already established a presence and rapport, namely, in villages with on-going projects or where they had successfully completed project activities. Another consideration was selection of projects where successful innovations would have the possibility of being up-scaled, as in the case of Andhra Pradesh where WOTR is implementing projects funded by the IWMP.

Accordingly, WOTR selected villages that covered different agro-ecological zones in different states in which they had a presence. Adaptation innovations were selected based on an assessment of what was the most important "adaptation deficit" of the villages and concerned region as well as which had the best potential for up-scaling. This was arrived at after discussions with the villagers, government officials and WOTR field teams.

In summary, in these villages the idea was not to introduce a comprehensive and integrated suite of adaptive development activities but rather, to transfer, test and adapt selected innovations developed in the Akole and Sangamner clusters in different agro-ecological zones. This resulted in the following selection of the following innovation interventions in the Aurangabad, Maharashtra; Madhya Pradesh and Andhra Pradesh village clusters:

CCA Cluster	Corresponding Agro-ecological zone	Focus of interventions introduced from 2011 onwards
Maharashtra: Akole and Sangamner villages	6.2 – central and western Maharashtra Plateau, hot moist semi-arid ESR	
Maharashtra: Aurangabad cluster		Water management (surface and ground water), climate change vulnerability and livelihoods assessment in the Aurangabad Cluster;
Madhya Pradesh villages	10.4 – Satpura range and Wainganga valley, hot dry sub humid ESR	Biodiversity, DRR, water management and adaptive sustainable agriculture
Andhra Pradesh: Mehboobnagar villages	7.2 – North Telangana plateau, hot moist semi-arid ESR	Micro-irrigation and water sharing, renewable energy, system of crop intensification (SCI) and preparation of organic and biological agricultural inputs and provision of web-based weather forecasts.
Andhra Pradesh: Kurnool villages	7.1 – South Telangana plateau, hot dry semi-arid ESR	

[xxi] The NABARD head office in Mumbai (21st February 2014) asked about discrepancies in delivery by WOTR against several targets, including those for honey harvesting; farm pond construction and livestock management

[xxii] McGray H *et al.,* (2007) *op.cit.*, section 1.

[xxiii] McGray H *et al.,* (2007) *op.cit.*

[xxiv] McGray H *et al.,* (2007) *op.cit.,* section 4.

[xxv] See Figures 2, 6 & 7 in WOTR (2008)

[xxvi] 'Conceptual strategy' is the term used by SDC in their ToR for this review, question (b): 'Review the relevance and effectiveness of the conceptual frameworks, strategies and approaches followed under the project in promoting adaptive capacities and adaptation actions'. In this review we use this term inter-changeably with 'Theory of Change', as the latter term is now widely used within the development community and, usefully in our view, places an emphasis on making assumptions about pathways of change explicit.

[xxvii] Vogel I (2012)

[xxviii] See films produced by the CCA project, available at http://youtu.be/oix3rXQyHO4, http://youtu.be/ZnoRdrXMhJM, http://youtu. be/75z6UlDK9Oc.

[xxix] Kunke *et al.* (2014) *op.cit.;* Zade *et al.* (2014) *op.cit.* Kumbharwadi was one of the targeted villages in the SDC project extension phase from 2011 onwards, with the main focus on water management and use. This included motivating the farmers for better water management.

[xxx] Sixty-four percent of the households had diversified crops much more as compared to the previous year. They grew 24 crop varieties (small quantities on a reduced area) as compared to the 15 crops grown in 2011, a year of normal rainfall.

[xxxi] Zade *et al.* (2014) *op.cit.*

[xxxii] Schwank O (2013) March 21-29, 2013 mission BTO Report (final1), *7th May 2013,* page 6

[xxxiii] CCD/SDC clarified to us (13th March, 2014) that it prefers not to use the term 'policy influencing', but to speak instead of "contributing to the policy development process at national and state level'. Both terms are used in the Terms of Reference for the evaluation. In this review we use the term 'policy influencing' as shorthand for the latter, more nuanced understanding.

[xxxiv] Interview with NABARD Mumbai: Business Initiative Division, 21st February 2014

[xxxv] SDC (2013a)

[xxxvi] Jeans H with Colvin J (2013)

[xxxvii] See for example, Murray N (2013); DFID (2013)

[xxxviii] See for example, Gündel *et al.,* (2001)

[xxxix] Hall *et al.* (2004); Hall *et al.* (2006); Hall *et al.* (2009); World Bank (2012)

[xl] Jeans H with Colvin J (2013) *op.cit.*

[xli] SDC (2013a) *op.cit.*

[xlii] SDC (2014) *SDC Global Programme Climate Change (GPCC). Updated Strategic Framework 2014 – 2017.* SDC, for internal use.

[xliii] The EDP involves inviting policy makers, decision makers and managers across a spectrum of related institutions to have a structured live-in experience in project villages (usually 2-3 days) where they try to enter into the "skin' of the individuals and families so as to understand reality the way it is experienced by them. They accompany the host family in their daily chores and tasks, establish a personal relationship with them and enter into an intensive dialogue with them so as to understand and "feel" their world, their hopes, their dreams and the challenges they face as they go about their daily lives. All who have gone through this profound experience have testified to its life-affecting power and all have returned to their responsibilities determined to make things better for the poor.

[xliv] WOTR with SDC & NABARD (2010); WOTR with SDC & NABARD (2011); WOTR with SDC & NABARD (2012)

[xlv] The first state level workshop took place in Ahmednagar on 13 June 2013, with the objective of discussing 'preparedness towards climate hazards - particularly droughts' and sharing of experiences of what different stakeholders (like WOTR) had been doing in this regard – agro-met stations, early warning messages, advisories, climate resilient agriculture etc. A network has since grown out of this workshop that meets on a regular basis and there have been four subsequent meetings (with all member NGOs). See:

The second state level workshop was planned for early 2014 in either AP or Maharashtra, for sharing of some of the key highlights of the project and for discussing the potential for application of WOTR tools for vulnerability assessment (CoDRiVE-PD) etc. Being pressed for time, and since a state level consultation was planned as part of the evaluation process, WOTR decided to make the most from its interactions with the participants on the 7th of March, and not call for another separate workshop.

[xlvi] CCD/SDC (2010)

[xlvii] CCD/SDC (2013a)

[xlviii] CCD/SDC (2013) *op.cit.*

[xlix] This diagram was developed by the review team, on the basis of the review workshop conducted with the WOTR senior team in Pune on 6th March 2014.

[l] For 3 years running WOTR was invited to attend pre-budget consultations convened by the Finance Minister.

[li] The CCA project was part of the Planning Commission deliberations for the 12th Plan in regard to watershed development and minor irrigation and to the agro-forestry deliberations at the National Advisory Council (NAC) leading up to the formulation of the National Agroforestry Policy, both of which are also sub-components of the related Mission action plans.

[lii] CRIDA is the nodal agency for NICRA (Impact of Climate Change on Agriculture).

[liii] At the State level, MPKV is responsible for agricultural adaptation in the dry, rainfed and semi-arid zones of Maharashtra.

[liv] *Email from WOTR to SDC, dated 19th September 2012:* "Regarding the institutionalization of policy learnings, the partnership with NABARD plays an important role, not only with respect to its influence within policy levels, but also in institutionalizing these learning for purposes of replication of the CCA project across the country, in partnership with the other NGOs. We have this precedent in the WDF at NABARD, which grew out of and built upon the Indo–German Watershed Development Program (IGWDP). It is our attempt and goal to set up a similar fund at NABARD specifically dedicated to promoting climate smart adaptive behaviour in rural, agrarian systems. This would facilitate field level practical interventions at scale to build resilience and reduce vulnerability of rural communities."

[lv] Integrated Water Management Programme. The IWMP is the largest watershed development programme in the world with Rs. 12,000 crores allocated to it.

[lvi] The Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) has selected four consortia to undertake research in three climate change hot spots in Africa and Asia: semi-arid regions, deltas, and glacier and snowpack-dependent river basins. These hot spots represent regions where demographic trends and climate change impacts put large numbers of people and their livelihoods at risk. The Adaptation at Scale in Semi-Arid Regions (ASSAR) consortium, coordinated by the University of Cape Town, South Africa, and of which WOTR is a member, aims to enable longer-term approaches to climate change adaptation-while supporting the management of current risks through transformative scenario planning.

[lvii] This responds to review question (a): "Was the project engaged with the **right mix of stakeholders** at different levels"?

[lviii] These include: Suchil Bajpai, Arjuna Srinidhi and Mihir Mathur.

[lix] Co-drive Community Driven Vulnerability Evaluation handbook

[lx] Co-drive Livelihoods Assessment tool

[lxi] Co-drive Visual Integrator for Climate Change Adaptation in India handbook

[lxii] Zade D *et.al.* (2014) *op.cit.*

[lxiii] The following review questions are relevant to this section of the report (bold sections in the original): **(c) assessment of the overall achievements (accountability aspects) in terms of outreach, viability and sustainability of outcomes and impact, at the level of target groups, beneficiaries and stakeholders institutions, keeping in view aspects of equity**; (h) relevance and effectiveness of the **monitoring instruments used at different levels,** especially in integrating key principles of **results based management, change management and learning and flexibility**; and (i) effectiveness and efficiency of the **backstopping arrangements** provided and their uptake.

[lxiv] Here the relevant review question is (bold section in the original): (b) relevance and effectiveness of the **conceptual frameworks, strategies and approaches** followed under the project in promoting adaptive capacities and adaptation actions;

[lxv] About INR 20-30 lakhs each year

[lxvi] 'Initial starting conditions' and 'pathway dependency' are both concepts of concern to systems theorists and practitioners (e.g. Ison *et al.,* 2011). In complex systems the sensitivity to initial starting conditions of unfolding dynamics is now well known (Chapman, 2002).

[lxvii] CDE (2009)

[lxviii] The reporting format and schedule were different for SDC and NABARD. While all three organizations met twice a year to jointly review broader common outcomes of the project during the steering committee meetings, inputs from NABARD during these meetings were relatively light touch.

[lxix] GoI (2008) *op.cit.*

[lxx] SDC (2010) page 5.

[lxxi] SDC (2010) *op.cit.,* page 4.

[lxxii] As stated in the SDC webpage: "In 2008-09, SDCs programme in India was reviewed and reoriented to address issues of common interests in the area of Climate Change namely, climate change adaptation, climate resilient development, energy efficiency and renewables" (http://www.swiss-cooperation.admin.ch/india/en/Home/SDC_In_India/History:). The Embassy of India noted: "During the course of 2008, India and Switzerland celebrated the 60th anniversary of the signing of the Friendship Treaty, an important milestone in the annals of Indo-Swiss bilateral relations. In recognition of the growth of multi-faceted bilateral relationship over six decades and to outline the future areas of mutual interest and cooperation, India and Switzerland have decided to elevate the bilateral relationship to a new and higher level by agreeing *to establish a Privileged Partnership between them*" (http://www.indembassybern.ch/eoi.php?id=India-Switzerland).

[lxxiii] *Source:* Interview with Othmar Schwank, 4th June 2014

[lxxiv] Email from Marcella D'Souza to John Colvin, June 2014

[lxxv] For example, the role played by Meteodat and INFRAS in providing support to improve the functioning of the Agro-met system

[lxxvi] 3_March, 2013_follow up actions_WOTR comments

[lxxvii] WOTR (2008)

[lxxviii] WOTR (2009a)

[lxxix] WOTR (2009b)

[lxxx] 'Sensing' is a term frequently used by WOTR. It refers to an individual or collective practice of reflection, in which the focus is not only on what has been happening, but also on what may be emerging. It would appear to have close resonance with the 'U-process' described by Scharmer (2008) and with 'anticipatory learning' described by Tschakert & Dietrich (2010).

[lxxxi] Mathur M, D'Cruz M (2014)

[lxxxii] See for example, Hall *et al.* (2006); World Bank (2012); Nederlof & Pyburn (2012); KIT (2014)

[lxxxiii] Interview with CCD/SDC, 13th March 2014.

[lxxxiv] Sen A (2005)

[lxxxv] Zade *et al.* (2014) *op.cit.*

[lxxxvi] Patton, MQ (2011)

[lxxxvii] Earl S *et al.* (2001)

[lxxxviii] Van Mierlo B *et al.* (2010)

[lxxxix] See http://www.kit.nl/kit/Monitoring-ampamp-evaluation-for-learning-in-rural-innovation-systems?tab=2

[xc] Earle, L (2002)

[xci] Gasper D (1997), page 2

[xcii] Uphoff N (1992)

[xciii] Suchman (1967) in IDRC (2001)

[xciv] WOTR (2009b)

[xcv] http://www.sdc.admin.ch/en/Home/Effectiveness/Measuring_results. *See also:* SDC (2009); dlgn (2012).

[xcvi] WOTR (2013)

[xcvii] Email communication from Arjuna Srinidhi, 2nd April 2014:

"When the first phase of the project (Sangamner/Akole) was sanctioned in 2009, there was a single logframe (**LFA)** to give us direction. In the subsequent 18 to 24 months, an **OMS** (Outcome Monitoring Summary) was

prescribed by SDC and project back-stopper which broke down targets into a little more detail. In some cases the OMS had targets like "40% of households will participate in AE programmes" etc., although there was no mention of such specific numbers/targets in the LFA.

When the work in the Extension areas (MP, AP and Aurangabad) began in 2012, there was a **revised LFA** in which some of the targets were revised, but wording and targets for some other sections of the LFA were left unchanged. However, there was ***no*** change to the OMS. In cases where targets expressed as a % had been set, it was difficult to see how it would apply in the Extension areas as the intensity of work and number of activities being implemented was much less. In cases where the targets are mentioned as a straightforward number, we were going to exceed those figures significantly due to the increased number of villages.

We brought up the matter of the lack of clarity in reporting structure and targets, even suggesting a revised OMS during a couple of the Steering Committee meetings, most recently in the Sept 2013 steering committee meeting. We specifically asked if the OMS could be altered, but were told that it is won't be necessary/ practical at this stage of project. We were told that the frame of reference for monitoring and evaluation will the **revised LFA** agreed in 2011. And since the **revised LFA** does not spell out all targets explicitly, it was discussed that the **revised LFA** would be supplemented with appropriate information, updates, justification for the same etc. [Ref BTO KGJ VISKR and CHASU_Oct 13, page 6, point g)]."

[xcviii] Interview with CCD/SDC, 13th March 2014.

[xcix] Minutes of the CCA Project Inception Workshop, 6th August, 2009, page 4

[c] Minutes of the CCA Project Inception Workshop, 6th August, 2009, page 7

[ci] SDC (2009a) *op.cit.*, Section 7

[cii] Arjuna Srinidhi, personal communication, 12th March

[ciii] Mihir Mathur (Manager – Energy and Knowledge Management, WOTR), personal communication, 8th March 2014

[civ] Colvin J (2014)

[cv] Roth G, Bradbury H (2008); WWF (2013)

[cvi] Gearty M, *et al.* (2013)

[cvii] See for example Ison (2010), chapter 10 (s10.4.1)

[cviii] See for example the Community of Evaluators (CoE), a platform that facilitates knowledge exchange between parties interested in evaluation in the South Asian region (http://communityofevaluators.org/).

[cix] Australian Public Service Commission (2007); FitzGibbon and Mensah (2012); Harvey B, *et al.* (2013).

[cx] See for example: Leach M, *et al.* (2010); O'Brien K (2013).

[cxi] This responds to review question (k) set out in the TOR: "Extent to which **innovations in climate adaptation** and climate resilient development were effectively addressed under the project and with what results".

[cxii] See e.g., Ison (2008); Colvin *et al.* (2014a).

[cxiii] See e.g. Hall *et al.* (2003); Morriss *et al.* (2006); Hall *et al.* (2006); World Bank (2012).

[cxiv] Rip and Kemp (1998)

[cxv] See e.g. Geels and Schot (2007)

[cxvi] Geels (2002)

[cxvii] Roep & Wiskerke (2004); Hoogma *et al.* (2002).

[cxviii] Geels (2002) *op.cit.*

[cxix] But see Li *et al.* (2012)

[cxx] See for example, Colvin & Abidi-Habib (2013); Colvin *et al.* (2014b); Siebentritt *et al.* (2014).

[cxxi] Klerkx *et al.* (2010)

[cxxii] Li *et al.* (2012) *op.cit.,* p.218

[cxxiii] UNFCCC (2011)

[cxxiv] *Source:* WRI (2012)

[cxxv] Interview with Yuka Greiler, 28th May 2014

[cxxvi] Bond (2012)

[cxxvii] WOTR (2008) page 53

[cxxviii] *Source:* WOTR (2013) page 11.

[cxxix] *Source:* WOTR (2014a)

[cxxx] *Source:* WOTR (2013) *op.cit.*, page 11.

[cxxxi] *Source:* WOTR (2013) *op.cit.*, page 7.

[cxxxii] *Source:* WOTR (2013) *op.cit.*, page 7.

[cxxxiii] *Source:* WOTR (2013) *op.cit.*, page 7

[cxxxiv] See newspaper article in Annex 27: "Hailstorm in MP a national calamity: Chouhan", the Times of India, Bhopal, Saturday, March 1, 2014. Besides anti-hail guns, it seems that there is little way to prevent standing crop damage from hailstorm and that insurance is the most widespread coping mechanism. Following the crop damage in March, WOTR has been involved in supporting the assessment of this damage to help farmers' claim government compensation.

[cxxxv] This activity was funded by NABARD

[cxxxvi] *Source:* WOTR (2014a) *op.cit.*

[cxxxvii] KR Viswanathan, personal communication, April 2014

[cxxxviii] Interview with Dr VP Singh, Regional Representative for South Asia, ICRAF, 27th February 2014.

[cxxxix] Funded by NABARD only.

[cxl] *Source:* WOTR (2013) *op.cit.*, page 10.

[cxli] *Source:* WOTR (2014) *op.cit.*

[cxlii] *Source:* WOTR (2014) *op.cit.*

[cxliii] (http://www.siasat.com/english/news/unseasonal-rains-hailstorms-damage-crops-many-states, accessed 13 March, 2014).

[cxliv] *Source:* WOTR (2014) *op.cit.*

[cxlv] *Source:* WOTR (2013) *op.cit.*, page 15.

[cxlvi] WOTR (2014) *Report to SDC on activity 2.3.1: Livestock development and Climate change.* Pune: WOTR.

[cxlvii] *Source:* WOTR (2014) *op.cit.*

[cxlviii] *Source:* WOTR (2014) *op.cit.*

[cxlix] *Source:* WOTR (2014) *op.cit.*

[cl] Lobo C (2014) Personal communication. See also Zade D (2014).

[cli] Zade D (2014); Mathur M et.al. (2014b); D'Cruz M, *et.al.* (2014); Mathur M *et.al.* (2014a)

[clii] WOTR (2014b)

[cliii] Zade D (2014)

[cliv] http://trainings.wotr.org/?page_id=69 accessed on 08 March, 2014

[clv] There are three sets of activities that fall under output 2.4 (2.4.1 Implement Participatory Growth Monitoring and Nutrition for children in the 0-5 years age group; 2.4.4 Promotion of balanced diet from local food sources; 2.4.3 Implementation of Drudgery Reduction Initiatives (e.g. drinking water provisioning; energy efficient clean cooking devices, improved implements etc.); all were entirely funded by NABARD

[clvi] Activity 3.1.4 was jointly funded by SDC and NABARD. This activity falls under outcome 3 (local institutions have in place effective mechanisms to sustainably manage regenerated ecosystems); for this reason we have added the word 'institutional' in brackets.

[clvii] *Source:* WOTR (2013) *CCA Project – progress report, April – September 2013.* Pune: WOTR, page 15.

[clviii] Apart from activity 3.1.1, all activities under this outcome were either funded by SDC alone (activities 3.1.2; 3.1.3) or jointly by SDC and NABARD (activities 3.1.4; 3.2.1; 3.2.2; 3.3.1; 3.3.2)

[clix] Funded by NABARD only.

[clx] *Source:* WOTR (2013) *op.cit.*, page 15.

[clxi] The Samyukt Mahila Samiti (SMS) is an institutional policy tool initiated by WOTR to actively involve women in watershed development by providing them a space to mobilise and unite for rural development. The SMS is an apex body of women's SHGs, which generally consist of 15-20 women who come together to organise savings and credit activities. See e.g.

[clxii] DFID (2012)

[clxiii] DFID (2013)

[clxiv] Brouder A (2012)

[clxv] Brouder A (2012) *op.cit.*

[clxvi] Cocking J, Jennings S (2013)

[clxvii] Cocking J, Jennings S (2013) *op.cit.,* p.1

[clxviii] This project involved Oxfam GB, CARE, Save the Children, World Vision and ODI.

[clxix] Levine S, *et.al.* (2011)

[clxx] Colvin J, Lonsdale K (2012)

[clxxi] Interagency Resilience Working Group (IRWG) (2012)

[clxxii] Based in part on Figure 7 in McGray H *et al.,* (2007) *op.cit.,* section 3.

[clxxiii] GCAP (2014) Tom Downing, personal communication. The table is based on expert advice from Bruce Hewitson and there is a fiche on this approach in an old EC project that Annie Roncerel created.

[clxxiv] GCAP contribution to CRGE technical report, 2013

[clxxv] *Source:* Shaxson with Bielak *et al.,* (2012)

[clxxvi] Shaxson with Bielak *et al.,* (2012) *op.cit.*

[clxxvii] Newman K, et al. (2012)

[clxxviii] Newman K, et al. (2012) *op.cit.*

[clxxix] Kingdon J, Thurber J (2010)

[clxxx] *Source:* WOTR (2008) *op.cit.,* page 9

[clxxxi] Bours D *et.al.* (2014a)

[clxxxii] Pringle P (2011)

[clxxxiii] Brooks N *et al.* (2011)

[clxxxiv] Hedger MM *et al.* (2008)

[clxxxv] Bours D *et al.* (2014b)

[clxxxvi] ESPA (2012)

[clxxxvii] Bajpai, S (2013)

[clxxxviii] Bajpai, S (2013) *op.cit.*

[clxxxix] WOTR (2011)

[cxc] *Source:* Hall *et al.* (2006)

[cxci] *Source:* Geels & Schott (2007)