FINAL EXTERNAL REVIEW

PROGRAMA DE ADAPTACION AL CAMBIO CLIMATICO PACC 2

FINAL REPORT

FEBRUARY,2017

Josefa Rojas Pérez, ACC specialist
Philip Boyle, M&E specialist
Marco Ruiz Serkovich, ACC negotiations specialist
Manuela Zurita, journalist
Augusto Cavassa, Economist, contributed to the Net Present Value analysis

With the support of Jahir Anicama, M.Sc. Governance of Risks and Resources and Cecilia Sueiro, Anthropologist &

ACRONYMS

AC	Adaptation Committee
ACC	Adaptation to Climate Change
ACCA	Asociación para la Conservación de la Cuenca Amazónica
AGRORURAL	Programa de Desarrollo Productivo Agrario Rural (of MINAGRI)
ANA-UGRH	Autoridad Nacional del Agua- Unidad de Glaciología y Recursos Hídricos
APA	AD Hoc Special Working Group on the Paris Agreement
CAF	Cancun Adaptation Framework
CAR	Comisión Ambiental Regional (Apurimac)
CDM	Clean Development Mecanism
CEPLAN	Centro de Planeamiento Nacional Estratégico
CHF	Swiss francs
CICCA	Centro de Investigación y Capacitación Campesina
CMA	Meeting of the Parties to the Paris Agreement
CONCYTEC	Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica
COP	Conference of Parties (to the UNFCCC)
CPGA	Centros Provinciales de Gestión Agroindustria
CORCYTEC	Consejo Regional de Ciencia y Tecnología
CORFO	Corporación de Fomento -Chile
CORECC	Consejo Regional de Cambio Climático (Cusco)
CRIAR	Creación de Iniciativas Agroalimentarias Rurales (CRIAR)
DAC	Development Assistance Committee
DGCCDRH	Dirección General del Cambio Climático, Desertificación, y Recursos Hídricos
DGDB	Dirección General para la Diversidad Biológica
DGEVFPN	Dirección General de Evaluación, Valoración y Financiamiento del Patrimonio Natural
ERFCC	Estrategia Regional Frente al Cambio Climático
FAO	Food and Agricultural Organization (UN)
FMRA	Fondo de Mitigación de Riesgo Agrícola
FONCODES	Fondo Nacional de Cooperación para el Desarrollo Económico y Social
GCF	Green Climate Fund
GEF	Global Environment Facility
GIGA	Grupo Impulsor de la Gobernabilidad de Apurimac
GID	Grupo Impulsor de la Descentralización
GIRA	Gestión Integrada de Riesgos Agrícolas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GPCC	Global Project for Climate Change (SDC)
GRADE	Grupo de Análisis para el Desarrollo
Helvetas	Helvetas Swiss Intercooperation
IGP	Instituto Geofísico del Perú

INAIGEM	Instituto Nacional de Investigación en Glaciares y Ecosistemas de Montaña
INIA	Instituto Nacional de Investigación Agraria
INDC	Intended Nationally Determined Contribution
INDAP	Instituto Nacional de Desarrollo Agropecuario -Chile
IPACC	Inversión Pública en Adaptación al Cambio Climático
LEG	Least Developed Countries Expert Group
M&E	Monitoring and Evaluation
MCLCP	Mesa de Concertación de Lucha contra la Pobreza
MEF	Ministerio de Economía y Finanzas
MIDIS	Ministerio de Desarrollo e Inclusión Social
MINAGRI	Ministerio de Agricultura y Riego
MINAM	Ministerio del Ambiente
NAP	National Adaptation Plan
NDA	National Designated Authority
NDC	Nationally Determined Contribution
NE	Núcleo Ejecutor
NEC	Núcleo Ejecutor Central
NGO	Non-governmental Organization
NWP	Nairobi Work Programme
OECD	Organization for Economic Cooperation and Development
OPI	Oficina de Programación e Inversiones
PACC	Programa de Adaptación al Cambio Climático
PCCB	Paris Committee on Capacity Building
PDLC	Plan de Desarrollo Local Concertado
PDTI	Programa de Desarrollo Territorial Indígena -Chile
PEDRR	The Partnership for Environment and Disaster Risk Reduction
PEI	Plan Estratégico Institucional
PIP	Proyecto de Inversion Pública
PNACC	Plan Nacional de Adaptación al Cambio Climático- Colombia
POI	Plan Operativo Institucional
PREDES	Centro de Estudios y Prevención de Desastres
PUCP	Pontificia Universidad Católica del Perú
PROSUCO	Asociación Promoción de la Sustentabilidad y Conocimientos Compartidos
PRODESAL	Programa de Desarrollo Local - Chile
ProDoc	Project document
PROFIN	Fundación para el Desarrollo Productivo y Financiero
RENAMU	Registro Nacional de Municipalidades
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCF	Standing Committee on Finance

SCCF	Special Climate Change Fund
SDC	Swiss Development Cooperation
SENAMHI	Servicio Nacional de Meteorología e Hidrología
SIDT	Small Islands Development States
SNIP	Sistema Nacional de Planificación
TA	Technical assistance
TSA	Territorial Situational Analysis
UNAPA	Unión de Asociaciones Productivas del Altiplano
UNALM	Universidad Nacional Agraria de La Molina
UNAMBA	Universidad Nacional Manuela Bastidas de Abancay
UNFCCC	United Nations Framework Convention on Climate Change
UNSAAC	Universidad Nacional Antonio Abad de Cusco
UMATA	Unidades Municipales de Asistencia Técnica Agrícola- Colombia
UORCC	Unidad Operativa Regional de Cambio Climático
WRI	World Resources Institute

TABLE OF CONTENTS

Executive Summary

The Swiss Agency for Development and Cooperation (SDC)'s Global Program on Climate Change (GPCC) focuses its work on the key global issue of climate change, representing a major challenge for achieving sustainable development and human wellbeing. SDC is in the position of benefitting from longstanding experience in development cooperation – including in the Andean region. Under its adaptation component, GPCC contributes to enhancing the resilience of livelihoods and ecosystems to expected changes, in order to alleviate current and future climate change impacts and contribute to poverty reduction.

In February 2009, SDC/GPCC – in partnership with the Peruvian Government – launched the Climate Change Adaptation Program (PACC) in Peru with geographic focus on the Peruvian Andes (Cusco and Apurímac regions). At that time, it was one of the first long-term endeavours with a primary focus on adaptation that Switzerland had launched in the framework of its international cooperation efforts. From a local grass-root pilot initiative, PACC successfully reached out to the regional and national level and was able to make a meaningful contribution to shaping the Peruvian adaptation policies in place today. Its second and last operational phase will come to an end in March 2017.

The PACC 2 specific objective is**: "**Vulnerable rural populations in the high Andes of Apurímac and Cusco increase their adaptive capacity to the principal challenges of climate change, reducing the impacts on their means of livelihood through efficient actions carried out by public and private actors." There are four major program effects leading to the specific objective focused on: regional and local governmental implementation of strategies of adaptation to climate change; strengthening of adaptive responses in Andean populations; regional university research and training in climate change; and scaling up adaptive responses and experiences through national public policies and mechanisms. The scaling up of experiences and lessons learned from PACC 1 was the principal mandate under PACC 2

A four-person final revision team collected information on the content and performance of PACC 2 covering the full period from inception in May 2013 to close to program end in December 2016. Data were collected through document review, personal interviews, focus groups, and three mini-surveys. The team went to field offices and implementation sites in Cusco and Apurímac regions. Interviews were also held with persons outside of Peru to explore PACC 2 replicability and scaling opportunities.

Part I of this documents deals with the results of the PACC 2 final review. Part II presents a review of experiences in climate change adaptation to appreciate differences and similarities with the PACC 2 model and themes with the aim to draw a prospective for a regional program. Part III deals with the challenges and opportunities that Andean countries face under the UNFCCC.

EVALUATION RESULTS

RELEVANCE

PACC has made an important contribution to the consolidation of the national agenda in climate change led by MINAM following the COP 20 and the signing of the Paris Accord. During the COP 20 and acting as host country, Peru was able to demonstrate its advances in adaptation through the Water and Mountain Pavilion in which adaptation advances throughout the country were presented.

PACC also made a contribution to various national policy instruments such as the National Contributions, which include a chapter on adaptation, and the updating of the National Strategy on Climate Change. Likewise, Cusco and Apurímac were models to follow for the remaining regions, which were engaged in formulating their own regional climate change strategies.

PACC 2 was also relevant to advancing initiatives to increase public investment in ecosystemic services and biological diversity promoted by MINAM along with MEF. This also will contribute to Peru's capacity to leverage funds from other international finance mechanisms such as the Green Climate Fund that requires that developing countries exercise ownership by integrating funding into their own national plans.

The various activities, products, effects, and specific objective are all consistent with rural development policies as exemplified by the partnership with the Haku Wiñay project of FONCODES. This project is an example of a successful program of direct transfer of knowledge to poor agricultural families which operates alongside another rural anti-poverty program of the same ministry (MIDIS). These are also consistent with the directions and indicators of the SDC Global Program in Climate Change. The results chain and goals were consistent with global, national and subnational rural development objectives

The PACC 2 M&E Plan has been relevant and effective in support of the operational products and activities but underdeveloped to support evidence at the effect and impact levels. It could have been simplified and prioritized somewhat in terms of indicators, some of which are not relevant. Some of the important products could have been raised to a higher level of intermediate result with effects becoming strategic objectives. This would have reduced the number of output (product) indicators and left description of their attainment to the text of annual reports.

EFFECTIVENESS

The various results reported for indicators in the final M&E report indicate a level of overall accomplishment of indicators of program effects and products, including full and partial achievement, at nearly 92%. The average level of accomplishment varies by program effect, some products containing different numbers of indicators, and some product-level indicators contain multiple parts. The following calculation of level of achievement is totally based on the indicators selected by PACC 2 for its monitoring plan and does not weight them by importance or strategic role in program success. Nevertheless, it is useful to see to what degree these indicator targets were achieved. Effect and product indicator accomplishments summing partial and full accomplishments are:

- ★ 100% achievement of indicators under Effect 2 (10 indicators)
- ★ 94.4% achieved under Effect 4 (9 indicators)
- ★ 92.2% achieved under Effect 3 (16 indicators)
- ★ 85.8% achieved under Effect 1 (18 indicators)
- ★ 43 of 53 effect and product indicator objectives overall (81.1%) were fully achieved (excluding

the 4 impact indicators)

The evaluation team had difficulty measuring the effects and the impacts of PACC 2 due to the fact that it did not have access to information collected in a systematic manner. The six independent studies related to impact were not sufficiently integrated and coherent to be used by the evaluators. One on impact indicator 4 had not yet been finalized.

Value appraisals of the effectiveness of the four PACC 2 effects are mixed, running from moderately satisfactory to highly satisfactory. The working models which functioned with success were the following:

The first successful model of PACC 2 has been the strengthening of institutional mechanisms in climate change in both Cusco and Apurímac. The success of this model was anchored in PACC Phase 1 and in working with MINAM to improve climate change management by implementing and monitoring its regional strategies. The institutions that make up CORECC and CAR are actively involved in ensuring that public and private rural development projects include technologies and adaptive practices for high Andean communities. In the long run this will influence the growth of investments with a focus on climate change.

The second successful model is the work with FONCODES-HW, which was also key to the subsequent collaboration with MINAGRI in the Program of Sowing and Harvesting Water. In this model, three key factors came together: (a) the experience in Phase 1 that consolidated learning in various documents; (b) the leadership and political commitment of high-level officials of both organizations and (c) the opportunity provided by the occurrence of the El NIÑO phenomenon on the Peruvian coast and announced in mid-July 2016. In like manner to the first model, the contribution of PACC 2 was focused on its methodological skills for documenting experiences and scaling up which is necessary for political advocacy.

The third successful model has been the PACC contribution to the creation of the Master in Climate Change and Sustainable Development in UNSAAC. This is an excellent case of the role of facilitation, based also in the experience of the diplomate in climate change in Phase 1 realized with the support of the Swiss Scientific Entities (SSEs). In this model, support was given to the responsible actor (the university) to gain access to experts located normally outside the region but which were necessary to provide quality to the coursework. The master's program today is self-sustaining, and the university has succeeded in retaining the group of professors that began it.

The fourth successful model is the contribution of the SSEs that was instrumental in the work of capacity building in research of professors and other teaching staff. It would be appropriate to state that the SSEs can continue to realize the work they have undertaken in Product 3.2 without the support of PACC 2. This model is successful in part due to the high degree of research experience in climate change that the SSEs bring and which the national universities find attractive.

The following models require greater refinement and improvement:

The work with MEF and CEPLAN has remained at the level of planning and methodologies and whose final outcomes do not depend on PACC 2, since they require greater leadership from the lead agency (MINAM) for approval of these methodologies.

The work with CORCYTEC in the preparation of regional research agendas did not attain its objective of linking the university with the other relevant actors, due in part to the organizational culture of Peruvian national universities and in part to the implementation of the New University Law.

EFFICIENCY

Institutional efficiency ratios measure how effectively the organization uses its resources per unit of investment. The lower the ratio the better, and 50% is generally regarded as the maximum optimal ratio. PACC 2 efficiency is 0.52, higher than PACC I (0.45) and higher than projects in ACC in Cuatro Cuencas (0.34) and PRODATU (0.29).

Implementation structure is basically in accord with the facilitation role of PACC 2: establish relationships with allies and offer technical assistance directly or through consultants and training in fluid coordination with the national director in Lima for advocacy actions.

In accordance with the responsibilities assigned to each partner of the implementing consortium, the highest level of effort under PACC 2 was by Helvetas with 68%, followed at some distance by PREDES at 15% which together with the SSEs at 12% shared responsibility for work with the universities and collaborated also under Effect 4, especially during COP 20 and events of InterClima. Libélula provided some 6% of total PACC 2 effort, contributing to Effect 4 through advisory services to the MINAM negotiating team and support to the M&E plan in conjunction with Helvetas, as well as conducting a study of value added by PACC to the FONCODES Haku Wiñay project.

It can be reported that insufficient attention was given to three themes: (i) monitoring of effects and impacts; (ii) a strategy for working with the private sector and (iii) incorporation of a focus on gender. Moreover, there was an absence of synergy in the work under Effect 3, especially in the involvement of the SSEs in the work of the regional research agendas.

IMPACT

Beyond the 1,294 families directly benefitting in the pilot areas and the 3,264 direct beneficiaries of nearby zones, the global impact of PACC 2 can be found in approximately 70,000 high Andean rural families of Cusco and Apurímac that have adopted and benefitted from appropriate technologies for confronting climate change. Benefits can be appreciated in the improvement of income through new activities on agricultural parcels, increased access to water in dry periods by means of qochas, improvement of pastures, and increased access to vegetable production through family gardens. Farmer capacities have been strengthened in irrigation management, preparation of organic fertilizers, and management of plant and animal diseases. The adoption of these technologies has been brought about through combined public and private actions (CORECC and CAR), of public investment projects, and NGO programs that have included these technologies in their portfolios. In addition, over 2,000 public and private officials have received training in the incorporation of risk management and adaptation to climate change in public investment, and university students, professors, and researchers

have become aware of climate change and its impacts by participating in courses, seminars, workshops, and meetings.

There is evidence from the field that the use of improved productive technologies has great impact on women`s lives. Women are at the nexus of several productive technologies in and around the family homestead and their roles become key to longer term capacity building.

PACC NET PRESENT VALUE (NET PRESENT WORTH)

The final revision team carried out a calculation of net present value created by PACC 2 and by its allies in CORECC and CAR, including PIPs, NGO activities, and the Haku Winay project, involving a total population of 73,234 families in 115 districts of Cusco and Apurímac.[1]

PACC 2 and its allies – NGOs and regional governments of Cusco and Apurímac – have produced a Net Present Value of US$ 29.7 million calculated for a total of 73,234 rural Andean families in 115 districts. The internal rate of return (IRR) over 10 years is 29%. This shows that the overall social investment of the set of interventions promoted by PACC and imitated by its partners to improve production activities with attention to ACC has achieved a return acceptable to the market.

SUSTAINABILITY

At the institutional level, it is clear that the political and institutional sustainability of PACC 2 achievements are based in UNSAAC and in the public and private institutions participating in CORECC and CAR and their activities at the local level. The CORECC in Cusco has maintained active participation of some 36 of 60 organizations in activities related to the Regional Strategy for Climate Change. Some organizations such as Arariwa and ACCA (Asociación para la Conservación de la Cuenca Amazónica) are picking up activities that PACC carried out as part of its capacity building role. The organizations that compose the CAR in Apurimac, such as CESAL and CICCA, also have solid commitments to sustaining the implementation activities of the Regional Strategy in Climate Change.

There is also evidence from the CORECC first report (October 2016) that new projects related to water management for Andean communities have been approved and are heading to implementation. It reports that a number of small producer associations with new productive technologies and economic activities have exceeded the original target by 164%. The report also considers that nine municipalities have included climate change in their planning process, and there has been a 42% increase in the number of projects related to ecosystem recuperation.

The technologies promoted by PACC are of low cost to families which facilitates their acceptance. It is expected that families with support from local governments can maintain and improve their technologies. Smaller public investment projects (PIPs) are clearly the most effective way to maintain the financial sustainability of the technologies promoted by PACC and Haku Wiñay.

[1] The definition of the steams of incremental income took as reference point the logic proposed in the document "Análisis Costo Beneficio de Medidas de Adaptación al Cambio Climático en el Sector Agrícola", in a policy matrix for the Programa PE-L1127: Programa de Apoyo a la Agenda de Cambio Climático. (Prepared for the IDB by Joanna Kamiche Zegarra. July 2013.

With respect to the 13 projects formulated during the MEF Course in PIP development, these are all awaiting opportunities to be funded. On the other hand, if MINAM keeps pushing for ecosystemic PIPs over the long term, it is possible that investment in this type of projects will increase.

PACC 2 – SYSTEMIC APPROACH & FACILITATION ROLE

The five successful models are consistent with the focus on **systemic change** applied by PACC 2 during its design and made explicit in the ProDoc. The support functions assigned to its **facilitator role** have functioned adequately for four successful models. The previous experience in Phase 1 has been key to **scaling up to the level of public policies**. In this fifth model, generation of evidence and methodological capacities have been key to capitalizing experiences of other contexts that provided sufficient validity to support a national-level program.

The facilitator role requires a group of methodological skills to capitalize knowledge and channel it to different audiences (academics, policy makers, communication media, etc.). Enabling conditions were found in the program environment that supported implementation of PACC 2. In point of fact, the COP 20 in Peru in 2014 and the El Nino phenomenon in 2016 favored PACC 2 work, especially in order for regional and local governments to prioritized prevention actions and identify PACC as the ideal ally for such work.

Also important were political will and leadership with capacity to influence within the public sector. Behind the successful experiences with FONCODES-HW, MINAGRI, and CORECC have been leaders that opened the way for PACC's work and have supported it in a sustained manner.

Science, Knowledge Generation, and Exchange

Science, knowledge generation, and exchange in relation to climate change have taken various forms and were extensive during PACC 2 implementation. PACC 2 has produced a great number of good quality documents, especially regarding the promotion of improved Andean technologies in the face of climate change risks, from its own experience and from that of other organizations. Some 15 experiences nationwide were identified and examined inn Water Sowing and Harvesting with MINAGRI.

Other forms involve formal scientific research; peer-reviewed scientific articles; and knowledge exchange among researchers within the UNSAAC and the SSE. Further sources of knowledge have been produced in the courses on PIPs carried out by MEF and the local planning process carried out by CEPLAN.

There is also institutional knowledge generation from within Cusco and Apurimac regional governments. CORECC is now actively monitoring 22 indicators in 15 implementation strategies which will produce evidence of how local and regional governments advance their CC strategies and how they relate to national indicators collected by MINAM.

One of the issues that PACC 2 did not address is the high disparity and lack of connection of information between regional governments, universities and NGOs (bridging dialogue between science policy and practice).

APPRAISAL OF THE PROGRAM ACCORDING TO OECD CRITERIA

Highly satisfactory	**RELEVANCE**
	EFFECTIVENESS EFFECT 1
Satisfactory	(a) support to the consolidation of regional institutional mechanisms linked to the management of climate change in Cusco and Apurimac;
Moderately Satisfactory	(b) strengthening of capacities in the formulation of public investment projects incorporating climate change criteria in collaboration with MEF;
Satisfactory	(c) local development planning at the district level linked to the regional level including cross-cutting attention to climate change and under the framework of CEPLAN guidelines
Moderately Satisfactory	(d) creation of a mechanism of citizen oversight that maintains a watch over the degree to which adaptation to climate change remains active in the policy agenda of authorities
	EFFECTIVENESS EFFECT 2
Satisfactory	*Product 2. 1: Optimized proposal with replication potential that capitalizes on the PACC experience and of other actors.*
Highly satisfactory	Product 2.2 Adaptive responses incorporated into the FONCODES intervention generate additional impact
Satisfactory	Product 2.3: Mechanism of knowledge management of methods and Andean adaptive technologies. National Environmental Prize and publication of a book entitled "Lecciones de la Tierra" in 2015
Highly satisfactory	Product 2.4: Solid evidence consolidated on cause-effect and cost-benefit of innovative adaptive responses. Studies in Mollebamba and Huacrahuacho and of value added in FONCODES - HW
	EFFECTIVENESS EFFECT 3
Moderately satisfactory	Product 3.1: Regional coordinated research agendas in climate change
Highly satisfactory	Product 3.2: Strengthened research capacity in climate change of professors and researchers
Moderately satisfactory	Product 3.3: Normative changes dynamize the use of the Canon in research
Moderately satisfactory	Product 3.4: Supply of Training at the undergraduate and graduate levels
Moderately satisfactory	3.4.1 Support to thesis to undergraduates
Moderately satisfactory	3.4.2 Include CC in Syllabus
Highly satisfactory	3.4.3 Master in CC & SD
	EFFECTIVENESS EFFECT 4
Moderately Satisfactory	Product 4.1: Public rural development policies incorporate adaptation to climate change based on evidence
	Product 4.2: Existing Public Mechanisms Scale Up Rural Adaptive Responses
Highly satisfactory	4.2.1 Work with MINAGRI -

Satisfactory	4.2.2 Work with FONCODES - HW
Satisfactory	4.2.3 Work with CEPLAN
Satisfactory	4.2.4 Work with MEF
Satisfactory	4.2.5 Work with MINAM- NAP
Satisfactory	Product 4.3: Mechanisms of national- regional dialogue formulated in the face of climate change. (InterClima)
Satisfactory	Product 4.4: Needs and adaptive responses in high Andean rural populations are made visible in global dialogue
	EFFICCIENCY
Moderately Satisfactory	Institutional efficiency ratio: 0.52.
Satisfactory	**IMPACT**
	SUSTAINABILITY
Highly satisfactory	Political & Institutional
Satisfactory	Social (support & acceptance & commitment
Satisfactory	Financial

PART I: PACC 2- External Final Review

1.-BACKGROUND

1.1 PACC 2 profile

Overall Goal:	Contribute to the consolidation of the livelihood base and reduce vulnerability to climate change in the population characterized by medium and high poverty in rural high Andean zones.
Specific Objective:	Vulnerable rural populations in the high Andes of Apurimac and Cusco increase their adaptive capacity to the principal challenges of climate change, reducing the impacts on their means of livelihood through effective actions carried out by public and private actors.
Effect 1:	Regional and local governments implement in an articulated and effective manner strategies of adaptation to climate change
Effect 2:	Rural high Andean populations strengthen adaptive responses and provide useful evidence for public policy.
Effect 3	Universities generate research and train professionals in accord with regional demand for management of adaptation to climate change.
Effect 4	National governmental entities scale up adaptive responses through public policies based on evidence and make contributions to global dialogue.
Program Governance	Board of Directors: With vote: MINAM, APCI, COSUDE, FONCODES/MIDIS, Apurímac regional government, Cusco regional government, UNSACC, UNAMBA. With voice: Helvetas Swiss Intercooperation (representing the facilitating advisory consortium), Nacional Coordinator for PACC.
Implementing Consortium	Made up of Helvetas Swiss Intercooperation (leader of the consortium), Libélula Cambio Climático y Comunicación, y el Centro de Estudios y Prevención de Desastres (PREDES).
Swiss Scientific Consortium	Made up of University de Zürich (UZH) with coordinator role, la Universidad de Geneva (UGE), WSL, Agroscope, and Meteodat.
Time Frame	May 2013 – December 2016
Budget	**CHF 4´349,082** (US$ 4,433,716.6)

1.2 Accomplishments of PACC Phase 1

The current Program for Adaptation to Climate Change (PACC 2) is a follow-on phase to a Phase 1 program implemented between 2009 and 2012. According to the Phase 1 final report and summarized in the Phase 2 project document (ProDoc, pp.14-15), the impact of the first phase was:

More than 1,200 families strengthened and with improved practices relating to their adaptation to climate change. 745 families in the micro-watershed of Huacrahuacho (Cusco region) participated in competitions related to practices in adaptation to climate change (57% of the total of inhabitants in the watershed). 463 families in a similar micro-watershed in Mollebamba (Apurimac region) participated in competitions (86% of all families). Some 46% of participants in trainings and internships involved in farmer contests were women.

(1) 14 of a total of 21 communities (16 in Huacrahuacho and 5 in Mollebamba) drew up community agreements to implement collectively one or more of five selected adaptation measures. 89% of the communities carried out at least one of these adaptation practices.
(2) More than 1,000 professionals and technicians of local, regional, and national institutions, as well as community leaders, strengthened knowledge, methods, and use of tools for the management of adaptation to climate change through 31 courses, workshops, seminars, diploma courses, and leadership trainings. Some 30% of professionals and technicians and 32% of community leaders were women.
(3) 3 local governments (2 in Cusco region and 1 in Apurimac) developed local adaptation strategies with gender equity and investment projects with components of adaptation to climate change.
(4) 2 regional governments (Cusco and Apurimac) have approved regional strategies of adaptation to climate change whose formulation mobilized regional technical groups in climate change and participation of a considerable number of actors (714 from 15 institutions in Cusco and 280 from 17 institutions in Apurimac). In addition, the regions formed Regional Operational Units in Climate Change that work to insert regional policy in climate change into regional public management and investment.
(5) In national public policy, PACC impact resulted from the positioning in national policy of knowledge generated through the experiences of regional and local actors involved in the program. This included: a national guide to formulation of regional strategies focused on climate change published in 2012 by MINAM; the Second National Communication on Climate Change that made reference to the experiences of regional and local actors involved in PACC; and the contribution in the preparation of the Peruvian delegation for COP 14 and COP 15.

1.3 PACC 2 STRATEGIC ORIENTATIONS (M4P)

Strategic orientations for PACC 2 come from the Making Markets Work for the Poor (M4P) approach[2], supported by donors such as the Department for International Development (DFID) and the Swiss Agency for Development and Cooperation (SDC). The central idea is that the poor are dependent on

[2] A Synthesis of the Making Markets Work for the Poor (M4P) Approach. Published by DFID and SDC. 2008. http://www.value-chains.org/dyn/bds/docs/681/Synthesis_2008.pdf

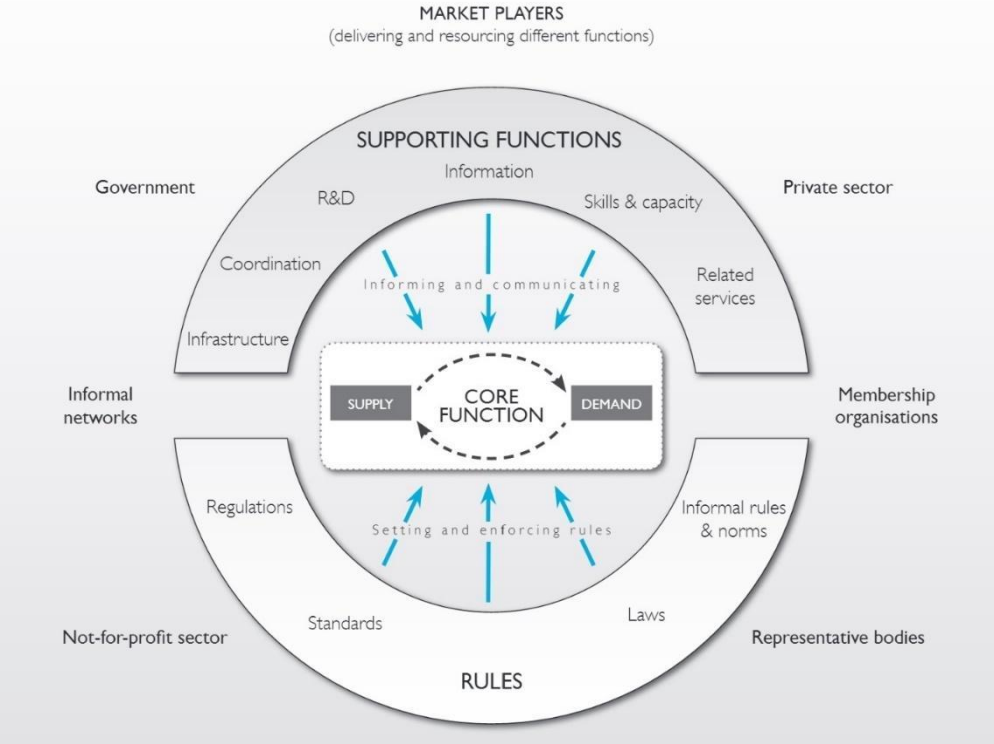
market systems for their livelihoods. Therefore, changing those market systems to work more effectively and sustainably for the poor will improve their livelihoods and consequently reduce poverty. More accessible and competitive markets enable poor people to find their own way out of poverty by providing more real choices and opportunities. M4P requires that organizations play a facilitating role outside of the market system to work with different players within the system, to make it work more effectively. Their essential role is active and catalytic, to enable others to do rather than do themselves, stimulating changes in a market system without becoming part of it. In practice, the facilitation role can involve many different tasks: strengthening supply-side capacity; introducing new ideas and innovations; enhancing networks and exchange; providing information; and increasing demand-side awareness.[3]

Accordingly, PACC 2 was designed to adopt a **role of facilitation and support** to permanent actors responsible for the provision of services and products required by the rural Andean population and assist them to deepen and scale up adaptive responses. In this way, the program was to limit its direct work with the rural Andean population, while strengthening the capacities of those supplying services and products directly to this population – particularly regional governments – using adaptation practices that provide value added to these interventions, strengthen their sustainability, and supply additional benefits to development (ProDoc, pp.55-56).

One of the facilitation roles for PACC 2 was **increasing and scaling up ACC** management capacity of public and private actors to respond to the major effects of climate change on the most vulnerable sectors (water and agriculture) of the high Andes. This involved deepening PACC regional actions to ensure sustainability of advances made in the regions of Cusco and Apurimac and promoting dialogue and advocacy to scale up small farmer adaptive practices based on evidence and linked to national and/or regional mechanisms that permit their replication and expansion.

To smooth the systemic approach a third strategic orientation in PACC 2 was scientific or critical **knowledge generation and exchange** in adaptation to climate change, especially attention to enabling conditions, dissemination of adaptive approaches, and appropriation by beneficiaries. Critical knowledge generation and exchange were meant to feed into **national and international public policies**. PACC would be enabled though its experiences to provide technical advice to policy designers and implementers. This policy advice would encourage incorporation of ACC into public rural development policies; strengthening the capacities of multi-level actors and dialogue mechanisms; and influencing and promoting lessons learned in adaptive responses of high Andean rural populations into global dialogue.

[3] Idem., p.32



M4P Synthesis Report, 2008. P. 36

1.4 PACC Theory of Change

The four PACC 2 components are each designed to address a distinct aspect of preparing Andean communities to deal effectively with greater climatic variability and unpredictable extremes. One of the four components focuses directly on the target population of rural subsistence farmers, whose increased capacity to adapt to climate change is the explicit objective of the program. Three other components deal with changes in regional governance, university research, and spread of adaptive strategies to reduce Andean communities to climate change. This would lead to increased public investment in adaptive strategies the lessons of which might be scaled up and out nationally.

1.5 PACC 2 Governance & Organization

PACC 2 is composed of an Oversight Committee (Comité Directivo), the Implementing Consortium, the Consortium of Swiss Scientific Entities (SSEs), and the Implementing Unit.

The Oversight Committee, the decision making and political and strategic body of PACC, is composed of representatives of MINAM, SDC, regional governments of Cusco and Apurímac, the UNSAAC and UNAMBA, the APCI, and FONCODES/MIDIS. In the last year it was foreseen that MINAGRI would become involved because of the progress realized in the formulation of the Program of Sowing and Harvesting Water. The Committee meets once a year and receives the implementation report from the

National Coordinator and approves the operational plan for the following year. In its strategic role, the Committee approves changes in the structure of the logical framework and project indicators.

The Swiss Scientific Entities (SSE) constitute a consortium under PACC 2 of five Swiss universities and institutes with the University of Zurich as coordinator. The other entities are the University of Geneva, WSL (Swiss Federal Institute for Forest, Snow and Landscape Research), Agroscope, and Meteodat. The roles of the consortium were defined from the beginning in the PACC 2 project document (ProDoc) as: scientific guidance to two applied research projects; and support to Peruvian researchers in spreading research results and in joining research networks under Effect 3 (ProDoc, pp. 59-60).[4] Information on the course of implementation is derived from the PACC M&E system, SSE annual reports, and an interview with the SSE representative in Peru.

The PACC 2 program team was charged with maintaining close coordination with the SSE through a member of PREDES. The relationship between the SSE consortium and the PACC implementing consortium led by Helvetas was defined in a Memorandum of Understanding, but both consortia signed separate agreements with SDC.

The Implementing Consortium, in its character of advisor and facilitator (backstopping), is composed of Helvetas as leader, Libélula, and PREDES. As a body, its role is to advise and support the National Coordination to ensure programmatic coherence and strategic vision. The consortium has its own operational budget for time dedicated to advising, in addition to a fund for consultancies in accord with responsibilities assigned under the project.

2. External final review

The external final review will evaluate the impact of the programme on the vulnerable rural highland population. It will critically assess the scaling up strategy of PACC applied during Phase 2, which involved a systemic approach to sustainability, science and knowledge generation, and policy advocacy. It will assess to what extent the planned objective/ outcomes/ outputs/ activities have been achieved, making reference to the results and resources framework, and is also charged with identifying factors that have hindered or fostered their achievement. The final review is therefore also aimed at communicating program lessons so that the legacies of PACC can be replicated beyond program lifetime.

2.1 External final review Methodology

This final external review seeks to evaluate the achievements and impact of PACC Phase 2 only. It began in early October 2016 and consisted of four principal team members: Josefa Rojas, team leader; Philip Boyle, M&E advisor; Marco Ruiz, ACC negotiation specialist, and Manuela Zurita, communications specialist. The team was assisted by Augusto Cavassa for the net present value analysis.

In the field and in the administration of small surveys, the team was assisted by Cecilia Sueiro, and for research on line and telephone interviews in Chile, Bolivia, Ecuador y Colombia, the team was assisted by Jahir Anicama. The methodology followed in this external revision has focused largely on document

[4] PACC. 2013. Propuesta de Plan de Segunda Fase (ProDoc). Lima.

review, focus groups, mini-surveys, and interviews with key informants. During the revision, in Peru a total of 35 interviews, 8 focus groups, and 7 visits to families practicing improved technologies or mini-reservoirs (qochas) were carried out in Lima, Cusco, and Apurimac. Ten other interviews were conducted with professionals in Ecuador, Chile, Colombia, Bolivia and Switzerland.

Three mini-surveys were conducted with responses back from: 20 MEF-PIP special course participants from both Cusco and Abancay; 16 members of the CORECC in Cusco and CAR in Apurimac involved in implementing regional strategies and capacity strengthening plans; and 22 students of the UNSAAC master's program in Climate Change and Sustainable Development. Lists of participants were obtained and all were invited to answer the questionnaire online. Follow up telephone calls were made to some not answering online.

Valuation criteria

The valuation criteria used in this evaluation are adapted from the International Fund for Agricultural Development (IFAD), as follow:

Highly satisfactory	The project has reached or surpassed its goals, objectives, expectations, and results (or impact) and could be considered a model project
Satisfactory	The project has achieved 80-96% of its goals, objectives, expectations and results (or impact)
Moderately Satisfactory	The project has achieved 60 to 80% of its goals, objectives, expectations, and results
Not satisfactory	The project has achieved goals, objectives, expectations, results minimally or below 60%

3. EVALUATION RESULTS

3.1 PACC 2 Major achievements

Institutional Strengthening

- Cusco region has a platform (CORECC) to promote the implementation of the Regional Climate Change Strategy that includes some 30 active public and private institutions that monitor progress toward objectives compared to a baseline developed in 2015. In addition, CORECC has a capacity building plan that is implemented with funding from its members.

- Cusco also has an updated (2016) Coordinated Regional Development Plan (PDRC) that incorporates risk analysis in the face of climate change. The plan includes the Decentralization Promotion Group of Cusco (GID), which employs risk management and adaptation to climate change in its agenda. Other regional strategies in food security, education and health have integrated risk management and adaptation to climate change.

- Apurímac has a Regional Environmental Commission (CAR) with 18 public and private institutions that promotes the regional climate change strategy at the level of the Municipal Environmental

Commissions (CAM). It has a capacity-building plan based on competency that will be presented to the National Civil Service Authority (SERVIR). CAR works together and coordinates with the Promotional Group for the Governance of Apurímac (GIGA) in the areas of climate change and risk management. Apurímac has integrated climate change, desertification, and biodiversity strategies into a single common strategy.

- Six (6) rural – urban municipalities of Cusco and Apurímac have developed Coordinated (Combined) Local Development Plans (PDCL) with assistance from CEPLAN and have incorporated climate change into these plans. Guidelines have been produced for further planning of coordinated local development with resilience to climate change for urban-rural municipalities with potential for application by CEPLAN to another 550 municipalities in the country.

Strengthening Capacities in Public Investment

- One feasibility study formulated for the public investment project of "Improvement of Andean Productive Systems with ACC Strategies in Mancomunidades of the region of Cusco" for an amount of about 20 million soles (US$ 5,934,718). This is awaiting implementation.

- One set of four public investment projects formulated: "Management of the Natural Resources of the Sub-basin of the Antabamba River" in Apurímac. This is awaiting implementation.

- 169 public officials from Cusco and Apurímac received training in considering climate risk management in public investment projects.

- 13 public investment projects have been formulated in a MEF course, of which 7 are oriented to the consolidation and regulation of water in micro-watersheds, wetlands, and creation of water systems for irrigation. Another 5 pertain to ecosystem recovery and erosion control of wetlands (bofedales), land around bodies of water (circunlacustre), natural prairies, and a RAMSAR site. There is also one for a fire prevention and control project in 32 districts of Apurímac. These are all awaiting implementation.

High Andean Families with Improved Technologies

- 1,294 families participating in the Haku Wiñay program in the Ocongate and Cotaruse districts have implemented up to five rural production technologies incorporating ACC criteria. Another 3,264 families have benefited from these technologies in nearby areas through yachachiq (promoter) training and the use of manuals, radio programs, and videos.

- 54 yachachiqs (41 men and 13 women) have been trained to demonstrate and transfer adaptive technologies to families who request assistance.

- 532 families from Cusco and Apurímac implemented sowing (infiltration) and harvesting water projects and participated in competitions organized by municipalities and other actors.

- A partnership and working model with FONCODES that has successfully integrated adaptation to climate change to improve the technologies offered by the Haku Wiñay project to high Andean populations.

Strengthening Capacities in Research and Education

- Both in PACC 1 and 2, a large number of scientific publications was produced by the SSE consortium in a lead or supporting role: 11 under PACC 2 and 7 under PACC 1.

- The research project: "Deglaciation and Perceptions of Climate Change in Populations of the Sacred Valley of Cusco: an anthropological psycho-social study" of UNSAAC has been underway since 2015 with Canon funding of about US$ 166,800.

- The research project "Efficiency and Impact of Small Systems of Sowing and Harvesting Water in the Improvement and Recovery of Hydrological Services in the Huacrahuacho Basin, Kuturkanki District, under Conditions of Climate Change." This project with Canon funding was approved on September 15, 2016 through UNSAAC resolution in the amount of US$ 803,170.

- 75 professionals expect to receive a Master's degree in Climate Change and Sustainable Development in UNSAAC, including the current class.

- 260 teachers, researchers and students from various universities in Lima, Apurímac, Cusco and Ancash have participated in courses to improve research and publishing scientific articles. About 200 of these were trained by the SSE consortium under PACC 2.

- About 1,300 students, teachers and researchers participated in academic activities related to climate change.

- An ongoing research project on the availability and recovery of ecosystem services in the context of ecosystem-based adaptation in a high-mountain wetland ecosystem (bofedal) in the Ampay National Sanctuary in Abancay (Apurímac). In this project, 32 students from UNAMBA, UTEA, UNSAAC, PUCP, and UNMSM have already received intensive training in hydrological and ecological/botanical field methods.

Scaling Up and Influencing National Policies

- PACC has been instrumental in positioning Peru in adaptation to climate change at international events during COP 20 (Mountain Pavilion and a side event on CC financing) and the realization of the InterClima conferences at the national and regional levels (Cusco and Apurímac). In COP 21 PACC participated in a session on gender and ACC.

- A national public investment program in sowing and harvesting water of about US$ 63 million that when implemented will benefit eight highland regions over five years. This program is based on learning from public and private institutions, synthesized with PACC 2 support in the 2016 MINAGRI document: "Towards a National Program for Sowing and Harvesting Water."

- 134 officials from 18 territorial units of FONCODES have been trained in risk management and adaptation to climate change.

- CEPLAN has field tested guidelines for including climate change in the local development plans of urban-rural municipalities that can be applied to another 550 similar municipalities.

3.2 Relevance

Peru is considered among the most vulnerable countries in the world to climate change making adaptation to climate change crucial to sustainable development, poverty eradication, and food security. The Paris Agreement (2015) provides the necessary guidance to strengthen the planning and implementation of actions in adaptation at the national level. In July 2016, Peru ratified the Paris Agreement through Supreme Decree Nº 058-2016-RE with the aim to continue with its commitment and leadership to address climate change. Under this scenario, the INDC of Peru have become its first NDCs for the period 2020 to 2030. To this end, Peru has launched a process for the implementation of the National Contributions, both for mitigation and adaptation actions, through the creation of a temporary Multi-Sectoral Working Group (Supreme Resolution N° 005-2016-MINAM).

PACC 2 has played a very relevant role in the consolidation of the national agenda in climate change led by MINAM following the COP 20 and the signing of the Paris Accord. During the COP 20 and acting as host country, Peru was able to demonstrate its advances in adaptation through the Water and Mountain Pavilion in which adaptation advances throughout the country were presented. In like manner, in 2014 and 2016 various national policy instruments were approved, such as the National Contributions, which include a chapter on adaptation, and the updating of the National Strategy on Climate Change to which PACC 2 made an important contribution. Likewise, Cusco and Apurímac became models to follow for the remaining regions which were engaged in formulating their own regional climate change strategies.

The various activities, products, effects, and special objective of PACC 2 were all consistent with rural development policies as exemplified by the partnership with the Haku Wiñay project of FONCODES. This project is an example of successful direct transfer of knowledge to poor agricultural families and which operates alongside another rural anti-poverty program (Juntos) of the same ministry (MIDIS). These program outputs and outcomes were also consistent with the directions and indicators of the SDC Global Program in Climate Change. The PACC results chain and goals were consistent with global, national, and subnational rural development objectives.

PACC 2 was also relevant to advancing initiatives to increase public investment in ecosystemic services and biological diversity promoted by MINAM along with MEF. This will also contribute to Peru's capacity to leverage funds from other international finance mechanisms, such as the Green Climate Fund that requires developing countries to exercise ownership by integrating funding to their own national plans.

In 2014 national guidelines were proposed with the objective of increasing decentralized investment in projects more related to climate change. These guidelines opened the possibility of formulating projects for recovery of ecosystems, saving species in danger, and profitable use of natural resources, among others. Investment projects have, in fact, been designed but these have to compete with other largely urban priorities of voters that governors cannot ignore. This situation goes well beyond the PACC intervention.

The PACC 2 M&E Plan has been relevant and effective in support of operational activities and products but underdeveloped in supporting evidence at the effect and impact levels. The Plan could have been simplified and prioritized somewhat in terms of indicators, some of which do not appear very relevant.

Some of the important products could have been raised to the higher level of intermediate result with effects becoming strategic objectives. This would have reduced the number of output (product) indicators and left description of their attainment to annual reports.

PACC has developed results chains by effect which are carefully constructed to show actions by or influenced by PACC that set in motion a series of events leading to desired outcomes. These are logically correct and relevant, and they are useful for visualizing and distinguishing permanent actors´ roles in relation to those of a temporary project. For reasons of simplicity of tracking program progress, the M&E Plan did not include indicators on "third-party actions" or distinguish systematic information about PACC 2 impact "through others."

All processes engaged in appear valid, with success in influencing regional governmental policy and learning, as well as scaling up some concepts to national ministries for replication in future. Regional and local governmental public investment procedures have been influenced appropriately by PACC 2.

3.3 Effectiveness

Accomplishment of Effect and Product Indicators[5]

The various results reported for indicators in the final M&E report indicate a level of overall accomplishment of program effects and products at 92%. This is certainly very satisfactory. The average level of accomplishment varies by program effect, some products contain different numbers of indicators, and some product-level indicators contain multiple parts. The following calculation of level of achievement is totally based on the indicators selected by PACC 2 for its monitoring plan and does not weight them by importance or strategic role in program success. Nevertheless, it is useful to see to what degree these indicator targets were achieved. Effect-level effect and product indicator accomplishments summing partial and full accomplishments are:

- ★ 100% achievement of indicators under Effect 2 (10 indicators)
- ★ 94.4% achieved under Effect 4 (9 indicators)
- ★ 92.2% achieved under Effect 3 (16 indicators)
- ★ 85.8% achieved under Effect 1 (18 indicators)
- ★ 43 of 53 effect and product indicator objectives overall (81.1%) were **fully** achieved (excluding the 4 impact indicators)[6]

[5] N.B. These levels of accomplishment have been calculated and provided in the final report of the PACC 2 M&E plan. These are the official PACC 2 indicators. They do not include the numerous publications produced by the SSE.

[6] This is number and percentage of fully achieved indicators only, not counting partial achievement in 11 indicators.

[7] PACC 2 contracted for three types of studies to measure the qualitative aspects of program impact. The first was a qualitative study of value added by PACC to Haku Wiñay in the pilot areas of Cotaruse and Ocongate. The second was a baseline on families of the pilot areas constructed from Haku Winay baseline data but which was never followed up. The third was a set of 6 qualitative studies undertaken by GRADE, two focused on program indicators I-3 and I-4 and four others based on peer comparisons between Haku Wiñay families, yachachiqs, regional governmental officials, and officials, professors, and students of UNSAAC.

The evaluation team had difficulty validating measures provided by PACC 2 for program effects and impacts, due to the fact that information on indicators was not collected in a systematic manner. The six independent studies carried out on impact are not sufficiently integrated and coherent to be used by the evaluators. Most of them relied on extremely small sample size. This is also true for the study of value added by PACC to the results of the Haku Wiñay project. A baseline study on families in PACC intervention areas under Haku Wiñay was never followed up or redone.

To approach the impact of PACC 2 and of all its allies, the evaluation team calculated an estimate of total net present value (NPV) with data from the MEF information system (SIAF) as of January 31, 2017, with information provided by FONCODES HW for its programs in Cusco and Apurímac and from other proxy indicators taken from other programs in the same intervention zone as PACC 2. The results of this estimation are presented in the chapter on impact.

Effect 1: Regional and local governments implement in an articulated and effective manner strategies of adaptation to climate change.

The strategic orientations placed in the ProDoc for this program effect were set up to facilitate systemic changes leading to the implementation of the Regional Climate Change Strategies (ERFCC in Spanish) in Cusco and Apurímac; promote policy dialogue to reaffirm commitments and set in motion decisions involving this direction; and support consciousness raising and promote informed and proactive social oversight, involving dialogue upward from below through joint work with authorities, public employees, and civil society organizations.

Product 1.1: Human capacities and management processes strengthened.

The work in this activity started with PACC 1 with its support to the Regional Climate Change Strategy (ERFCC) that was drawn up in both Cusco and Apurímac. To address the multi-sectoral approach a Regional Operational Unit for Climate Change (UORCC in Spanish) was formed, with participation of the regional governmental planning, economic development, social development, and environment and natural resources departments. UORCC's mission was to incorporate adaptation to climate change as a cross-cutting issue into all regional planning and investment processes.

The UORCC working together with the Regional Technical Group for Climate Change (GTRFCC in Spanish) pulled together more than 60 institutions grouped into eight thematic committees (water/integrated management of hydrological resources, food security, health and housing, education, energy, climate/management of risks and disasters, biodiversity, institutionalization and governance). A ninth committee on production was later added. A regional governmental ordinance approved the creation of a Regional Council on Climate Change in 2014 (CORECC in Spanish) with the mission to promote the implementation of the Regional Strategy for Climate Change. The CORECC reports that some 36 of the original 60 institutions are still fully engaged on a regular basis.

The Regional Environmental Commission (CAR in Spanish) performs the same role in Apurímac as CORECC and is composed of 32 public institutions and NGOs, of which only 18 are fully engaged in CAR activities.

Both the CAR and the CORECC received technical assistance from PACC to develop four management tools: (1) an Implementation Plan for the Regional Strategy (PIERFCC in Spanish); (2) a Monitoring and Evaluation Plan; (3) a set of baseline measures; and (4) a Capacity Development Plan.

CORECC published its PIERFCC, M&E plan, and a set of baseline measures in March 2015, and in October 2016 presented its first monitoring report with measurements on 22 indicators from 15 strategies. The CAR in Apurímac has not yet produced its M&E plan (see Cusco M&E report in Annex 3), nor does its regional strategy contain objectives. This Cusco set of measurements is a good example of how Peru can report on its Nationally Determined Contributions (NDCs) in adaptation to climate change with the support of the regions, especially in water and agriculture.

The region of Cusco is the only region in Peru to have an ACC implementation plan and a monitoring system that has now published its first report. There is generally explicit recognition that this level of institutionalization is in large part due to support from PACC during its second phase, especially in the preparation of these key management tools. These tools can clearly serve as a model and example for other regions that now have regional CC strategies and can be considered as a future means for scaling up the experience beyond Cusco.

Product 1.2: Public Investment Considers Guidelines for Adaptation to Climate Change

PACC 2 has placed special attention on providing capacity to a group of professionals in the art of formulating public investment projects, a financial mechanism as much for disaster risk management as for typologies of projects in ecosystemic services and biological diversity. This is to provide a counterweight to "brown" investment and increase "green" investment.

In 2014 MINAM along with MEF approved guidelines for public investment in ecosystemic services and biological diversity with the objective of increasing decentralized investment in the recovery of ecosystems, protecting species in danger, and making profitable use of natural resources, among others. In addition, MEF updated guidelines for projects in irrigation and reforestation to align the methodology with risk management and new discussions on climate change. The MINAM DGCCDRH and the MEF Directorate of Methodology work together with cooperating entities to support training at the regional level.

PACC 2 has been part of this public investment initiative in the regions of Cusco and Apurímac with the MEF. Other similar courses were carried out in Piura with the TAC project and in Huaraz with the Glaciers Program of CARE Peru.

Completion certificates for the MEF courses were provided to graduates by the Faculty of Economics of UNSAAC. This teaching and knowledge generation experience has provided contributions to the methodology and refinement of the definition of dangers, exposure, fragility, and the proposal of alternatives in ecosystems undergoing climate change and is likely to be substantially replicated.

The contribution of PACC to these courses has been in providing complementary technical advice[7]. The various specialized areas of MINAM also participated in the technical assistance team. PACC videotaped the whole course providing the possibility to make a virtual version for other interested parties. MEF has expressed great appreciation to PACC for this collaborative work.

The 2015 Annual Report identified some problems with the first round of training: training often required greater technical capacity; a high rotation of regional government managers, functionaries, and professionals reduced time committed to the course; and it was observed that managers in natural resources focused on implementing their Regional Climate Change Strategy did not always share the same investment priorities of managers from planning and other departments.

However, these PIPS are designed to improve investment in "green" projects and for this more than training is necessary. During interviews, participants indicated that costs are associated with their formulation (about US$ 17,751). Lack of information on precipitation and water sources among others also represent barriers to the approval and implementation of these projects. Moreover, investment priorities of governors do not lie in green projects but rather in infrastructure projects in basic sanitation (as is the case in Apurímac) and other commitments, such as the international airport, Lorena hospital, and the bypass road in Cusco region. Faced with this situation, one interviewee commented that if there cannot be greater investment in green projects, it would be necessary to work to "climatize" brown investments.

Product 1.3: Local Governments Linked and Aligned with Regional Governments in Adaptation to Climate Change.

An alliance was formed between PACC and CEPLAN in the first half of 2015 to undertake a pilot experience in incorporating management of climate change into local development planning.

As a result six rural – urban municipalities of Cusco and Apurímac have developed Coordinated Local Development Plans (PDCL in Spanish) with assistance from CEPLAN and have incorporated climate change into these plans. The pilot districts involved are: Chinchero, Poroy, y Huarocondo in Cusco and Curahuasi, Tamburco, y Huanipaca in Apurímac. These are urban-rural districts (7,000 - 15,000 inhabitants) characterized by considerable complexity, because they contain cities that attract migrants from surrounding rural areas. There are 556 municipalities of this kind in Peru.[8]

As a result of this collaboration a "Guide to Updating Development Plans in a Context of Climate Change" was prepared for scaling up in other districts at the national level. The potential for nationwide scaling is substantial and this experience has certainly contributed to the national scaling objective of Effect 4. CEPLAN has expressed great appreciation for this collaborative work, although it is not yet clear if these guidelines will be approved and implemented

Product 1.4: Citizen Oversight and Advocacy Mechanism Implemented and Effective

[7] Advice provided by CONDESAN and the team in the Pastures Laboratory of UNALM in respect to refining indicators for wetland ecosystems.

[8] MEF. 2014. "Incentivos Municipales: Sistematización de la Experiencia."

During the 2014 electoral period (national congress) and 2015 (presidential), PACC 2 along with other civil society organizations established governance agreements with the candidates to ensure respect for advances in planning that had already been achieved under the previous administration.

These governance agreements are not just for planning in ACC or risk management but also include the agendas of other civil society organizations in the region like Decentralization Promotion Group (GID) in Cusco and Governance Promotion Group of Apurímac (GIGA). CORECC points out that meetings with the technical teams of the various candidates were characterized by greater ease and flexibility than with the candidates themselves.

No outside oversight (vigilance) reports on how regional governments are implementing ACC have been produced in Cusco and Apurímac. During interviews carried out in these two regions, the evaluators gathered opinions with respect to the difficulty of accomplishing vigilance roles. The organizations involved within the GID and GIGA work in a coordinated manner with local and regional governments, but they have difficulty carrying out performing citizen oversight roles. On the other hand, there is no evidence that such citizen oversight activities really obtain expected results. In any case, this indicator under Product 4 of Effect 1 has failed to achieve even a partial result.

Product Valuation under Effect 1 for Effectiveness	
Product 1.1: Human capacities and management processes strengthened.	Satisfactory
Product 1.2: Public Investment Considers Guidelines for Adaptation to Climate Change	Moderately satisfactory
Product 1.3: Local Governments Linked and Aligned with Regional Governments in Adaptation to Climate Change.	Satisfactory
Product 1.4: Citizen Oversight and Advocacy Mechanism Implemented and Effective	Moderately satisfactory

Effect 2: Rural high Andean populations strengthen adaptive responses and provide useful evidence for public policy.

It is clear that the partnership with the Haku Wiñay project of FONCODES to work directly with beneficiary families on the ground is the primary accomplishment under Effect 2. Early in 2013 Helvetas reached agreement with FONCODES to integrate a component of adaptation to climate change into the Haku Wiñay program and a cooperative agreement to this effect was signed in July 2013[9]. This collaboration enabled PACC to employ its experience in Phase I as reflected in two of its Effect 2 products: 2.2

[9] PACC. 2016. "Informe Síntesis de la Cooperación Suiza otorgada al MIDIS-FONCODES entre 2013-2016, en el marco del acuerdo relativo al Proyecto Haku-Wiñay/Noa Jayatai y al Programa de Adaptación al Cambio Climático-PACC Perú." Lima.

"Adaptive responses incorporated into the FONCODES intervention provide marginal impact; and 2.4 "Solid evidence on cause-effects and cost-benefits of innovative adaptive responses consolidated."

The cooperative agreement specified four action areas: (i) Training the FONCODES technical teams at all levels and the technical coordinators and yachachiqs (promoters) in the pilot NECS of Ocongate and Cotaruse in climate change, adaptation to change, and rural productive technologies with a focus on adaptation; (ii) Technical assistance in the field and support to yachachiqs in the process of transferring knowledge and experience to farmer families; (iii) Incorporation of climate and adaptation to climate change criteria into technical manuals and into planning, management, and local Haku Wiñay evaluation tools; and (iv) Monitoring of the additional impact generated from the incorporation of an orientation to adaptation to climate change.

Scaling Up the Collaboration with FONCODES

By January 2015 the joint implementation experience in the two pilot areas was so successful that it was decided to scale up nationally the incorporation of a focus on ACC within the national Haku Wiñay project. A plan to this effect contained the following:

(i) Formalization of the adoption of ACC guidelines by their explicit incorporation into the framework that regulates projects in current implementation.
(ii) Production of instruments of mass distribution (audiovisual and radio) for national training and technical assistance in the incorporation of ACC issues into Haku Wiñay productive technologies.

(iii) Strengthening the capacities of specialists and local technical coordinators of the FONCODES Territorial Units.

(iv) Strengthening the set of Haku Wiñay productive technologies by the inclusion of sowing and harvesting water practices associated with management of natural pastures as a specific adaptive measure to climate change accompanied by a technical manual.
(v) Consolidation of technical assistance of beneficiary households of the Ocongate and Cotaruse NECs.

As a result, two important Haku Wiñay management tools had been modified to incorporate issues of adaptation to climate change: the participative diagnostic guide for communities; and the guide for developing technical project design documents forming the basis for Haku Wiñay interventions. These are key indicators of the institutionalization of ACC criteria into Haku Wiñay.

Scaling up in 2015 also involved geographical extension of pilot experiences and training of yachachiqs to neighboring NECs in March in Apurímac: Huancarama, Juan Espinoza y Huancarama-Ccorawire and in June in Cusco region to Ccapacmarca, Ccolquepata, San Salvador, Challabamba, and Valle de Lares.

Scaling up nationally was assisted by three macro-regional trainings (Chiclayo, Lima, Cusco) in November 2015. Technical coordinators and specialists of 18 FONCODES Territorial Units across the country were exposed to the materials and methods of integrating ACC into Haku Wiñay activities.

Although a focus was placed in these macro-regional trainings on preparing for possible effects of El Niño, it was clear that most of the preparatory measures to reduce risks from the El Niño phenomenon also applied to climate change risks over time. The materials that PACC and FONCODES had prepared to integrate adaptation to climate change into productive activities also applied to risks to family assets from El Niño.

In 2014 and 2015 PACC produced a series of six technical manuals for use by yachachiqs and beneficiary families:

- ✓ Small systems of spray irrigation at the family level
- ✓ Sowing and management of improved pastures for rural families
- ✓ Family gardens for the production of vegetables
- ✓ Raising of guinea pigs
- ✓ Production and use of organic fertilizers: biol, compost, and humus.
- ✓ Sowing and harvesting of water
- ✓ five educational videos[10]
- ✓ five radio programs
- ✓ A guide for the use of these materials in the future training of yachachiqs[11]

Competitions in Sowing and Harvesting Water

Between December 2015 and March 2016 nine family competitions in sowing and harvesting water were carried out in the pilot NECs of Cotaruse and Ocongate. A year earlier the same NECs had carried out three competitions, and two more were held later in November 2015. This promotional technique and capacity development was extended in 2016 to two other NECs beyond the pilot zones: NEC Ccapacmarca in Chumbivilcas and NEC Colquepata in Paucartambo.

One of the nine competitions in the second round was organized by the municipal government of Cotaruse and extended participation in the competition to the whole of the Cotaruse district.

The involvement of municipal governments in funding and organizing these competitions in sowing and harvesting water is essential for sustaining and extending this technology, including contracting yachachiqs, purchase of tools, training, monitoring, qualification of participants, and prizes.

The synthesis report provided to SDC and MIDIS by PACC (June 2016) quite correctly states that: "Competitions in sowing and harvesting water have become a potent means to promote direct methods of adaptation to climate change in water management. They contribute to increasing the recharging of water tables at the upper end of micro-watersheds, improving productive activities of farm families (PACC, 2016, p.7)."

[10] One criticism by an informant from FONCODES is that the videos are not in Quechua.

[11] PACC. 2016. "Guía de Procedimientos para Realizar Interaprendizajes Utilizando los Materiales Instructivos sobre Tecnologías Productivas Promovidas por el Haku Wiñay (manuales, programas radiales y videos)." August 2016. Lima.

Sowing and harvesting of water has been a distinct contribution by PACC to FONCODES and Haku Wiñay. This was not one of the original set of productive technologies promoted by Haku Wiñay, but it has now been formally adopted by the project.

The former Executive Director of FONCODES, instrumental in launching the collaboration between PACC and Haku Wiñay in 2013, subsequently became Vice Minister of Agricultural Policy in MINAGRI, where he launched a major effort to promote sowing and harvesting water into a national program under his ministry. PACC continues to support this move to a national program through advocacy and studies of successful experiences and typologies (cf. Effect 4).

Product 2.3: Mechanisms of knowledge management of methods and Andean adaptive technologies.

The mechanism established consisted of the creation by MINAM of a National Environmental Prize in the management of climate change designed to reward best practices in ACC. During 2014 173 experiences in 22 regions were proposed and 29 more in 2015. Six winners were declared in 2014 and another two in 2015. PACC 2 documented this whole process. The theme in 2015 was sowing and harvesting of water. PACC published the winning practices in a book entitled "Lessons of the Earth" (Lecciones de la Tierra) in 2015.

Product 2.4: Solid evidence consolidated on cause-effect and cost-benefits of innovative adaptive responses.

PACC 2 continued to monitor measures linked to the impact of Phase 1 activities in the Huacrahuacho and Mollebamba micro-watersheds from 2014 to 2016. In Huacrahuacho a study was carried out each year of water volumes of springs associated with qochas that benefit livestock (and milk) production upon which local families most depend. This represents the major economic value of storing water in this way for the dry season. In Mollebamba a report each year was made on variation of aquifer recharge and recuperation of biodiversity and biomass linked to the management of natural pasturage. These studies were facilitated by PACC 2 with assistance of experts from Lima. In 2016 with support of the SSE a research project was approved by UNSACC entitled: "Evidence on the Recuperation of Hydrological Services Affected by Climate Conditions Involving the Reappraisal and Implementation of Small Systems of Sowing and Harvesting Water in the Huacrahuacho Watershed, Kunturkanki District."

The evidence reported by these studies in Huacrahuacho was published by PACC with another 14 experiences nationwide to serve as a base of evidence in the formulation of the National Program on Sowing and Harvesting Water under MINAGRI.

A major qualitative study of the value added to Haku Wiñay productive technologies from the addition of technical assistance focused on adaptive measures in the face of climate change was carried out by Libelula and published in 2016.

Product Valuation under Effect 2: Effectiveness	
Product 2. 1: Optimized proposal with replication potential that capitalizes on the PACC experience and of other actors. (Summary document of the PACC 1 experience).	Satisfactory
Product 2.2 Adaptive responses incorporated into the FONCODES intervention generate additional impact	Highly satisfactory
Product 2.3: Mechanism of knowledge management of methods and Andean adaptive technologies. (National Environmental Prize and publication of a book entitled "Lecciones de la Tierra" in 2015.	Satisfactory
Product 2.4: Solid evidence consolidated on cause-effect and cost-benefits of innovative adaptive responses. (Studies in Mollebamba y Huacrahuacho and on value added)	Highly satisfactory

Effect 3: Universities generate research and train professionals in accord with regional demand for management of adaptation to climate change.

This program component was led by PREDES in collaboration with the Swiss Scientific Entities (SSEs) and the public national universities UNSAAC and UNAMBA in Cusco and Apurímac, respectively. The principal purpose has been that the research carried out by these universities be used in decision making by local and regional governments. To reach this objective PACC established four major output products: (i) the preparation of coordinated research agendas; (ii) strengthening of research capacities in professors and researchers of UNSAAC and UNAMBA by SSE; (iii) the introduction of legal changes to facilitate the use of Canon resources for research in UNSAAC; and (iv) support to research in adaptation to climate change among undergraduate students.

Product 3.1: Regional coordinated research agendas in climate change

This activity aimed to link universities with society, especially to policy makers. Two regional research agenda were prepared. The Cusco Regional Research Agenda (ARIN in Spanish) was approved in 2015 by the governmental Regional Council through ordinance as well as by university authorities through resolution, and was published and distributed under the title of: "Cusco Regional Research Agenda to 2021." The Regional Research Agenda of Apurímac (AIR) was approved in 2015 by the Regional Council through ordinance, and its preparation had been the responsibility of the Regional Council for Science and Technology (CORCYTEC in Spanish) and the Regional Environmental Commission (CAR) of Apurímac.

These Agendas were developed through a participatory process with the support of a consultant charged with coordinating the process with the relevant CORCYTEC, a body containing various private and public institutions, including universities.[12] An outline of these agendas is presented in Annexes 4 and 5.

[12] In CORCYTEC Cusco, participate: Department of Economic Development (presiding), Department of Social Development, the regional governmental Directorates of Education, Health, Production, and International Technical Cooperation, Dirección del Instituto Nacional de Innovación Agraria (INIA), Dirección del Servicio Nacional de Adiestramiento en Trabajo Industrial (SENATI), Dirección de la Cámara de Comercio del Cusco, Instituto Superior

Both Agendas define their research agenda along three dimensions: social, economic, and environmental. Under this last dimension, themes related to mitigation and adaptation to climate change are presented. There are themes relating to climate change in sections on agriculture/livestock, water resources, agro-biodiversity, forests, and pastures. Only the Apurimac agenda describes climatic scenarios and climate change risks in the region, but they have not been used for prioritization of micro-watersheds, population centers, or services to be studied.

One great weakness of both Agendas is that they have not yet forged effective linkages between research centers to avoid redundancies in research themes and do not propose mechanisms to share and disseminate research among them. The scant amount of diffusion of research results at the local level is one of the problems that only recently is being addressed. It has only been in the last year that UNSAAC has created a repository for public use to disseminate undergraduate and postgraduate theses.

In addition, the selection of CORCYTEC in both regions as a platform has the strong inconvenience that it includes different actors with different interests and priorities with resulting differences in pacing and timing. Research tries to get well ahead of future problems, while political decisions only occur in a short-term framework of four to five years.

The two Agendas form a good start toward establishing research needs in accord with development actors in a broad and participatory process. Nevertheless, this process should be considered a first step in the design of research agendas that respond to future regional requirements based on climatic scenarios. The next step should be to refine the analysis and include selection of two or three future scenarios, with attention not only to adaptation to climatic risks (agriculture/livestock, water resources, health, risk management) but also policy directions relating to possible "green development" options or lowered emissions (renewable energies, solid waste management, use of soils, reforestation, etc.).

Product 3.2: Strengthened research capacity in climate change of professors and researchers

PACC prepared a capacity development plan for both universities that includes: (1) advisory support in the preparation of large-scale multidisciplinary research projects with support from the Swiss Scientific Entities (SSE); (2) realization of courses promoting scientific discovery and disclosure, combined with the organization of science promotional weeks realized on a broad scale; (3) production and publication of scientific articles in indexed journals. More on the role of the SSEs follows in a subsequent section.

Product 3.3: Normative changes encourage the use of the Canon in research

The efforts realized by PACC 2 to spur investment in research have been recognized by UNSAAC, especially because they occurred at the same time that authorities decided to upgrade its Directorate for Research to the level of Vice Rectorate for Research (VRIN in Spanish) in 2012. PACC 2 contributed to defining the profile that the VRIN would have during its first and second management teams, the

---

Tecnológico Túpac Amaru, Asociación Regional de Innovadores de Cusco, Dirección de Investigación de la Universidad Andina del Cusco, Vicerrectorado de la Universidad San Antonio Abad del Cusco (UNSAAC), Universidad Andina del Cusco, Caritas del Cusco,and the district municipality of Wanchaq. In CORCYTEC Apurimac, participate a total of 27 public and private institutions, including: the four universities; regional governmental Directorates of Education, Environmental Health, Agriculture, Production, Energy and Mines; the Group for Struggle against Poverty(MLCP), and numerous NGOs and projects, such as CICCA, IDMA, CARITAS, IIDA, Asociacion Pro-Derechos Humanos, CESAL Apurímac, Programa Andino de Bosques, and PACC.

second one taking over in 2016 in the context of the new University Law. This new management structure contains research projects financed with Canon now in implementation, a renovated infrastructure for laboratories, defined procedures for accessing Canon resources, as well as a coordinated agenda for research.

However, a few problems persist, particularly the low level of financial drawdown of these funds -- only 21.7% of available Canon funds were used from 2011 to 2015.[13] The explanation for this low figure is found in the persistence of management models in the university focused on teaching in isolation from the rest of society and with little need for accountability. It would have been very difficult for a program such as PACC to have changed this situation.

The new Universit Law offers opportunities to advance beyond existing accomplishments already achieved by PACC. In 2016, the VRIN organized on its own its research week and is preparing a cooperative agreement with CONCYTEC to administer Canon research funds. Likewise, UNSAAC has shown a desire to collaborate with authorities to investigate losses of equipment from laboratories that occurred in previous years.

Product 3.4: Supply of Training at the undergraduate and graduate levels

One of the most salient achievements realized by PACC 2 under Effect 3 has been the incorporation of a Master's degree in Climate Change and Sustainable Development in the postgraduate school of UNSAAC. This master's program is the result of work by two professors in UNSAAC that participated in special diplomate courses realized during PACC 1 and in which the SSE consortium played an instrumental role.

The professors subsequently prepared a proposal that they submitted to authorities in UNSAAC at the end of 2012, but the proposal was lost in the university administration and recuperated by PACC 2 and subsequently approved by the University Council in March 2014.

At present 55 graduate students (25 in the first class in 2015 and 30 more in 2016) have completed the required coursework. According to participants in the master's program interviewed during the external review, PACC facilitated the hiring of some very specialized professors that gave the master's course high technical quality. Subsequently, these professors were hired by the UNSAAC Postgraduate School to maintain the master's program. This is an excellent example of sustainability. Special modules within the master's program were also taught by professors and scientists from SSE and University of Zurich, partly in collaboration with the Glaciers Project (CARE).

During the final revision a short survey was given to 22 students involved in this master's program (11 men and 11 women) with ages ranging from 25 to 53 and an average age of 37. Their background is primarily in engineering (59.1%) and life sciences (18.2%) with all others constituting another 22.7%. Only 9.1% were from the social and health sciences.

When queried on quality issues in the master's program, respondents on average gave generally high marks (1-5): quality of instructors – 3.9; quality of texts and materials – 3.5; quality of class discussions –

[13] Informe de Gestión 2011-2015. Universidad Nacional San Antonio Abad del Cusco. Vicerrectorado de Investigación. UNSAAC. Tarea. Diciembre, 2015

3.7; progress of specialization advancement in coursework – 3.7; relevance of coursework – 3.8; fulfillment of expectations regarding the master's degree – 3.7; punctuality of classes – 4.3; quality of physical installation – 2.6; and ease and simplicity of administrative details of post-graduate school – 3.3.

With respect to continuing their involvement with climate change issues, these students on average also gave a very high rating: interest in continuing to work in the field of CC – 4.8; interest in working in research on CC – 4.7; interest in including focus on CC in current work – 4.8; and interest in future job positions in CC – 4.8.

In terms of academic information: some 20 of 22 surveyed had finished the thesis (91%), but only 1 of 20 (5%) had defended it. The reasons chosen for non-defense of their thesis was: lack of time – 63.2%; lack of advising – 36.8%; and lack of money – 31.6%. Finally, 21 of 22 (96%) recommended the program to others.

PACC 2 supported 17 undergraduate thesis projects related to climate change during 2014 and 2015.[14] Eleven of these theses have now been approved by UNSAAC.

In 2014, proposals were drawn up to formalize courses on climate change in the curricula of general studies in the engineering schools and in the social sciences for nine academic departments of UNSAAC. In 2016 a course syllabus was shared with various career tracks (biology, geology, agronomy, architecture, zoology, economics, communications, anthropology, civil and electrical engineering, geology, mines, metallurgy, chemistry, and agriculture/livestock). None of these modifications has as yet been approved. The Geography Department has independently proposed a course on CC in its curriculum. These departmental proposals are already in accord with the focus on competency that the new University Law requires. For the present, these proposals are awaiting approval by UNSAAC.

Roles and Performance of the Swiss Scientific Entities

Research Projects

The SSE consortium supported the design of various research projects in Apurimac with UNAMBA[15] and in Cusco with UNSACC, in order to access Canon research funds. In the meantime a full set of rules and norms for projects using these funds had to be drawn up in parallel to project design.

Beginning in May 2014, UNAMBA was severely destabilized by reorganization, strikes, and removal of key administrators, including the Academic Vice Rector. The Canon-funded research project in UNAMBA was blocked for some time by university turmoil, so that it was decided to terminate the agreement with the university in August 2015. Collaboration on a personal level and with the doctoral research project of Jan Baiker in Ampay National Sanctuary continued. Moreover, the regulations relating to the use of Canon funds remains a solid achievement of the PACC team in UNAMBA and can be reactivated once the university is functioning normally again.

[14] UNSAAC supports these thesis students with one tax unit (approximately 3,750 soles = US$ 1,100), while PACC supplies economic support to the thesis advisor.

[15] The project was entitled "Influence of Climate Change on the Micro-watershed of Rio Marino, Abancay, Peru.".

Additionally, it was possible to undertake studies with researchers in UNAMBA under the leadership of the University of Zurich on linkages between climatology and economic activities, namely the study to estimate the demand for water by maize producers in Apurimac and how it might be affected by climate change conditions in the future.

The first study under way in UNSAAC was "Deglaciation and Perceptions of Climate Change among Inhabitants of the Sacred Valley of Cusco: a psychosocial-anthropological study" and was approved in July 2015 with a budget of $166,766.

Another study was initiated by a group of professors in UNSAAC and was focused on the PACC Phase 1 pilot zone of Huacrahuacho with the title of "Evidence on the Recuperation of Hydrological Services Affected by Climate Conditions Involving the Reappraisal and Implementation of Small Systems of Sowing and Harvesting Water in the Huacrahuacho Watershed, Kunturkanki District." The project involved purchasing and installing meteorological and hydrological instruments, and the SSE was involved in their evaluation and selection, along with other institutions, particularly the National Meteorological and Hydrological Service (SENAMHI). The project and budget were finally approved by UNSAAC in mid-2016 with a budget of $803,169.

Research activities were assisted by seven members of the SSEs in various country visits (missions). Meetings were held directly or on Skype with the teams responsible for both research projects and considerable assistance was provided by members of SSE. Proposals were ready for both projects by the end of 2014. Altogether between 2013 and 2016, 14 country visits were made by the SSEs, involving 10 scientists from Swiss institutions. A study visit to Switzerland was made by three members of the Sacred Valley study research team in November 2015.

Scientific Journal.

The proposed journal on "Climate Change in the Tropical Andes" required considerable work by the SSE in collaboration with UNSAAC on rules, structures, and regulations. The first edition was presented during the UNSAAC Science Week (September 2014) with the participation of the SSE consortium. Two members of SSE were part of the group of principal editors, and SSE obtained the support of 25 outside experts to join the editorial group.

The SSE indicated in its annual 2015 report that it could not take the leadership on this journal but would be available to assist as requested. SSE continued to discuss support options during a mission in February 2016 with the UNSAAC. Nevertheless, the SSE reports that two more volumes were published, one in 2015 and the other in 2016. This is not reported by the PACC final M&E report.

Scientific Platform

In January 2014 during a mission by members of the SSE a proposal was agreed to establish a scientific platform to group researchers in UNSAAC that had a Canon research project related to climate change. The idea was to strengthen exchanges and inter-disciplinary dialogue between various faculties in UNSAAC and solidify scientific support from SSE. The training courses provided by SSE in 2014 were to be part of this new platform. It was hoped that the platform would take form as a "scientific network of UNSAAC researchers in climate change" pulling together those responsible for the new journal on climate change, researchers with Canon projects, and thesis students working on subjects related to

climate change. However, those responsible in the Vice Rectorate for Research for advancing this platform failed to do so through the remainder of the year. There does not seem to have been further progress on this proposal during the remainder of PACC 2.

Training Courses

Various other courses were organized and delivery by the SSE consortium related to:

(a) "Principles of Academic Work and Writing Scientific Articles."
(b) "High Mountains and Climate Change: Knowledge Management and Research Proposals."

Participants were drawn from other universities and research centers from Lima, Huaraz, Cusco and Apurimac, including PUCP, ANA-UGRH, UNASAM, UNAMBA, and UNSAAC. The course contained theoretical and practical portions, with classes alternating between Spanish and English.

With respect to the first course, the SSE annual report for 2014 states that "already from the beginning, it was evident that there was high motivation of participants and continuous questions and comments from them that contributed enormously to course dynamics."[16] One of the ideas behind the course was that some of the participants might in the future produce articles for the new journal on climate change in UNSAAC. Because SSE's experience with scientific proposals from UNSAAC and UNAMBA revealed serious weaknesses in the scientific work of faculty from these institutions, it was decided to repeat the courses and add others in 2015 still in collaboration with the Glaciers Project. A new proposed course was to be on research methods in the social sciences.

To strengthen research and publication skills of professors in the universities the courses were presented along with various tools to identify reviews, databases and bibliographical browsers. The tools were generally new to participants and much appreciated, especially those with free access. In the second, practical segment the objective was that participants could work with their own scientific material, organizing and representing its results, as well as seeking potential reviews to which a manuscript could be sent prepared according to required norms.

A third course on methods entitled "Research Methods in the Social Sciences in Projects on Adaptation to Climate Change" was finally held August 3-5, 2016, in UNSAAC with 25 participants. It was focused on the population perspective study underway in Urubamba and involved instruction from a distance (video-chat) from two SSE members.

A final course dealt with basics of hydrological balances and took place on November 14-15, 2016 in UNSAAC and was primarily targeted to the members of the research project in the Huacrahuacho basin, with 27 participants (UNSAAC, SENAMHI, ANA) introduced to approaches and challenges of water balance computations and related measurements.

[16] Swiss Scientific Entities. 2015. Annual Report 2014 (p, 8).

Doctoral Research in AMPAY National Sanctuary

Supported by the SSE, Jan Baiker's doctoral research project in the Ampay National Sanctuary prepared measurement campaigns and planned for fieldwork during 2014. Meteorological and hydrological measurements began in the national sanctuary, as well as ecological evaluations to investigate different climate and livestock impacts on the biodiversity of the wetlands under investigation. Although begun under PACC 2, this research is now being carried out by Baiker under advisement by various colleagues from the SSE.

COP-20 and COP 21

The SSE participated in the COP-20 in Lima in December 2014, in which it presented experiences in China, India, and Peru with respect to adaptation financing, especially below the national level. The official Peruvian side event was organized by PACC, and included MINAM, MIDIS, FONCODES, SDC, Helvetas, and the German Development Institute. The event is reported by SSE as generating much enthusiasm for this type of South-South exchange of experiences.

Representatives from SSE also participated in the COP-21 in Paris in December 2015, where they presented experiences generated in PACC in a side event on climate financing with a presentation entitled "Experiences with adaptation projects and lessons for climate finance."

Product Valuation under Effect 3: Effectiveness	
Product 3.1: Regional coordinated research agendas in climate change	Moderately satisfactory
Product 3.2: Strengthened research capacity in climate change of professors and researchers	Highly satisfactory
Product 3.3: Normative changes encourage the use of the Canon in research	Moderately satisfactory
Product 3.4: Supply of training at the undergraduate and graduate levels	

in CEPLAN pilot district development plans; and collaboration with MEF in a Special Course in the formulation of green Public Investment Projects. CEPLAN and MEF activities are also reported under Effect 1.

PACC 2 was ready to provide training and technical assistance to the Ministry of Agriculture (MINAGRI) in the context of the emergency appeal emitted by the Peruvian government in December 2015 to address the approaching El Nino phenomenon. This provided an excellent opportunity to scale up experiences under PACC 1, especially promotion of the practice known as sowing and harvesting water to reduce vulnerability from water scarcity.[17]

[17] This activity replaced an earlier planned activity: "Integration of ACC criteria into the MEF Incentives Plan for the Modernization of Municipal Management." This proposal from MINAM developed with support from PACC was

CEPLAN activities in local planning are clearly also achievements at the national level: scaling up from pilots and guides for national-level use, while the pilot activities at the local and regional level under CEPLAN are reported in the chapter on Effect 1. In the case of MEF, capacity development was carried out at the regional governmental level, while knowledge management and replication occur at the national level.

Sowing and Harvesting Water National Program

Under PACC Phase 1 and with FONCODES in Phase 2, PACC has promoted the use of mini-reservoirs (qochas in Quechua) near the top of micro-watersheds in the Andes as a relatively inexpensive yet valuable rural technology.

These reservoirs are constructed in small hollows by damming with earthen dikes the downhill exit of water collected from rainfall. Directly uphill from the mini-reservoir are transverse ditches to slow runoff and promote soil infiltration and on nearby slopes other ditches channel water toward the pond. This is "sowing of water" or increasing water infiltration through human efforts. Below the pond further down the small watershed may be more such constructions. Depending on the soil, considerable volumes of water may move down the watershed underground from pond to pond and to springs in various locations. "Water harvesting" is the collection and storage of runoff water in the rustic reservoirs, much of which would normally have simply been lost to further human use.

PACC 2 supported MINAGRI through its participation in the Technical Advisory Committee to outline next steps leading to the new National Program in Sowing and Harvesting Water. While PACC has clearly not been alone in the Technical Advisory Committee, it has played a strong role both financially and technically in the final design of the program found in the recently completed program profile.[18] Beyond numerous national and regional governmental entities, PACC and Helvetas are acknowledged in this project document along with FAO, Global Water Partnership South America, GIZ, and Welthungerhilfe.

PACC 2 and Helvetas took on the task of designing the process and developing tools, as well as the design and processing of results of a workshop were some 15 experiences nationwide were identified and documented. A volume summarizing the experience in this technology was published in July 2016.[19] At the same time, another report was published by MINAGRI on the details of the 15 experiences divided into three basic types: water recharge in subsoils and aquifers; increase in humidity and recharge in situ of soil and subsoil; and surface storage of water.[20] One of these 15 documented experiences was the PACC Phase 1 experience in Cusco: "Sowing and Harvesting of Water in the Micro-watershed of Huacrahuacho."

PACC Partnership with MINAM

---

not accepted by MEF with the argument that ACC is too focused on local circumstances difficult to generalize under a broad concept of incentives.

[18] AGRORURAL. 2016. "Mejoramiento de la Disponibilidad, Acceso, y Uso de Agua para la Agricultura Familiar en Microcuencas Andinas y de Alta Selva. Estudio de Pre inversión. Perfil Programa de Inversión Pública"

[19] MINAGRI. 2016. "Rumbo a un Programa Nacional de Siembra y Cosecha de Agua: aportes y reflexiones desde la práctica. Julio de 2016. Lima.

[20] MINAGRI. 2016. "Informes de sistematización de quince experiencias de siembra y cosecha de agua en el Perú."

PACC 2 has been working very closely with MINAM during its entire implementation through the Directorate General for Climate Change (DGCCDRH). PACC 2 has facilitated technical advice, training activities, consultation with stakeholders, and national meetings with regional governments to assist MINAM to fulfill its duty as a country focal point in climate change.

According to Peruvian INDC,[21] the adaptation component focuses on reducing vulnerability in five priority areas -- water, agriculture, forestry, fisheries and health -- through the inclusion of cross-cutting approaches of disaster risk management. These actions are aimed to increase the adaptive capacity and resilience of communities, facilitating mainstreaming of planning processes and investments. Furthermore, it delineates the path towards climate resilient public infrastructure and the need to consider poverty and vulnerable communities, gender, cross-culturalism, and promotion of private investment.

Currently, Peru is in the process of formulating and implementing a National Adaptation Plan that will allow for the implementation of actions in the identified priority areas included in the adaptation component of the INDC. The NAP will become the national instrument for compliance with the indicators and goals established in the national contributions for adaptation.[22] The NAP seeks to reduce vulnerability of communities and ecosystems against the adverse effects of climate change. The road map contemplates four objectives:

(a) Identify strategies, programs, projects and activities needed for disaster risk reduction and associated negative impacts on society, economy and ecosystems.
(b) Generation of mechanisms for the articulation of adaptation decision making processes
(c) Establishment of national adaptation priorities
(d) Clear guidelines for sectoral and territorial actions

The NAP process aims to facilitate the integration of adaptation to climate change into territorial and sectoral planning with the aim of achieving a low carbon sustainable development.[23] Consequently, the NAP process will help realize the contributions to adaptation included in the INDC, while partially contributing to Objective 1 of the National Strategy on Climate Change (ENCC). The NAP should be updated periodically and evaluated in order to provide evidence on whether adaptive capacity has increased while vulnerability has decreased. Also, it is important to update it periodically to evaluate if further work is needed to be done in other areas, for example in energy or cities.

PACC has played a very relevant role in the consolidation of the national agenda in climate change led by MINAM following the COP 20 and the signing of the Paris Accord. During COP 20, PACC 2 and its allies set up the Water and Mountain Pavilion in which adaptation advances throughout the country were presented. In like manner, in 2014 and 2016 various national policy instruments were approved

[21] Peru Intended Nationally Determined Contribution. Available at <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Peru%20First/iNDC%20Per%C3%BA%20castellano.pdf>

[22] UNFCCC. Peru Third National Communication. Available at <http://unfccc.int/resource/docs/natc/pernc3.pdf>

[23] Peru National Contribution-INDC: agenda for a climate responsible development. Available at <http://www.minam.gob.pe/cambioclimatico/wp-content/uploads/sites/11/2015/12/LA-CONTRIBUCI%C3%93N-NACIONAL-DEL-PER%C3%9A1.pdf>

including the Nationally Determined Contributions, which includes a chapter on adaptation, and the updating of the National Strategy on Climate Change to which PACC made an important contribution.

PACC 2 also contributed to the institutionalization of InterClima as an annual event to share and update the advance of attention to climate change in the country. PACC also launched the InterClima in Cusco as a way to decentralize and disseminate knowledge out to the regions. InterClima is now under MINAM management with the support of other organizations.

Assistance to MINAM in the National Adaptation Plan (NAP)[24] had begun with support by PACC to the process of formulation of the Nationally Determined Contributions (NDCs). PACC 2 joined the Technical Support Group for NDCs for the adaptation chapter and participated in workshops and working meetings in which country priorities were defined. PACC also facilitated two consultancies to define contributions in adaptation and another to design a strategy of involvement of necessary actors. The final report on NDCs was provided by Peru to the UNFCCC in October 2015.

In July 2015, it was agreed by MINAM that PACC would support the Multi-sectoral Commission in the development of the NAP and provide a consultant to assist in defining the structure of this document through a major consulting process within the Commission. Between February and March 2016 five thematic workshops were held in: water, agriculture, fisheries, health, and forestry to strengthen NAP objectives, goals, and indicators. Finally, by mid-May 2016 a workshop was held to validate NAP components in which objectives were presented and strategic sectoral and cross-cutting orientations were reviewed. Themes of gender, multi-culturalism, and inter-generationality were also discussed for inclusion.

Product Valuation under Effect 4: Effectiveness	
Product 4.1: Public rural development policies incorporate adaptation to climate change based on evidence	Moderately satisfactory
Product 4.2: Existing Public Mechanisms Scale Up Rural Adaptive Responses	
4.2.1 Work with MINAGRI	Highly satisfactory
4.2.2 Work with FONCODES - HW	Highly satisfactory
4.2.3 Work with CEPLAN	Satisfactory
4.2.4 Work with MEF	Satisfactory
4.2.5 Work with NAP	Satisfactory
Product 4.3: Mechanisms of national- regional dialogue formulated in the face of climate change. (InterClima)	Satisfactory
Product 4.4: Needs and adaptive responses in high Andean rural populations are made visible in global dialogue	Satisfactory

[24] A description of this activity is provided in the 2015 Annual Report and the 2016 Semester report (June 2016), but the activity is not tracked in the M&E system. This is because at PACC 2 program inception in 2013 MINAM had not yet opted to do a NAP.

Conclusions on Effectiveness

The evaluation team has been given the following questions: Was the institutional set up effective and cost efficient? To what extent have the objectives been achieved? What are the major factors influencing the achievement or no achievement of the objectives? How effective was PACC 2 in consolidating the results chains? How effective was PACC 2 in linking implementation action with public policies and promoting contributions? Are PACC 2 outcomes and outputs in alignment with the originally defined objectives and were these outcomes and outputs achieved?

Appraisal of the effectiveness of PACC 2 has been mixed, running from moderately satisfactory to highly satisfactory. However, four work models have been particularly successful under PACC 2. The term model is used here rather than orientation or focus, because they are appropriately developed for replication to other regions or countries.

The first successful implementation model of PACC 2 has been institutional strengthening in climate change in both Cusco and Apurímac. The success of this model is based in PACC Phase 1 and in the work linked to MINAM which during PACC 2 (2013-2016) was already providing support along with other cooperating agencies to Regional Strategies in Climate Change. PACC played a role of facilitator that made it possible to disseminate techniques and practices of adaptation to climate change discussed in various places and platforms for concerted action that in conjunction with trained farmer promoters allow technology transfer and galvanize agro-pastoral production, ensuring in this way the adoption of adaptive practices and technologies for climate change. Within CORECC and CAR it was made clear that all NGO and public investment in rural development projects must include these practices and technologies. Over the long run this promotes an increase in investment with a focus on climate change.

The second successful model has been the work with FONCODES-HW that also became key to subsequent work with MINAGRI. In this model three key factors came together: (a) the Phase 1 experience that consolidated and synthesized learning; (b) leadership and political commitment of officials at the highest level of both institutions; (c) the opportunity provided by the occurrence of the El NIÑO phenomenon on Peruvian shores announced in July 2016. In like manner to the first model, PACC's contribution was focused on its methodological capacity for documenting experiences and scaling these up which was necessary for political advocacy.

Because of this documentation, this model could have been replicated (horizontal scaling) as well through other international cooperation projects in Cusco and Apurímac. In Cusco alone, the Cusco Regional Management (Gerencia Regional de Cusco) has a register with 200 NGO agro-pastoral technicians and 300 field agro-pastoral professionals linked to the regional government.

The third successful model has been PACC's contribution to the creation of the Master's in Climate Change and Sustainable Development in UNSAAC. This represents an excellent example of the role of facilitation based also on a Phase 1 diplomate course in climate change realized with the support of the SSE consortium. In this model the major actor (UNSAAC) was supported to access experts located outside the region and which were necessary to give quality to the course. This master's program today is self-sustaining, and the university has been able to retain the same group of professors that launched it.

The fourth successful model is the contribution of the Swiss Scientific Entities that have been instrumental in the work of capacity strengthening in research for professors and other teaching staff. It is appropriate to say that the SSEs are capable of continuing the work carried out under Product 3.2 without support from PACC. This model is successful in part due to the high level of experience brought by the SSEs that are attractive for national universities, as well as for their flexibility in extending their actions to other universities and to other places with greater development options, such as Lima.

The following models require greater refinement and improvement:

The work with MEF and CEPLAN has remained at the level of planning and methodologies and with final results that no longer depend on PACC 2, since they require greater leadership from the lead ministry (MINAM). For short-term projects such as PACC 2, other work models should be sought that are more effective and with potential for sustainability over the long run.

Working with MEF methodologies does not ensure that projects designed with valid methodologies will be approved by the evaluation offices of this same ministry at the national level. MINAM should work to ensure a commitment from MEF for all its component offices and dependencies.

Working with CEPLAN requires an agreement with MINAM and cannot simply be transferred to a program. Conformity of development plans with climate change issues is already addressed in the Bicentennial Plan along with its direct implementation through regional and local governments with technical assistance from MINAM for methodological and conceptual aspects.

The courses on PIP development require a coordinated effort between universities,[25] MEF, and MINAM to achieve consensus on conceptual frameworks and methodologies for the various typologies of public investment projects.[26]

These agreements can then be disseminated to be taken into consideration by project proposers and designers at the national level. The Colombian experience is interesting to study because it joins a territorial dimension to investments and in this way relevant actors – including international cooperation – can make more effective contributions.

The preparation of regional research agendas failed to achieve its objective of linking universities to other relevant actors, due in part to the organizational culture of the Peruvian national universities and in part to the advent of the New University Law. These factors were not considered in the analysis of the systemic change roles and funtions.

None of the members of the implementing organizations – except the SSEs – had previous work experience with universities in their research roles, although perhaps some with their teaching functions. It is hoped that to the degree universities strengthen their capacities in research into climate change, these universities can make a more specific contribution to the development agenda.

---

[25] This model was also implemented for the PDRS of GiZ in Cajamarca, Piura, and San Martin.

[26] The Pastures Laboratory of the Agricultural University of La Molina has developed along with MINAM and MEF a conceptual framework for wetlands (bofedales) in a technical note which has been distributed nationally to universities to be used by project designers. (document link)

The success of the facilitation role of PACC 2 is based in the previous experience of PACC 1 and in its methodology capacity for organizing this experience so that other actors can assimilate and replicate them. This model when employed by PACC 2 in its Effect 2 provides evidence of the effectiveness of adaptive technologies through studies – involving key personnel of universities, scientific institutes, and the SSEs – for application in other program components (Effects 1 and 3) and seeks to scale up this experience to similar national programs (Effect 4). It is a model that has functioned well and can be replicated in other contexts.

3.4 EFFICIENCY

Efficiency measures the outputs –qualitative and quantitative – in relation to the inputs. The evaluation team was required to answer the following questions: What is the perception of efficiency relating to the use of SDC funds? Were PACC interventions cost – efficient? Was PACC implemented in the most efficient way compared to the Phase 2 plan, national context, and alternatives? Was the PACC monitoring and evaluation system efficient and replicable, such as for contributing to the national adaptation metrics?

Institutional Efficiency Ratio

Efficiency ratios measure how effectively the organization utilizes its resources per investment unit. The lower the ratio the better, and 50% is generally regarded as the maximum optimal ratio. An increase in the efficiency ratio indicates increased costs to allocate one additional US dollar investment. It is important to note that different organizational models can generate different efficiency ratios. The role of facilitator could help the organization reduce its ratio through collaborative implementation with others or inviting them simply to invest.

To calculate the efficiency ratio all operational costs are placed in the numerator and total investment costs in the denominator. In the case of PACC 2, operational costs represent 34% and the other costs of the program are 66%.

PACC 2 Efficiency Ratio

PACC BUDGET 2013/2016[27]	CHF[28]	US$
A. Operational Costs (34%)	**1,494,349**	**1,524,236**
A.1. Administrative Costs		
Administrative Staff	295,700	301,614
A.2. Maintenance		
Equipment	10,400	10,608
Rental office, combustible, vehicles maintenance.	267,496	272,846
A.3. Other administrative costs		

[27] There was an additional budget of CHF 1.1 million ($1,120,000) for the SSE-led work, which is not considered in this analysis.

[28] Exchange rate Swiss franc (CHF) to U.S. dollar: 1 CHF = $1.02

Service Headquarters	73,520.00	74,990.40
Local offices (staff of implementing consortium)	787,233.00	802,977.66
Short term consultants	60,000	61,200
B. Program Investment (66%)	**2,854,732**	**2,911,827**
B.1. Specialists		
Long term staff in Lima, Cusco, Apurimac	1,373,872	1,401,349
Travel expenses	52,260	53,305
B.2. Program Components		
Effect 1	350,000.00	357,000
Effect 2	525,600.00	536,112
Effect 3	220,000.00	224,400
Effect 4	333,000.00	339,660
Organizational efficiency of PACC 2		
Cost of placing one 1 USD de investment (A/B)		**0.52**

Following the same criteria mentioned in this report, the efficiency ratio of similar international cooperation projects with the Peruvian government with an emphasis on facilitation has been calculated. In this comparison, Phase 1 of PACC has been included and obtained a ratio of 0.45 from which it can be deduced that PACC 2 was not as efficient as PACC 1 or as the other projects selected, as can be appreciated in the following table.

Program	Implementing Entities	Efficiency Ratio
PRODATU[29] 2002-2008	DEVIDA and KfW	0.29
Proyecto de Adaptación al CC Cuatro Cuencas. PET 1168 [30] 2012-2014	BID-MINAM	0.34
PACC –1 2009-2012	SDC-MINAM	0.45[31]

Contributions of the Implementing (Facilitating) Consortium to the Program and Levels of Effort

In accord with responsibilities assigned to each partner of the consortium, Helvetas had the highest level of effort with 68% of the total, followed at some distance by PREDES at 15% which together with the SSEs (12%) were responsible for Effect 3 and collaborating as well under Effect 4, especially during COP

[29] Evaluación Final Externa. Programa de Desarrollo Alternativo Tocache Uchiza PRODATU. 2007. PRODATU. DEVIDA. KfW. pág. 38

[30] Calculado para este reporte con datos del Informe Final del Proyecto, octubre, 2014. Josefa Rojas.

[31] Calculado del reporte final Fase I PACC / Febrero, 2012, pag. 34

20 and the events of the InterClima. Libélula was responsible for 6% of total level of effort, contributing to PACC objectives under Effect 4 through advisory services to the MINAM negotiating team and sharing support to the M&E Plan with Helvetas, including conducting a value added study of PACC's activities under Haku Winay.

Level of Effort by Product of the Members of the Implementing Consortium				
	HELVETAS	LIBELULA	PREDES	SSE
Effect 1 (4 products)	4			
Effect 2 (4 products)	4			
Effect 3 (4 products)	0.5		2.0	1.5
Effect 3 (4 products)	2.5	0.5	0.5	0.5
M&E (1 product)	0.5	0.5		
	11.5 (68 %)	1 (6%)	2.5 (15%)	2.0 (12%)
Own elaboration for this report				

The PACC 2 team was charged with implementing work plan activities in coordination between Lima, Cusco, and Apurímac. It is led by the program National Coordinator based in Lima who is responsible as well for advocacy and scaling activities under Effect 4. She works closely with the deputy coordinator based in the Cusco project office who is responsible for all field operations and coordination with authorities and allies in both Cusco and Apurímac.

In Apurímac, the program works out of an office in the regional government in Abancay, where two technical advisors were located responsible for Effects 1 and 2. From the office in Cusco PACC provides program services in logistics, administration, as well as in M&E and communications for both regions. The coordinator for Effect 3 provided by PREDES fills out the team and provides liaison with the universities of both regions and communications with the SSEs. The technical advisors for Effect 1 and 2 for the Cusco region are also attached to this office.

The basic program team in the field is thus composed of two technical advisors for institution building and productive technologies in each region, a manager for M&E, and an advisor in communications. This structure is in accord with the PACC facilitation role: establish relationships with allies and offer technical assistance directly or through consultants and training in fluid coordination with project leadership in Lima for advocacy actions.

A certain absence of synergy was noted in strategic aspects of the program that have not allowed taking advantage of existing capacities of members of the consortium or discouraged their participation in new institutional learning experiences. The regional research agendas should have counted with the participation of the SSEs, and work with the private sector was not undertaken by any of the consortium members. The same observation can be made for inclusion of attention to gender issues.

M&E reports delivered by the program were delivered on time and with a high level of information. The M&E Plan (p.17) spells out PACC team responsibilities and two persons are placed in charge of M&E: one responsible for operational monitoring and learning management and another specialist in impact monitoring and appraisal. The person originally in charge of impact monitoring and valuation was not replaced leaving only one person for all aspects of monitoring who was also responsible for learning management. This explains why there have not been any systematic monitoring reports on indicators of

effect-impact[32] and the difficulties of integrating the consultancies carried out by GRADE, the study of value added of PACC to Haku Winay, and the baseline build from data supplied by FONCODES. Even with reports from these three types of impact evaluation, the evaluation team had difficulty coming up with adequate measures of impact.

Responses to Basic Questions on Program Efficiency

Were PACC interventions cost – efficient? Was PACC implemented in the most efficient way compared to the Phase 2 plan, national context, and alternatives?

The institutional cost efficiency of PACC is above 50%, meaning that there is room for improvement compared to other similar projects.

Was the PACC monitoring and evaluation system efficient and replicable, such as contributing to national adaptation metrics?

The PACC 2 M&E system was very well designed as much in the definition of indicators as in the logic of the chain of results, with a clearly appreciable level of sophistication from the conceptual point of view. This was well grounded at the operational level (level of activities and products), but not well grounded in the monitoring of effects and impacts that would allow for periodic and systematic measurements of data. This deficiency affects the measurement of the net value of the program that for this evaluation took on conservative values.[33] In a program with a facilitation role, it is important to have this information since it measures what is obtained through others (action of PACC—actions of others). The M&E system is replicable for other projects similar in design. However, improvement is required in the implementation of the plan at the strategic level.

Valuation of the Institutional Efficiency of PACC 2: Moderately satisfactory.

3.5 Impact

Impact involves the main positive and negative changes and effects resulting from the activity on the micro and macro social, economic, environmental and other development indicators.

The specific objective of PACC 2 impact was an "increase in the adaptive capacity of rural high Andean subsistence farming populations faced with climate change." This was qualified to mean that change would occur in priority areas of Cusco and Apurimac because of: regional and local governmental actions (Effect 1); strengthening of rural farmer knowledge and adaptive practices (Effect 2); improved capacities in university research and researcher training (Effect 3); and scaling up these actions, knowledge, practices, and skills to higher geographic or governmental levels for widespread replication (Effect 4).

---

[32] Information on minor PIPs carried out by municipalities or new projects generated by members of CORECC and CAR that report on advances in the chain of results.

[33] Solo se incluyeron proyectos de inversión del sector ambiente.

Each of the four impact indicators reviewed below pertains essentially to one of the four program effects, and three measure accomplishments at the level of people or households. These are proxy indicators that serve to capture essential steps on the way to the specific objective of increased adaptive capacity of subsistence farmers of the high Andes.

PACC 2 Impact Indicators

Ultimate PACC 2 impact was defined as: "Vulnerable rural populations in the high Andes of Apurimac and Cusco increase their adaptive capacity to the principal challenges of climate change, reducing the impacts on their means of livelihood through effective actions carried out by public and private actors."

The PACC Monitoring and Evaluation Plan contains four impact indicators: one linked to households benefitting from PIPs supported by PACC; one linked to households benefitting from PACC-supported Haku Wiñay activities in pilot and replication areas; one focused on public mechanisms to scale up adaptive measures developed in rural areas by PACC and its partners; and one focused on professionals and leaders with strengthened skills and capacity who contribute to climate change management from their positions.

	Indicator	Status	Observations
I.1	30% of beneficiary households of public investment projects (PIPs) supported by PACC report satisfaction with the positive impacts of these projects.	None of the supported PIPs (4 in Apurimac and 1 in Cusco) have yet been enacted, although the one in Cusco has reached the feasibility analysis stage.	In early 2016 PACC reported that this indicator would not be measured in PACC 2 life of project.
I.2	50% of beneficiary households of Haku Wiñay in Cusco and Apurimac have incorporated criteria and actions for ACC in the implementation of their productive technologies and identify future benefits.	Achieved: 60.67% of a total of 4,558 families (includes expansion of training and TA to 8 other NECS beyond pilots -- 10 districts in all). Pilots reached original 1,294 families of the two district pilots.	It should be noted that the goal for this indicator was revised downward from 80% to 50% in 2015 prior to the final M&E measurement.
I.3	At least 2 public sector mechanisms develop decisions and actions to scale up climate change adaptive measures in rural areas that reflect experiences and learning developed through PACC partners.	Achieved: 2 entities have been able to achieve scaling (FONCODES and MEF), while 3 others are still waiting or scaling is conditioned on further actions (MINAM, MINAGRI, and CEPLAN).	This indicator does not qualify as one of impact but is rather much the same as the effect reported under E.4.1 and is means to an end only.
I.4	More than 2,000 public sector managers, farmer-extension agents, post-graduate students, and other promoters of development have strengthened skills and capacity that they bring to the management of adaptation to climate change from their positions.	Achieved: 2,880 professionals and leaders (functionaries, professors, researchers, and community leaders) already by March 2016.[34] No final figure yet reported by PACC.	Reported for December 2015 annual report. This is also a measure of means to an end of impact on populations. No report on 2016 yet available.

[34] Partial final measurement carried out in March 2016 but incorporated into the 2015 Annual Report.

To report on impact indicator values, PACC 2 commissioned six special qualitative studies to report on the perception of impact with several stakeholders and participants benefiting from PACC 2.[35]

In the original M&E Plan (not finalized after 2013) another four impact indicators were specified:

(1) % of municipalities that have viable minor PIPs that contribute to the reduction of vulnerability in the face of climate change.
(2) % of municipalities that assign a budget for the implementation of minor PIPs that contribute to the reduction of vulnerability in the face of climate change.
(3) % of beneficiaries of public investment projects supported by PACC that benefited from products and services resulting from these projects.
(4) % of rural households of the Haku Winay project in Cusco and Apurímac that show improvement in their means of livelihood resulting from the use of technologies or criteria of adaptation to climate change.

These indicators are relevant to PACC 2 in its role of facilitator and they are taken into consideration to calculate the PACC net present value (NPV)[36] described at the end of this chapter.

The final PACC M&E document also reports that progress has been made in 14 of 15 strategies of the Regional Strategy in Cusco. This indicator measures overall progress under Effect 1 and breaks out 464 projects, policies, areas, studies, organizations, centers, municipalities, published research, experiences documented, coordination mechanisms, of which 381 are strengthened producer organizations. This can be considered full achievement in Cusco region. In Apurimac, however, the first post-baseline measurements will not be made until after the closing of PACC 2, but it is expected to be at a similar level of achievement.

PACC indirect impact is also found through CORECC and CAR and the level of influence leveraged by all the public entities and NGOs that are formulating new projects that include productive technologies benefitting high Andean communities in Cusco and Apurimac. This broader impact results from PACC's role as facilitator, working through others to achieve results.

The value-added provided by PACC to household productive practices in its partnership with the FONCODES - Haku Wiñay project, consists of improved agro-pastoral measures that explicitly consider increased climatic swings, more frequent extreme events, and a long-term shift to a drier climate, reducing water availability for crops, livestock, and people. These enhanced technologies are focused on future expected climate events and trends, thus rendering the rural population less vulnerable and more resilient in the face of these challenges. Sowing and harvesting of water has been promoted by PACC since its experience in Phase I. This experience has not only been extended to Haku Wiñay under

[35] GRADE carried out semi-structured interviews with collaborators with PACC in five national governmental entities (MINAM, MEF, FONCODES, MINAGRI, and CEPLAN). Other peer interviews and a workshop with 12 families benefitting from FONCODES HW and another 12 without. The same methodology of peer interviews and workshop was carried out with yachachiqs from Cusco and Apurimac, officials from the two regional governments, and officials, academics and students held a workshop with universities on "Research and incorporation of climate change into national universities". Another workshop with regional governments "Management in the face of climate change: Reflections from Regional Government's. It was also an interview to master's level students in UNSAAC.

[36] Or net present worth.

Phase 2, but also capitalized upon by MINAGRI which intends to scale this technology up to the national level.

The role of promotors (yachachiqs) has been key in the promotion of these productive technologies. Beyond their technical knowledge, yachachiqs also have tangible qualities that assist them to achieve results (i) the social work they carry out to maintain the interest and commitment of families; (ii) their ability to encourage improvements and innovation that ensure that adaptation becomes a continuous process in most families. By virtue of their role as intermediaries with rural high Andean families, their presence ensure improvements in productive practices and sustainability of benefits.

Value-added from PACC to the Haku Wiñay Project

In 2016, the PACC 2 consortium completed a study on the additional value that PACC brought to Haku Wiñay in its component of productive technologies in subsistence agriculture.[37] The study combined gathering scientific knowledge of the physical, environmental, social, and economic impacts of incorporating measures to enhance resilience to climatic change into Haku Wiñay productive technologies. The study relied on quite small samples of participating families: 10 of the 535 in Cotaruse (Apurimac) and 11 of the 749 in Ocongate (Cusco).

The value-added study identified tangible & intangible benefits perceived by the families:

TANGIBLE BENEFITS	INTANGIBLE BENEFITS
✓ Protection against climate change and climate variability ✓ Food security ✓ Improved family economy ✓ Improved water availability and efficiency of use, and enhanced agricultural production	✓ Awareness of climate change ✓ Empowerment ✓ Strategic thinking ✓ Organizational capacity.

A final section of the value-added study deals with the benefits of introduction by PACC of the practice of family competitions or contests in the promotion of the technology of sowing and harvesting water. Five contest winning families in each NEC were interviewed for their perceptions, and most were pleased with the process and learning associated with participation.

This value-added study is entirely qualitative and based on interviews with small numbers of yachachiqs and beneficiary families. While it does validate the transmission of valuable climate change adaptive practices from PACC advisors to yachachiqs to families, it fails to provide even rough approximations of what these ACC-enhanced practices might yield in terms of increased agro-pastoral production, food security, and revenue generation.

Gender Equity

[37] PACC. 2016. "Estudio Cualitativo de los Indicios del Valor Adicional en los NEC Cotaruse y Ocongate en el marco de la intervención Haku-Wiñay – PACC." June 5, 2016.

There is evidence from the field that the use of productive technologies has great impact on women`s lives. Women are at the nexus of several productive technologies in and around the family homestead: irrigation of crops and improved pasturage in small fields near the house, cultivation of vegetables in the improved gardens and small greenhouses in the courtyard or near the house, the collection and use of organic fertilizers on gardens and nearby cash crops, and the raising of small animals, particularly guinea pigs. Women's productive roles become key to longer term capacity building.

3.6 PACC Program NET PRESENT VALUE

The PACC 2 specific objective is**: "**Vulnerable rural populations in the high Andes of Apurimac and Cusco increase their adaptive capacity to the principal challenges of climate change, reducing impacts on their means of livelihood through efficient actions carried out by public and private actors" (PACC 2 M&E Plan).

The cost-benefit analysis of the program will take into account four indicators from the original M&E Plan of 2013:

(5) % of municipalities that have viable minor PIPs that contribute to the reduction of vulnerability in the face of climate change.
(6) % of municipalities that assign a budget for the implementation of minor PIPs that contribute to the reduction of vulnerability in the face of climate change.
(7) % of beneficiaries of public investment projects supported by PACC that benefited from products and services resulting from these projects.
(8) % of rural households of the Haku Wiñay project in Cusco and Apurímac that show improvement in their means of livelihood resulting from the use of technologies or criteria of adaptation to climate change.

The following section presents an analysis of changes in farm household livelihoods, separating those that were induced by CORECC and CAR and those resulting from the Haku Wiñay project with PACC partnership.

PACC promoted a program logic inserted into a management system facing climate change promoted by the regional governments and CORECC/CAR, building inter-institutional spaces for knowledge building and the implementation of rural adaptation practices in the two regions.

From the beginning, PACC 2 played a facilitator role within this complex of public and non-governmental organizations that made it possible for techniques and practices of adaptation to climate change to be socialized and debated, then transferred to trained local farmers ensuring adoption of practices that will limit negative climatic impacts.

Improvement in income of rural families of Cusco and Apurímac

PACC sought to bring about changes in priority areas of Cusco and Apurímac as a result of efficient public and local management linked to policies on climate change. CORECC focused intended impact on the means of subsistence (resources and assets) of rural families, which include natural resources, technologies, knowledge and capacities, financial sources, and social support networks.

The first monitoring report on the implementation of the ERFCC in the Cusco region shows the broad participation of public and private organizations in implementing projects that cover a good part of district municipalities and in which interventions of municipalities, regional directorates, and NGOs complement each other and come together in local areas[38].

Investment through PIPs (environmental function of SIAF) and NGO projects have allowed families to adapt their production systems to the effects of climate change, facilitating the implementation of agro-ecological practices to recover crops and protect watersheds, introduce new irrigation techniques, promote new family economic initiatives, and strengthen communal organizational structures.

Determination of PACC coverage in districts and families employed the following criteria:

- Districts had to be within the intervention area of a regional PIP classified as having an environmental function related to the implementation of ACC technologies.
- Districts that are in the intervention area of special regional projects and of NGOs that are part of the CORECC, excluding those districts where Haku Wiñay has intervened (which will be analyzed separately).
- In these districts only rural families were selected, understood (as classified by INEI) as families living outside the district capital or that live in places with fewer than 100 contiguous houses.
- Within the group of identified families, two types of beneficiary families are considered: (a) one-third of those families received an intensive intervention through actions carried out by public and NGO organizations; and b) two thirds of families had a less intensive intervention with lesser impact as a result.

The following is a summary of families identified as part of coverage achieved by entities that worked with PACC in Cusco and Apurímac:

	Districts	N° of Rural Families	Investment in PIPs / NGO co-financing
Cusco and Apurímac	85	61,298	61,303,928
• Cusco	36	37,936	32,149,208
• Apurímac	49	23,363	29,154,720

The book “Rumbo hacia un Programa Nacional de Siembra y Cosecha de Agua: Aportes y reflexiones desde la práctica” (MINAGRI, 2016) considers that the impact of implementation of ACC practices can be appreciated in agro-pastoral income after only two growing seasons, compared with a control group of

[38] The NGOs without exception report to their funding sources the actions they carry out with local and regional public organizations.

non-implementers. The differential in agricultural income before and after a project is used as an indicator of changes between families, considering that full maturity of investments is ten years.

Agro-pastoral income is obtained by the summing of production values of different crops and livestock production of families, discounting expenses incurred. In this case the net increase is estimated for agro-pastoral income of families that received support for the implementation of technologies and practices related to ACC.

The estimate of net change in family income of families takes as reference point data collected on families of the Sierra Sur II project between 2012 and 2015 in districts of Cusco and Apurímac[39]. Monitoring results show that changes in the composition of agro-pastoral income resulted from effects attributable to ACC-related interventions and that income in families not receiving these interventions were oriented in much greater measure to off-farm income sources.

Expected changes in income and incremental costs are:

	N° of Families	Increase in Net Income per Family (USD)	Aggregate Increase of Income (USD)	Cost of Maintenance per Family (USD)	Aggregate Cost of Maintenance (USD)
Total Families	61,298				
● Families increase their means of livelihood – intensive intervention	20,433	250	5,108,167	100	2,043,267
● Families increase their means of livelihood – non intensive intervention	40,865	150	6,129,800	60	2,451,920

These estimated effects are related to the results of two other documents financed by PACC:

- A study on the effectiveness of practices of sowing and harvesting of water[40], concludes that despite the fact that "at the global level in the *Huacrahuacho* watershed the impact of filtration from *Qochas* is not very high, it is on the micro level. Finding traces of water from *Qochas* at a short distance guarantees small local economies a period of water that supplies springs that serve as zones of pasturage in a region where the total annual rainfall does not exceed an average of 826 mm."
- A synthesis study of sowing and harvesting of water presents the experience of the CCAIJO in Cusco that concludes that over ten years:[41]
  "The volume of water collected (*"harvested"*) in the high part of the micro-watershed of *Ccatccamayo* went from 0 M3 to 940,000 M3, which has allowed an increase of irrigated fields for farm families of

[39] See: MINAGRI-FIDA (2016). "Final Report of the Sierra Sur II Project." It presents monitoring reports on 929 families with Management Plans in Natural Resources and 1,700 families monitored with Business Plans for the agricultural campaigns of 2012 and 2014. Area of Cusco, Apurimac, Arequipa and Puno.

[40] PACC (2016). Technical report. "Consolidar evidencias sobre la efectividad de las prácticas de siembra y cosecha de agua, en base a estudios hidrológicos e hidrogeológicos realizados en la microcuenca Huacrahuacho". Consultant: Wilson Suarez.

[41] See: "Cosecha de agua en la microcuenca de Ccatccamayo, distrito de Ccatcca, Cusco. Luis Casayo, CCAIJO". In MINAGRI-PACC. Reports of syntheses of 15 experiences of water sowing and harvesting in Perú. Pp. 174-187.

208 hectares allowing them to cultivate pasturage, mahuay potatoes, and vegetables, products that were not usual previously in these communities."

In this last case, variation of income from agro-pastoral activities is reduced due to the greater security of water supply provided by greater retention of water in the soil even given the rise of evapotranspiration as a result of climate change: *"The evapotranspiration potential (ETP) has gone from 1035 mm (in 2002) to 1189 mm (in 2012), and in the same way the reserve of water in the ground (RES) has gone from 5.14 Lts / M2 (in 2002) to 119.06 Lts / M2 (in 2012)."*[42]

Improvement in income by families assisted by Haku Wiñay in Cusco and Apurímac

The impact study carried out by GRADE provides evidence on the general impact of Haku Wiñay on productive technologies of subsistence farmers of the high Andes.[43] The study compared households enrolled in Haku Winay to a control group and concludes that there is clear evidence of an increase in agro-pastoral farm income due without any doubt to the Haku Wiñay intervention (cf. pp.88-98).

Those results, even though not obtained in Cusco and Apurimac, can be extended these regions, especially taking into account that these were regions with greater progress related to the implementation of ACC measures by families of the high Andes and where PACC carried out work with the whole group of public and private organizations involved in this theme.

In the workshops conducted by GRADE[44] with farm families of the Cusco and Apurimac communities, one aspect mentioned by these families as a change in their lives is the presence of different state social programs (local, regional and national) and development NGOs. In all communities, families reported having participated in more than one program provided by different organizations with similar activities and done consecutively.

The PACC work carried out with Haku Wiñay has to be seen as it comes out in the workshops with families as a single package of technologies. Taking in account that water supply is the key factor that triggers adoption of other technologies, it has been a central aspect of the proposal implemented by PACC.

The coverage of the Haku Wiñay project in Cusco and Apurímac is as follows:

[42] Idem., p. 185.

[43] GRADE (2016), "Combinando protección social con generación de oportunidades económicas: Una evaluación de los avances del programa de Haku Winay." Mayo 2016. The study was not carried out in Cusco and Apurimac, but in similar high Andean zones.

[44] Entrevista de Pares y Talleres con Familias Campesinas. Informe Final. GRADE. October 2016.

	Districts	N° of Beneficiary Families of Haku Wiñay	FONCODES Investment per Family (USD)	Aggregate FONCODES Investment (USD)
Cusco and Apurímac	30	10,331	1,103	11,395,673
• Cusco	12	3,664		
• Apurímac	18	6,667		

The average income impact of the intervention is similar between those that received less attention and those that received greater attention from Haku Wiñay. The difference can be seen in those that got involved in business plans. The net effects from the intervention can be seen as part of the impact generated by PACC, distinguishing two types of beneficiaries:[45]

a) Beneficiaries with no business plans have an average net increase in income of 269 USD (910 soles)
b) Beneficiaries with business plans have an average net income increase of 325 USD.

The following table presents a summary of the assumptions made:

Haku Wiñay Program	N° of Families	Increase in net income per family (USD)	Aggregate Increase in income (USD)	Cost of maintenance per family (USD)	Aggregate cost of maintenance (USD)
Total of Families	**11,936**				
• Families with business interests	3,979	325	1,293,655	150	596,800
• Families without business support	7,957	269	2,142,359	70	557,013
•					

Economic Benefit return on investment

[45] "Households manage an asset base and different capacities and, when faced with a set of options they can accept some components and reject others. The business inclusive component was exclusively directed to those organizing into associations, who compete and earn the possibility of engaging in entrepreneurship.

This subgroup of beneficiaries launch their enterprises after creating associations with other producers —or taking advantage of already existing associations. This means that the enterprise opens the possibility of strengthening collective action. Secondly, the enterprise necessarily implies greater linkage to product markets." GRADE (2016). Ob. Cit. Pp. 100-101.

Exchange rate	3.38
Social discount rate	9%
Relation Prices Account	1.0
Net income flow	10 years
Inflation equal to exchange rate	

Net Present Value or Worth (USD)	$ 29,757,184
Internal Rate of Return (IRR)	29.0%

Incremental Net Benefits

The flow of benefits corresponds to incremental net incomes generated through family initiatives. Net incomes are equal to the sum of the gross value of production from crops and livestock raising, less the costs incurred during production.

Net benefits generated from the implementation of PIPs and NGO projects are differentiated from net benefits realized by beneficiaries of the Haku Wiñay project. Net benefits increase at a rate of 5% through time as implemented technologies gain effectiveness.

The social discount rate is 9% for the aggregate value added calculation.

Costs of the Intervention

The initial investment considers the cost of the PACC Program, the cost of PIPs, costs of NGO projects, and costs to FONCODES in working with families in the two regions evaluated.

The cost flow corresponds to the incremental cost of maintaining the technologies. These costs increase at an annual rate of 5%.

Results of the Intervention

The net present value of 29.7 million dollars represents the estimated value of wealth generated by society by means of the combined actions set in motion by the PACC 2 program. The discounted streams of income minus costs over 10 years is presented in Annex 2.

The IRR of 29% shows that the social investment of the combined interventions that accompanied PACC represent a level of return on investment acceptable to the market.

3.6 SUSTAINABILITY

Political and Institutional Sustainability

It is clear that the political and institutional sustainability of PACC 2 achievements are based in the public and non-governmental institutions – CORECC, CAR, and UNSACC – that brought change to the local

level.[46] CORECC in Cusco has maintained active participation of some 36 of 60 organizations in activities related to the Regional Strategy for Climate Change. Some organizations such as Arariwa and ACCA (Asociacion para la Conservación de la Cuenca Amazónica) are picking up activities that PACC carried out as part of its institutional capacity building role. The organizations that compose CAR in Apurimac, such as CESAL and CICCA, also have solid commitments to sustaining the implementation activities of the Regional Strategy in Climate Change.

The six district development plans drawn up with CEPLAN are on their way to receiving their Institutional Plans (PEI). There would appear to be no barrier preventing these district municipalities from obtaining budgets for implementing some ACC activities in 2018.

At the university level, the Master's program in Climate Change and Sustainable Development is heading into its third class with professors retained for instruction and is already under UNSACC management.

Collaboration between individual members of the SSE consortium and the project on climate change perceptions is continuing. Research partnerships have even been extended to outside the SSE, now involving additional researchers at the University of Zurich (UZH) to bring in new knowledge and their own funding contributions. Moreover, an agreement on collaboration between UNSAAC and UZH was signed in August 2016, confirming the interest of both universities to continue collaborating in the future beyond PACC. The two research activities in conjunction with the Swiss Scientific Entities are moving forward, although will be completed after the formal end of PACC. All in all, the sustainability of institutional and strategic accomplishments in adaptation to climate change seem assured at the Cusco and Apurimac regional levels.

The work undertaken nationally through at least five public entities (MINAM, MINAGRI, MEF, MIDIS, and CEPLAN) has great potential for future scaling and impact at the national level. In the case of MINAM, MINAGRI, and MIDIS (especially FONCODES) scaling activities in ACC are already occurring at the national level and should continue. This is particularly evident in the Haku Winay project of FONCODES.

On the other hand, MINAM continues to direct national-level actions in conformance with the UNFCCC commitments. According to the Peruvian NDCs[47], the adaptation component (NAP) focuses on reducing vulnerability in five priority areas: water, agriculture, forestry, fisheries and health, through the inclusion of cross-cutting approaches of disaster risk management. In two of the five priorities, PACC 2 make significant contributions in Cusco and Apurimac, especially testing indicators in their implementation plans (PIERFCC) that could be taken into the NAP monitoring and reporting system.

Social Sustainability

[46] UNAMBA may be less sustainable.

[47] Peru Intended Nationally Determined Contribution. Available at <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Peru%20First/iNDC%20Per%C3%BA%20castellano.pdf>

While there is no doubt that the joint FONCODES/PACC intervention in pilot areas under the Haku Winay project has increased the number and quality of adaptive productive responses of the local populations, it is expected that local governments will continue to providing some resources to maintain project achievements. Cotaruse Municipality has already supported water sowing and harvesting in almost every community through competitions.

The productive practices promoted by Haku Winay and enhanced by PACC 2 such as qochas, spray irrigation, greenhouse vegetable gardening, use of organic fertilizers, and improved pastures should continue to provide benefits to families, but qochas already have a 60% acceptance level in communities. The critical need for water, particularly in the dry season, is likely to ensure that families will continue to maintain and spread qochas.

There is also evidence from the CORECC first monitoring report (October 2016)[48] that new projects related to water management for Andean communities have been approved and are on the way to implementation. In addition, the report states that a number of small producer associations with new productive technologies and economic activities have surpassed by 164% their original production targets. Furthermore, nine municipalities are reported to have included climate change in their development planning process, and there has also been a 42% increase in the number of projects related to ecosystem recuperation.

The role of project promoters (yachachiqs) has been key in the promotion of the standard package of productive technologies and the enhanced measures offered by PACC. Yachachiqs are very well known in Cusco and Apurimac and they are often hired by rural development projects. Beyond their technical knowledge, there are intangible qualities that assist yachachiqs to achieve results: (i) the social work carried out by these promoters to maintain the interest and commitment of families; and (ii) their ability to encourage improvements and innovations that ensure that adaptation becomes a continuous process in a majority of beneficiary families. By virtue of their role as intermediaries with rural high Andean families, their presence ensures improvements in productive practices and sustainability of benefits.

The evaluation team also found that experienced yachachiqs, trained in productive technologies and in adaptation to climate change, are employed by local district municipalities in public investment projects, and they are maintaining their skills in their home communities and providing services to others.

There is widespread confidence that there are more concrete activities leading to increasng resilience to climate change among Andeans populations than before the PACC intervention.

Economic and Financial Sustainability

The technologies promoted by PACC are of low cost to families which facilitates their adoption. It is hoped that families with support from local governments can maintain and improve their new technologies. According to the Program of Sowing and Harvesting Water,[49] systems of water storage can become significantly cheaper than traditional dams and reservoirs implemented with public

[48] Reporte de Monitoreo del Plan de Implementación de la ERCC. See Annex 7 of this report.

[49] MINAGRI, 2016. Rumbo a un Programa de Siembra y Cosecha de Agua.

investment. In the PACC experience an investment of 250,000 soles in 146 micro-reservoirs with family contributions resulted in the storage of 83,177 m3 of water, making these qochas much less costly than earthen reservoirs of 50,000 m3 costing some 500,000 soles each.

In terms of public investment projects, smaller PIPs are surely the most effective ways to achieve financial sustainability of the technologies promoted by PACC with Haku Winay.

With respect to the 13 projects formulated during the MEF Course in PIP development, these are all awaiting opportunities to be funded. On the other hand, if MINAM continues to promote ecosystemic projects, it is possible that over the longer term investment in this type of projects will increase.

4 .Strategic Orientations and the M4P Approach

4.1 Systemic change

As the Project Document (ProDoc) explains, one of the foci that has guided the design of PACC 2 has been attention to a systems focus (p. 25).[50] In essence, this has meant that the project must include and link all "legitimate and permanent actors" of any system or systems in which the project is intervening to strengthen their capacities and support and motivate them to improve their functioning. The project should identify and promote changes that allow actors to overcome barriers and bottlenecks inhibiting their performance, while ensuring that these changes are sustainable and go on to stimulate impacts at greater scale. An important corollary to this is that PACC 2 must not substitute for persons whose functions involve providing services or products to target populations. The project must limit itself to facilitating sustainable improvements in the personal skills and interpersonal and institutional interactions involved in improving the adaptive capacity of the target population of Andean subsistence farmers.

Based on the ProDoc (p.24), PACC 2 identified support functions that corresponded to each of the program components, the actors involved, and the relationship between them. A detailed view of the system is described in Annex.6. It should be pointed out that the achievements shown by PACC 2 are due in large part to the fact that support functions were well identified during program design. The systemic focus adopted as a model was maintained during implementation, because these support functions were part of the very structure of program products and effects. It is noteworthy that the functions that achieved the level of "highly satisfactory" are functions based in PACC Phase 1 (identification of technologies and valid methodologies for high Andean communities, updating capacities, linkage of local to regional to national levels). The additional and complementary actions of PACC 2 have been in the vertical scaling to national entities that have generated expanded benefits from the program. However, the specific support functions under Effect 3 related to the capacity strengthening of professors, other teaching staff, and students in the target universities could only be developed by the Swiss Scientific Entities.

[50] PACC. 2013. "Programa de Adaptación al Cambio Climático en el Perú - PACC: Propuesta de Plan de Segunda Fase." April 11, 2013. Lima.

Table: PACC 2 Sub-systems and Support Functions

Sub-system	Principal Function	Functions Supported by PACC	Value Rating
1	Effective public management in the implementation of the ERFCC* This sub-system interacts with #4.	(1) Capacity updating (2) Linkage of local and regional (3) Public investment (4) Social vigilance	(1) Highly satisfactory (2) Highly satisfactory (3) Moderately satisfactory (4) Moderately satisfactory
2	Strengthen and consolidate knowledge of effective rural adaptive responses with potential for replication This sub-system interacts with #4	(5) Identification of effective rural farming technologies (6) Methodology of appropriate technologies (7) Innovation and compatibility (8) Knowledge management and monitoring	(5) Highly satisfactory (6) Highly satisfactory (7) Highly satisfactory (8) Highly satisfactory
3	Information and studies to respond to needs for knowledge in ACC This sub-system interacts with #1	(9) Linkage of university / society (10) Control for scientific rigor (11) Training of researchers (12) Research methodologies (13) Relevance and prioritization of themes	(9) Moderately satisfactory (10) Highly satisfactory (ESS) (11) Highly satisfactory (12) Not observed (13) Moderately satisfactory
4	Advocacy in policies and national mechanisms to spread ACC in rural areas This sub-system interacts with #1 and #2	(14) Linkage and consolidation of proposals	(14) Highly satisfactory

The functions that are rated with a high level of satisfaction are related to updating of capacities in the coordinated platforms of CAR and CORECC and local and regional linkages that indicate the possibility of linkage with the national entities MINAM, MINAGRI, FONCODES, CEPLAN, and MEF, thus attaining the scaling and advocacy objectives under Effect 4. The functions related to the adoption of technologies in ACC show evidence of having been performed in a highly satisfactory manner.

Support functions that have been carried out in a moderately satisfactory manner are public investment and social vigilance, functions that were not part of the experience of PACC in Phase 1. Under Effect 3 as well, linkage of the university with society and the relevance and prioritization of themes have had only a moderately satisfactory performance.

M4P and Adaptation to Climate Change

In Peru experience with an M4P implementation focus exists in IFAD and SDC projects.[51] These experiences have been successful, because they are focused on resolving key problem points of the system or sub-system involved in the intervention. The concept of "market" is general and not restricted and can be applied to management of ACC under the following considerations:

(a) Effectiveness of the ACC measures depends on the local context and are not easily replicable from one place to another. They are also not of sufficient scale to generate market value. The only market under way is the market for agro-climatic insurance,[52] and PACC did not include this in its package of ACC measures. In the same way, one could conclude that sowing and harvesting of water can be a service that high Andean communities provide to beneficiaries located lower down in watersheds and this model is now regulated by MINAM through the Law of Payment for Ecosystem Services and its regulations.[53] The contribution of PACC has been

[51] M4P is "Making Markets Work for the Poor."

[52] Persons interviewed during the evaluation mentioned the difficulties of showing its functioning to possible insurance beneficiaries.

[53] Ley de Mecanismos de Retribución de Servicios Ecosistémicos

oriented to providing evidence with respect to the social value (expressed in water availability) that qochas generate, distinguishing those that are easily adopted by communities.

(b) From a systemic point of view, it is difficult to isolate a value chain for the whole of the benefits that a high mountain ecosystem produces. A group of ecosystem services can be identified such as water, foodstuffs, forage, climate regulation, economic income from sale of meat and wool, etc. that represent complex combinations difficult to unravel and if the objective of analysis is not defined, this could be converted into a useless exercise.

(c) Rather, the challenges of adaptation require the application of strategies based on rapid learning experiences that function and prove out in various contexts, generate feedback, and are readapted until they achieve a level of significant resilience or what could be called "a continuous adaptation process based in learning loops – observation – response – feedback – learning – sharing – a process more similar to a learning algorithm that identifies adaptation models and improves and shares them.

(d) Adaptation to climate change requires the development of a metric of ACC that is still under development. In the period after 2015, when countries have finally established their national contributions in adaptation and prioritized sectors and goals, will be when they can invest finally in information generation in a systematic manner.

(e) In addition, the transdisciplinary character of ACC requires collaboration of multiple actors and different academic traditions, including evolving disciplines. Despite the Peruvian university reform and the efforts that have been realized in the last years to increase research budgets of scientific technical institutions such as IGP, SENAMHI, and CONCYTEC, there is still a large gap to fill before ACC knowledge is used as a base for policies. Work with universities using a systemic focus requires a new manner of approach. Peruvian universities have remained isolated from surrounding society and with little motivation to change toward more research. PACC's work has opened a window of opportunities in regions that like Cusco can profit in the future by training professionals in ACC and increasing research in high mountain communities.

4.2 Science, Knowledge generation, and exchanges (SKGE)

SKGE activities were established to enable conditions and validation of adaptation measures, dissemination, and adoption. PACC indicators were designed to show (1) solid monitoring of adaptive responses to generate sound evidence; (2) added value by contributing to the scaling up of adaptive responses that have been validated and proven relevant to Andean subsistence farmers; and 3) alliances to strengthen research capacities to increase local actors' knowledge of Andean rural activities.

PACC 2 planned the following activities in its M&E Plan (p.20).

	Effect 1	Effect 2	Effect 3	Effect 4
Building SKGE systems to produce evidence about ACC effectiveness	x			
Share lesson learned to implement regional policies	x			
SKGE mechanism on Andean technologies		x		
Capitalize lessons learned and sharing of PACC I		x		
Documentation of evidence		x		
Bridge between science-policy and practice			x	
Building alliances between universities and			x	

research centers at various levels				
Networking for applied research			x	
Collaboration between universities and other institutions			x	
Networking with actors (local governments)				x
Documentation of scaling up experience				x
Mechanism of national-regional dialogue				x

Various forms of SKGE were employed during the implementation of PACC 2:

- ✓ Formal scientific research in the two research projects in UNSAAC
- ✓ Eleven peer-reviewed scientific studies published or supported by SSE
- ✓ Knowledge exchange occurred within the two UNSAAC projects and during the proposal preparation at UNSAAC and its follow-up activities.
- ✓ A good deal of knowledge has been generated on criteria to improve small farmer productive strategies through the educational materials produced by PACC for training yachachiqs in the partnership with FONCODES in Haku Winay.
- ✓ Various reports planned on lessons learned from PACC collaboration with CEPLAN and MEF in its final days.
- ✓ Cusco Regional Government within the broader CORECC is now actively monitoring 22 indicators in 15 implementation strategies, which will produce evidence on how local and regional governments advance their CC strategies and how they can be related to national indicators collected by MINAM.
- ✓ Both CORECC and CAR include a number of actors whose growing knowledge can be exchanged between them and spread beyond, increasing knowledge of ACC in the high Andean rural environment.
- ✓ Some 15 experiences nationwide in water sowing and harvesting were identified and examined with MINAGRI, and a volume summarizing the experience in this technology was published in July 2016.
- ✓ Courses about PIPs carried out by MEF have also proposed a methodology in six modules that offer a base for other institutions or universities to build on.

Some shortcomings in SKGE were encountered by the evaluation team. One was that the rich qualitative data collected on value added from PACC to Haku Wiñay have not been complemented by quantitative measures. There is also valuable information collected from the PIP formulation course that needs to be capitalized on for broader use by CORECC and CAR. Moreover, one of the issues that PACC 2 did not address is the high dispersion and disconnect of information among regional governments, universities, and NGOs (bridge dialogue between science-policy and practice). The Regional Research Agendas meant to fill this bridging role failed to achieve it in part because the SSEs as specialists were not involved, and the selection of CORCYTEC was probably not the most adequate partner for this task.

The evaluation team did confirm the high amount of information generated in Haku Wiñay's "participatory diagnostics" and "technical files" that are very valuable for local governments and NGOs. On the other hand, there is no evidence that the Regional Environmental Information System (SIAR) had any role in SKGE during PACC 2.

PACC 2 has produced a great number of high quality documents, especially regarding the promotion of improved Andean technologies in the face of climate change risks, but no follow up has been reported of how these documents may have been used by other actors thus contributing to indirect program impact.

Beyond the articles produced by the SSEs, only a few documents have been produced for academic consumption in other universities in Peru or Andean countries in the form of technical notes making them accessible to students and teachers from different academic backgrounds.

The evaluation team considers that there is a potential for replication of the following SKGE products:

- ✓ The instruments produced by CORECC in the set of ERFCC implementation Plan, the M&E Plan, and its first monitoring report.
- ✓ The guidelines produced by CEPLAN for urban - rural municipalities' local development planning process. There are 556 similar districts awaiting its application.
- ✓ The hydrological studies carried out in the Huacrahuacho micro watershed to produce evidence to support the wider use of the water sowing and harvesting technology. The research methodology could be shared with other universities at the national level.
- ✓ A methodology of documentation similar to that of the 15 experiences of water sowing and harvesting to influence the formulation of a national program with MINAGRI could be applied to other ministry programs.

4.3 Scaling up and influencing public policies

PACC 2 has relied on centralized scaling by working directly at the national governmental level to integrate lessons learned and expertise gained from the pilot ACC experiences in PACC 1 into policies of various ministries and development working groups (e.g., MINAM, MIDIS, MINAGRI, MEF, CEPLAN, MCLP). The most successful scaling up of the Phase 1 experience at the national level under PACC 2 has involved MINAGRI's national program in sowing and harvesting water and PACC's involvement with MIDIS/FONCODES in the Haku Wiñay project.

Geographic scaling in partnership with FONCODES has spread the pilot experiences to eight new NECs in the same regions. It should be noted that given the administrative centrality of FONCODES in MIDIS, local geographic scaling is not possible without national-level scaling. However, it is not possible in the context of this evaluation to examine how the new instruments are been used in other regions.

It appears that there has been much spontaneous scaling of pilot experiences through replication by local individuals or communities, especially in the case of the qochas in the sowing and harvesting water technology. Yachachiqs are using the manuals, radio programs, and videos employed in their training in their own communities or in new jobs.

In terms of strengthening capacities of multiple actors, the latter have included regional and local government functionaries, members of civil society organizations, university researchers and professors, undergraduate and graduate students, national ministry and regional office officials, and agricultural extension agents (yachachiqs). In its fourth impact indicator, PACC has established and substantially

surpassed an objective of strengthening the capacities of at least 2,000 persons[54] that can contribute to adaptation to climate change directly from the normal exercise of their various functions. PACC 2 has also focused on integrating experiences into local and regional governmental policies and investment actions (PIPs) and various climate change working groups (e.g., CORECC, CAR).

The M&E systems did not report how partnerships with other NGOs are scaling up experiences in the two regions or employing them to extend successful adaptive measures to other regions with similar subsistence agricultural and climatic characteristics. In the case of the sowing and harvesting water technical committee with MINAGRI, it is clear that the added value of PACC 2 was to provide the analysis of 15 experiences nationwide that provide evidence to design the program.

The experiences of PACC 1 and PACC 2 have been documented in a number of high quality publications with potential for distribution to neighboring Andean countries where similar activities to those in Peru have been under way (cf. Chapter 7). Identical problems of subsistence agriculture high in the Andes are providing comparative experience to that generated by PACC.

Other activities with high potential of scaling both vertically and horizontally are:

(a) Instruments produced by CORECC in the set of ERFCC Implementation Plan, the M&E Plan and its first monitoring report.

(b) Guidelines produced by CEPLAN for the urban - rural municipalities planning process.

(c) Work carried out with FONCODES,

(d) Training carried out by the SSEs to strengthen research capacity in climate change of professors and researchers, both at the regional level and in Lima with alliances with other universities

(e) InterClima as a mechanism of national- regional dialogue formulated in the face of climate change.

4.4 Facilitation role and potential of replicability

The following reflections are derived from experiences under PACC 2 relating to replication.

(a) Previous experience. PACC has had success in activities where it has had previous experience, such as in the application of technologies that give it a corpus of "capitalized knowledge," placing PACC in a favorable position compared with others in ACC. This is valuable when it becomes necessary to work with the public sector.
(b) The role of facilitator requires a set of methodological skills to capitalize knowledge and channel it to different audiences (academics, policy makers, communication media, etc.).
(c) Favorable surrounding conditions. In this particular case, the occurrence of COP 20 in Peru in 2014 and the presence of the El Nino phenomenon in 2016 favored PACC's work, especially resulting in regional and local governmental prioritization.
(d) Political will and leadership with capacity to exert influence within the public sector. Behind the

[54] Impact indicator (I-4) refers to strengthened capacities of "more than 2,000 public officials, farmer extension agents, professors/researchers, graduate students, and development promoters."

successful experiences of FONCODES-HW, MINAGRI, AND CORECC have been leaders who opened the way for PACC and have supported it in a sustained manner. Unfortunately, this is not true in all cases. In Ocongate municipality, for example, the new mayor has chosen not to support the new Haku Winay/ACC technologies out of opposition to his predecessor.

The following table presents these program activities and the revision team's judgment of their success and potential for replication.

	Products / Services	PACC Support	Replicability
Effect 1	Human capacities and management processes strengthened.	(1)Training (2) Technical assistance to M&E (3) Backstopping and advocacy	Highly replicable. MINAM uses CORECC and CAR models and instruments in other regions
	Product 1.2: Public Investment Considers Guidelines for Adaptation to Climate Change	Technical assistance and personal support in pre-investment, implementation, and training	Replicable by universities and specialized centers with MINAM & MEF oversight
	Product 1.3: Local Governments Linked and Aligned with Regional Governments in Adaptation to Climate Change. CEPLAN	Guidelines have been produced for further planning of coordinated local development with resilience to climate change for urban-rural municipalities	High potential for application by CEPLAN to another 550 municipalities in the country
		.	
Effect 2	Product 2.2 Adaptive responses incorporated into the FONCODES intervention generate additional impact	(1) Technical assistance to FONCODES regional offices (2) Incorporation of ACC in diagnostics and technical dossiers (3) Training of technical coordinators and yachachiqs	Highly replicable
	Product 2.4: Solid evidence consolidated on cause-effect and cost-benefit of innovative adaptive responses. Studies in Mollebamba and Huacrahuacho and of value added to Haku Winay.	(1) Funding the studies regularly (2) Getting the best expertise (3) Disseminate to research networking	Highly replicable by universities The methodology of studies is adaptable. The model of study for advocacy is highly replicable.
Effect 3	Product 3.2: Strengthened research capacity in climate change of professors and researchers	(1) Training by other researchers on publication skills (2) Preparing research's plan and follow up (3) Visits to universities abroad	Replicable by SSEs
Effect 4	Influence in MINAGRI to formulate a National Program on Sowing and Harvesting Water	(1) Technical Assistance (2) Evidence provided to policy makers (real data provided) (3) Working with other allies (4) Publicity	Highly replicable

All in all, the final revision team observes that there are a number of services and products that are highly replicable to other regions in Peru and other Andean countries, especially those related to Effects 1, 2 and 4. These activities are related to one or another. To replicate the work on developing research capabilities under Effect 3 would require a specialized institution such as the SSE consortium, which can provide training for the new skills that are most required to advance research on climate change in countries like Peru. It would require time to negotiate the requirements of the hosting university.

5. Valuation According to the OECD Criteria

APPRAISAL OF THE PACC 2 PROGRAM ACCORDING TO OECD EVALUATION CRITERIA	
RELEVANCE	
Highly satisfactory	PACC has played a very relevant role in the consolidation of the national agenda in climate change led by MINAM following the COP 20 and the signing of the Paris Accord. During COP 20 and acting as host country, Peru was able to demonstrate its advances in adaptation through the Water and Mountain Pavilion, in which adaptation advances throughout the country were presented. In like manner, in 2014 and 2016 various national policy instruments were approved such as the National Contributions, which include a chapter on adaptation, and the updating of the National Strategy on Climate Change to which PACC made an important contribution. Likewise, Cusco and Apurimac were models to follow for the remaining regions which were engaged in formulating their own regional climate change strategies. The various activities, products, effects, and special objective are all consistent with rural development policies as exemplified by the partnership with the Haku Wiñay project of FONCODES. This is an example of a successful project of direct transfer of knowledge to poor agricultural families which operates alongside another rural anti-poverty program of the same ministry (MIDIS). These are also consistent with the directions and indicators of the SDC Global Program in Climate Change. The results chain and goals were consistent with the global, national and subnational rural development goals.
EFFECTIVENESS EFFECT 1	
Satisfactory	(a) support to the consolidation of regional institutional mechanisms linked to the management of climate change in Cusco and Apurimac
Moderately Satisfactory	(b) strengthening of capacities in the formulation of public investment projects incorporating climate change criteria in collaboration with MEF
Satisfactory	(c) local development planning at the district level linked to the regional level, including cross-cutting attention to climate change and under the framework of CEPLAN guidelines
Moderately Satisfactory	(d) creation of a mechanism of citizen oversight that maintains a watch over the degree to which adaptation to climate change remains active in the policy agenda of authorities
EFFECTIVENESS EFFECT 2	
Satisfactory	Product 2. 1: Optimized proposal with replication potential that capitalizes on the PACC experience and of other actors. (PACC 1 experience in “Exploring Adaptive Responses”)
Highly Satisfactory	Product 2.2 Adaptive responses incorporated into the FONCODES intervention generate additional impact
Satisfactory	Product 2.3: Mechanism of knowledge management of methods and Andean adaptive technologies. (National Environmental Prize and publication of a book “Lecciones de la Tierra” in 2015)
Highly Satisfactory	Product 2.4: Solid evidence consolidated on cause-effect and cost-benefit of innovative adaptive responses. (Studies in Mollebamba and Huacrahuacho and of value added in Haku Winay)
EFFECTIVENESS EFFECT 3	
Moderately Satisfactory	Product 3.1: Regional coordinated research agendas in climate change
Highly satisfactory	Product 3.2: Strengthened research capacity in climate change of professors and researchers
Moderately Satisfactory	Product 3.3: Normative changes dynamize the use of the Canon in research
	Product 3.4: Supply of Training at the undergraduate and graduate levels
Moderately Satisfactory	3.4.1 Support to undergraduate theses
Moderately Satisfactory	3.4.2 Inclusion of CC in Syllabi

Highly Satisfactory	3.4.3 Master's in CC & SD
EFFECTIVENESS EFFECT 4	
Moderately Satisfactory	Product 4.1: Public rural development policies incorporate adaptation to climate change based on evidence
	Product 4.2: Existing Public Mechanisms Scale Up Rural Adaptive Responses
Highly satisfactory	4.2.1 Work with MINAGRI
Satisfactory	4.2.2 Work with FONCODES - HW
Satisfactory	4.2.3 Work with CEPLAN
Satisfactory	4.2.4 Work with MEF
Satisfactory	4.2.5 Work with MINAM - NAP
Satisfactory	Product 4.3: Mechanisms of national- regional dialogue formulated in the face of climate change. (Interclima)
Satisfactory	Product 4.4: Needs and adaptive responses in high Andean rural populations are made visible in global dialogue
EFFICIENCY	
Moderately Satisfactory	The institutional efficiency ratio of PACC 2 is 0.52. Phase 1 obtained a ratio of 0.45. Other comparable projects are 0.29 (PRODATU) and 0.30 (Project 4 Cuencas of IDB – MINAM).
IMPACT Satisfactory	The overall impact of PACC 2 is found in 70,000 high Andean rural families of Cusco and Apurímac that have adopted and benefited from appropriate technologies to confront climate change. The benefits can be appreciated in an improvement of their income through new economic activities on their parcels, increased access to water in dry periods through mini-reservoirs (qochas), improvement of pastures, and access to vegetables from family gardens. Their capacities have been strengthened in irrigation management, preparation of organic fertilizers, and in dealing with plant and animal diseases. The adoption of these technologies has been brought about through combined public and non-governmental actions (CORECC and CAR), public investment projects, and NGO programs that have included these technologies in their portfolios. Added to this impact are the more than 2,000 public and non-governmental officials that have received training in the incorporation of risk management and ACC in public investment and the students, professors, and researchers in the universities that participated in courses, seminars, and workshops that have become aware of climate change and its impacts. Moreover, there is evidence from the field that the use of these productive technologies has great impact on women`s life. Women are at the nexus of several productive technologies around the family homestead and their roles become key to longer term capacity building.
SUSTAINABILITY	
Political & Institutional **Highly Satisfactory**	The sustainability of achievements at the level of the regional climate change councils -- CORECC in Cusco and CAR in Apurimac – appears ensured, since it is very likely that currently active members will continue to implement and monitor climate change options within both environmental policy and wider development and poverty issues. A good deal of knowledge has been generated between the universities in Cusco, Apurimac and the Swiss Scientific Entities through formal scientific research projects, peer reviews, and training activities. Local governments have improved their planning process under the CEPLAN training facilitated by PACC 2. PACC has made it possible for MINAGRI to design a National Program in Water Sowing and Harvesting based on knowledge and evidence generated in the field.
Social (support, acceptance, and commitment) **Satisfactory**	The productive practices promoted by PACC 2 through HW and CORECC / CAR members, such as qochas, spray irrigation, greenhouse vegetable gardening, use of organic fertilizers, and improved pastures, have a great deal of acceptance among communities. It is expected that local governments will continue to provide some resources to maintain project achievements. Cotaruse Municipality, had supported water sowing and harvesting in almost every community through competitions. The role of the project promoters (yachachiqs) has been key in the promotion of the standard package of productive technologies and the enhanced measures offered by PACC. Experienced yachachiqs, trained in productive technologies and in adaptation to climate change, are employed by local district municipalities in public investment projects and are maintaining their skills in their home communities and providing service to others.

Financial **Satisfactory**	The fact that the technologies promoted by PACC are low cost should mean that families can maintain and improve their technologies with some assistance, such as competitions backed by municipalities. Public investment projects (small PIPs) are certainly the most effective vehicle for the financial sustainability of technologies promoted by PACC and Haku Winay. With respect to the 13 projects formulated during the MEF Course in PIP development, these are all awaiting opportunities to be funded. On the other hand, if MINAM continues to promote ecosystem PIPs, over the long term it is possible that this type of project will become more common.

6. Recommendations

STRATEGIC LONG TERM

PACC has demonstrated the feasibility of integrating adaptation to climate change into anti-poverty programs targeting high Andean populations. This or a similar methodology can be applied to other programs focused on rural poverty or subsistence agriculture in Ecuador and Bolivia. The challenge is to look for evidence regarding the interaction between adaptation and mitigation, especially in high mountain water management and carbon capture mechanisms. The work to produce high quality evidence on watershed management benefits in Huacrahuacho and Mollebamba can not only be scaled up to the national level in Peru but also replicated in other countries.

A strategy to provide formal accreditation in ACC and Disaster Risk Reduction to agricultural extension agents (yachachiqs or similar promoters), should be addressed by MINAGRI, thus facilitating their hire by other projects and municipalities. A prototype could be developed in collaboration with other Andean countries, and methods to involve private sector entities should be examined.

A strategy on how to incorporate the private sector into rural development incorporating adaptation to climate change is highly needed. This collaboration could be based on public-private partnerships or tax incentives to private entities to invest in national or regional investment projects.

A strategy for scaling horizontally can be employed from the beginning of an intervention without undermining vertical scaling, in order to achieve greater impact. This will require strong commitment from local governments and linkages with other NGOs and community organizations.

The institutional arrangements and the M&E system adopted by CORECC and CAR can serve as a model and example to other regions that are developing regional climate change strategies and can be considered a proven means for scaling up the experience nationwide.

The working model of PACC with the UNSACC to implement the Master's degree in Climate Change and Sustainable Development is suitable for replication to universities in other regions. The syllabus and other materials could be shared among universities to update similar courses.

OPERATIONAL – SHORT TERM

The four pilot field locations of PACC 1 and PACC 2 (Huacrahuacho, Mollebamba, Ocongate, and Cotaruse) should be maintained as learning and research centers, in a follow-on ACC initiative. Follow-up research is currently being conducted by UNSAAC on sowing and harvesting water in Huacrahuacho. There also exists a baseline developed by PACC in both Cotaruse and Ocongate based on FONCODES data, where future periodic measurement may be carried out on selected indicators of interest.

In the absence of PACC, MINAM needs to address the methodologies and guides prepared with CEPLAN and MEF. There exist some 550 urban-rural municipalities that could benefit from planning that includes climate change and disaster risk management. Local and regional investment projects in various sectors can profit from the pilot experiences by including a component of adaptation to climate change in their interventions.

PACC 2 should produce some lessons learned from the use of their results chains and their M&E systems.

Follow up and continue to support the MINAGRI National Program on Sowing and Harvesting Water

Support the second monitoring report on CORECC indicators

Produce technical notes from research reports in Spanish for wide distribution among universities

The two Regional Research Agendas should be refined in their analysis and include selection of two or three future scenarios, with attention not only to adaptation to climatic risks (agriculture/livestock, water resources, health, risk management) but also policy directions relating to possible "green development" options or lowered emissions (renewable energies, solid waste management, use of soils, reforestation, etc.).

The cost structure of PACC 2 should be examined in order to see how operational costs can be reduced in future to increase investment expenditures, while still ensuring quality of technical assistance to the field and to the M&E system.

For future projects, SDC should channel resources to strengthen local capacities in M&E and ensure systematic collection of information to carry out measurements of effect and impact. Baseline studies should be carried out against which subsequent measurements can be periodically undertaken for comparison.

PART II: ANDEAN COUNTRIES STATUS ON CLIMATE CHANGE ADAPTATION

7. Adaptation in the Andean region

Under the UNFCCC agreement the adaptation contributions and the NAP process are fully linked to the ongoing negotiation process. This new commitment under the Paris Agreement aims to help the Parties identify their priorities, needs for actions and support, plans and other relevant information that will help the country catalyze adaptation action. Therefore, the actions and efforts on adaptation the country has already begun need to feed into guidelines for adaptation communication. Adaptation communication will be the means by which developing countries should communicate and update periodically their priorities, needs, and plans. This will allow for better allocation of available support and collaboration, as well as follow-up on the progress of adaptation under the UNFCCC.

Because they are developing countries, Andean countries qualify to receive support for the implementation of these actions and commitments as established in Article 7, paragraph 13. In addition, the GCF has approved up to USD 3 million per country through the Green Climate Fund Readiness and Preparatory Support Program to support the formulation of national adaptation plans and/or other national adaptation planning processes.[55]

The following summarizes the priorities, regulations, actions, and needs included in the INDCs of Bolivia, Chile, Colombia and Ecuador. It can be concluded from the following table that adaptation priorities among neighboring Andean region countries are similar to those identified by Peru in its INDCs, with special emphasis on water and agriculture. In that sense, there is a clear space for regional cooperation to share experiences and best practices, as well as for countries to work closely together on common watersheds or areas that have a trans-boundary character.

Table 4. Summary of Adaptation Component of INDC of Bolivia, Chile, Colombia and Ecuador

BOLIVIA	
Regulatory framework	State Constitution, Law No. 071 of The Rights of Mother Earth and Law N° 300 of Mother Earth and Integral Development to Live Well, guided by the 2025 Patriotic Bicentennial Agenda and its 13 pillars, as well as national plans for the medium and long-term.
Priority areas	Bolivia has prioritized a linkage of mitigation and adaptation actions in complementarity with holistic development in the areas of water, energy, forests, and agriculture as part of its 2025 Patriotic Agenda and national development plans.
Actions	Bolivia has launched programs "My Water" and "My Irrigation" on the basis of comprehensive and community management of water resources. In the immediate future, Bolivia plans to implement multi-purpose hydro projects to enable coverage of irrigation and water storage capacity in the country and thereby strengthen adaptation to climate change. Bolivia considers that forests facilitate the provision of environmental functions, strengthen food security and livelihoods of local and national populations in a complementary manner and promote timber and non-timber

[55] Green Climate Fund Board decision B.13/09, paragraph (e). Available at <http://www.greenclimate.fund/boardroom/board-meetings/documents>

	forest production and agroforestry systems, consolidating their contribution to development of country agricultural production with the participation of smallholders and communities as an important contribution to climate change adaptation.
Relevant ongoing measures/ actions/projects	In 2013, Bolivia has declared family agriculture as a national interest activity by Law of Peasant Economic Organizations, Indigenous (OECAS) and Community Economic Organizations (OECOM). The purpose is for integration of sustainable family agriculture and food sovereignty (Article 12 – Family agriculture and climate change). Two emblematic projects that had allowed an increase for potable and irrigation water for agriculture: 1. MIAGUA: increase coverage to 90% (urban) and 61%(rural) 2. MIRIEGO: Increase of irrigation coverage to 362000 hectares with the objective to increase agriculture land and use efficiency.
CHILE	
Regulatory framework	Chile's Climate Change strategy, National Climate Change Adaptation Plan and currently two sectoral adaptation plans have been developed and approved (forestry and agriculture and biodiversity plans), while another seven plans are scheduled: water resources, fisheries and aquaculture, health, energy, infrastructure, cities and tourism.
Priority areas	Biodiversity (approved), Water, Fisheries and Aquaculture, Health, Energy, Infrastructure, Cities, Tourism
Actions	Adaptation actions will be structured around two different cycles: the first one to be completed in 2021 and the second one to be completed in 2030. Implementing specific actions aimed at increasing resilience in the country, under the National Climate Change Adaptation Plan and the sectoral plans, with a decentralized perspective and seeking to integrate efforts among the different decision-making levels (national, regional, and municipal). - Identifying sources of financing to implement said plans, based on the considerations set forth in the financing section of this contribution. - Building synergies with the contemplated mitigation initiatives, and maximizing the benefits that stem from the development and capacity-building pillars, as well as technology creation and transfer included in this contribution. - Strengthening the institutional background of adaptation in Chile. - Preparation of metrics and measurement tools for the sectoral plans.
Relevant ongoing measures/ actions/projects	In agriculture, the climate change national adaptation plan for the silvo-pastoral sector (2013) is one to highlight. However, the mid-term assessment of the plan indicated progress of only 25% in the committed activities. In addition, related to disaster risk reduction in the agriculture sector, there is a National System for Agro-climatic Risk Management. This allows for an insurance market and facilitation of agriculture insurance for small farmers. However, only 10% of the potential population has coverage (there is still a gap in financial culture for appropriate adoption of an insurance scheme). There are two models for technical assistance: 1) Big and medium agriculture (CORFO and INIA); and 2). Peasant family agriculture (INDAP). Public services are channeled through two programs: Local development program (PRODESAL) and Indigenous Territory Development (PDTI). Also, other sectors that have made considerable progress in adaptation planning are the energy sector and biodiversity.
COLOMBIA	
Regulatory framework	National Adaptation Plan to Climate Change (PNACC in Spanish). Currently, Colombian entities have formulated 11 territorial adaptation plans for climate change, which have prioritized adaptation actions. To date, there are plans for the agricultural sector and the primary road network
Priority areas	Priority sectors of the economy (transport, energy, agriculture, housing, health, and trade, tourism and industry) will include climate change considerations in their planning instruments and will be implementing innovative adaptation actions.

Actions	- 100% of the national territory covered by climate change plans formulated and being implemented - A National System of Adaptation with indicators that allows the monitoring and evaluation of the implementation of adaptation measures - Water resource management tools, which include climate change and variability considerations, will be in place for the country's priority water basins - Six (6) priority sectors of the economy (transport, energy, agriculture, housing, health, and trade, tourism and industry) will include climate change considerations in their planning instruments and will be implementing innovative adaptation actions - Strengthening of awareness, training and public education strategy on climate change, focusing on different stakeholders of Colombian society - Delimitation and protection Colombia's 36 "paramo" areas (high mountain Andean ecosystems – approximately 3 million hectares). - Increase of more than 2.5 million hectares in coverage of newly protected areas in the National System of Protected Areas -SINAP- in coordination with local and regional stakeholders. - Inclusion of climate change considerations in projects of national and strategic interest –PINES in 10 subsectors of agriculture, such as rice, coffee, livestock and silvo-pastoralism, with improved capabilities to adapt appropriately to climate change and variability. - 15 of the country's departments participating in the technical working groups on climate and agriculture, linked with the national working group, and 1 million producers receiving agro-climatic information to facilitate decision making in agricultural activities.
Relevant ongoing measures/ actions/projects	- The "Adaptation Fund" was created initially to support the construction, reconstruction, and recovery and economic reactivation of zones affected by the La Niña phenomenon in 2010 and 2011. Later, the fund was used to enable the execution of projects in disaster risk management and adaptation to climate change with a multi-sectoral approach. o To date, the "Adaptation Fund" had carried out 2,953 interventions in 31 departments and 1,004 municipalities. o It has built 60 health services institutes, 300 education institutions, 200 projects for aqueducts and sewage, and 300 interventions in critical points in transport. Regarding agriculture, the Ministry of Agriculture and Rural Development has established the National Policy for Agricultural Technical Assistance. In this domain, the ongoing programs in Colombia are the Provincial Agribusiness Management Centers (CPGA) and the Municipal Agricultural Technical Assistance Units (UMATA), both in the public sector.
ECUADOR	
Regulatory framework	The National Constitution of Ecuador from 2008 The National Plan of Good Living (Plan Nacional para el Buen Vivir) 2013- 2017 that contextualizes climate change as a multi-sectoral problem at the national level that needs to be addressed through programmatic measures that generate results in the mid and short-term. The National Climate Change Strategy 2012-2025 that was formulated under a logic of adaptation and mitigation results. The National Climate Change Plan 2015-2018. The national legal framework to protect and preserve wildlife areas representative of the country's ecosystems.
Priority areas	The main contributions out to 2025 include the following: the application of actions to reduce the vulnerability of the impacts of droughts, floods, frosts and other climate change impacts in local planning regarding agriculture, water, ecosystems, and biodiversity.

Actions	- Measures for the effective management of water in communities where the availability or quality of this resource has been affected by climate change. - The establishment of weather stations in high-altitude mountain locations. - Conservation of protected areas, management of carbon stocks, and establishment of water recollection systems. - Strengthening the resiliency of vulnerable communities with a focus on food security. - Identification of areas vulnerable to drought and land degradation, in order to promote sustainable land management practices and water catchment systems. - Analysis of the vulnerability of infrastructure and water availability in hydroelectric plants with respect to the effects of climate change.
Relevant ongoing measures/ actions/projects	- Hydroelectric power is a priority for Ecuador. For this reason, the government wants to put all its efforts into creating 11 megaprojects with irrigation, water supply for human consumption, and flood control. The implementation of megaprojects has invested 2.5 billion USD to date. These projects aim to quadruple the irrigation area and number of habitants protected against floods by 2017. - Regarding agriculture, the Ministry of Agriculture, Cattle Raising and Fisheries is implementing a new agricultural development approach (Hombro con Hombro Strategy). It has the aim of expanding access to land, increasing productivity, expanding marketing and financial services, and rescuing biodiversity and ancestral knowledge by seeking rural development. This program aims to benefit 180, 000 producers.

7.1 Review Of Andean Region Adaptation Projects

The final revision team conducted a review projects in the Andean countries in climate change adaptation that are related to PACC 2 areas of interest: (a) introducing ACC technologies into existing poverty programs; (b) applied methodologies to measure impact and benefits in adaptation learning; and (c) some concrete experience in attracting the for-profit private sector. The following is a summary and extract of the review.

(1) PROGRAMA Creación de Iniciativas Agroalimentarias Rurales (CRIAR) [56] (Bolivia) 2015.

Key words: anti-poverty program / transfer of productive technologies / family agriculture / impact evaluation with control groups / food security / private sector

This is a program of direct support to small rural producers to equip themselves with technology, offering a bonus that covers 90% of the cost of the technology selected by the producer with the producer covering the remaining 10%. This includes the technical assistance needed to learn how to use the technology. The program offers technologies in five groups: greenhouses, technologies for sowing, harvesting, and post-harvest, and livestock. Seed technologies were the most requested (76%), mainly for modern irrigation equipment (spraying, micro-sprinkler and drip irrigation systems), followed by post-harvest technologies (12%), including mills, fruit driers, and silos. The program benefited more than 17,000 agricultural producers in 1,355 communities in five regions of the country. A private company certified that the technology had been delivered and technical training given, after which the cost of the technology delivered was paid to the supplier.

[56] The focus has changed in the work of CRIAR- PASA, which previously worked in infrastructure projects and now is involved in supporting food production through public – private resource transfers to communities and/or producer organizations found in areas with vulnerability levels VAM 4 and 5.

An impact assessment conducted in 2015 found that CRIAR participants compared with a control group increased the annual value of production per hectare by 92% and the value of production sold by 360%, while increasing annual net income of each farm household by 36% and per capita income by 19%. Regarding food security, a conclusion obtained through several estimates established that participating in CRIAR increased the probability that a household would have food security by 32%.

Source: "Food Security and Productivity: Impacts of Technology Adoption in Small Subsistence Farmers in Bolivia" by Lina Salazar, Julián Aramburu, Mario González-Flores y Paul Winters, that can be read in its entirely here: https://publications.iadb.org/ handle/11319/6783?locale-attribute#sthash.JcOFJgc1.dpuf.

(2) EL FONDO DE MITIGACIÓN DE RIESGO AGRÍCOLA (FMRA) de PROSUCO y PROFIN (Bolivia) 2012.

Key words: agricultural risk management / private sector / impact evaluation with control field / farmer leaders

The PROFIN foundation was created to generate financial innovations to support family and medium-size producers. For this purpose, it has been accumulating climatic, production and damage information for at least 10 years, from which technical models are developed that define the risk premium for an average year. Thanks to these capacities, and in alliance with PROSUCO, a comprehensive risk transfer product (multi-risk) was designed for the potato sector based on a yield index of 12 tons per hectare, using a control plot per homogeneous zone. Based on this original model, from 2011 on this has also included an insurance company and the Agricultural Development Service that is the state entity that provides technical assistance. This experience has earned the ILO award for being considered a micro-insurance product that combines agriculture, life, and assets in such a way that it helps to strengthen the asset base when there is damage during an extreme event. To make comparison measurements, control and demonstration plots were established within a homogeneous zone. Next to them are located an observer Yapuchiri (control plot observer) and an expert Yapuchiri (to perform technical analyses). Both are farmer leaders who want to communicate the experience to others. Having the plots together reduces the administrative costs of expertise.

Source: Informe de giras técnicas demostrativas de gestión de riesgos. PROSUCO: (www. Prosuco) y la Unión de Asociaciones Productivas del Altiplano (UNAPA). 2012.

(3) Sharing Risks in Production Chains SECOMPETITIVO (Peru) 2016

Key words: coffee and quinoa / private sector / agriculture risk management

Interesting initiatives are presented here in the field of competitiveness projects, such as those in coffee and cocoa production chains that already involve family producers working in mountain ecosystems. In these cases we have a local and international private sector already committed to services within the chain and that are not yet engaged in shared risk analysis against extreme events for these same crops. For more information see the SECOMPETITIVO projects, especially coffee and climate, in which the Coffee Chamber of Commerce and the SCAN platform participate. (https://assets.helvetas.org/downloads/fs_cafe_clima_270916.pdf).

Likewise, the Andean program of sustainable quinoa that seeks to strengthen competitiveness, does not have a shared analysis of the risks in the face of extreme climatic events. Since this a crop at risk and of high economic value for the families of the plateau, a shared risk analysis could open up real options for private sector involvement in strengthening resilience.
(https://assets.helvetas.org/downloads/fs_cadenaquinuaorganico_final_2.pdf)

(4) Proyecto Gestión Integrada de Riesgos Agrícolas (GIRA) HELVETAS Swiss Intercooperation (Perú)

Key words: agriculture risk management / farmer leaders / integration of scientific knowledge with indigenous knowledge / private sector

This project seeks to contribute to increased local adaptive capacity in the rural population to manage climatic risks in their agricultural production aggravated by climate change. The integrated approach is based on the premise that action management in the face of agricultural hazards should occur in families, communities, external actors such as NGOs, academe, etc. Basically, it is rural families engaged in subsistence agriculture that can reduce risks by applying knowledge and practices to prevent, reduce, and recover from events such as frost. The best practices come from farmer knowledge in dialogue with sources of technical-scientific knowledge. Once their effectiveness has been verified, they can be spread by local actors, such as municipalities and NGOs. This project is funded by Swiss Re (Schweizerische Rückversicherungs-Gesellschaft) with headquarters in Zurich, Switzerland, one of the largest reinsurers in the world.

(5) The Partnership for Environment and Disaster Risk Reduction (PEDRR) 2008- 2016

Key words: integration of risk reduction with ecosystem-based approaches / research / knowledge management / case studies / cost-benefit analysis.

PEDRR is a global alliance of UN agencies, NGOs, and specialist institutes that seeks to promote and scale up implementation of ecosystem-based disaster risk reduction and ensure it is mainstreamed in development planning at the global, national and local levels, in line with the Sendai Framework for Disaster Risk Reduction.

It provides technical and science-based expertise and applies best practices in ecosystems-based DRR approaches. PEDRR is guided by its vision of: “Resilient communities because of improved ecosystem management for disaster risk reduction (DRR) and climate change adaptation (CCA)”. Its objective is to pool expertise and advocate for policy change and best practice in ecosystem management for DRR and CCA, based on science and practitioners’ experiences.

Source: http://pedrr.org/about-us/

(6) ADAPTACION AL CAMBIO CLIMATICO EN MORROPON PIURA (Perú) (2008-2011)

Key words: crop switching / public and private alliances / local government

The agricultural experience of adapting to climate change in Morropón-Piura is illustrative of the alliance between the Morropón district municipality and the Agro-industrial San Carlos Company for the

productive reconversion of this district from the cultivation of rice to that of taupí bean. In this the participation of the local government made it possible to initiate a process of territorial organization, in which decisions were made to plan the use of land and water. This decision influenced the investments of the municipality towards rehabilitation of wells and provision of energy. From 30 hectares of taupí bean in 200, cultivation rose to 600 hectares in 2008 that is marketed through the San Carlos Company. The years of drought in 2004 and 2005 made it possible to prove that taupi beans consumed a third of the water used by the traditional rice crop.

7.2 Conclusions from the review

From the review[57] of the experiences outlined above, we can conclude that:

- ✓ Significant progress has been made in Andean countries in the search for further deepening of the practice of more integrated adaptation to risk management and adaptation based on high mountain ecosystems.

- ✓ Likewise, there is greater presence of anti-poverty programs that include transfer of productive technology, such as the case of Haku Wiñay in Peru and CRIAR in Bolivia, which make possible a scaling up of adaptation measures in these programs. Some programs, such as Haku Wiñay and FMRA, include the participation of farmer leaders (yachachiqs, kamayocs, yapuchiris, or others) who through participatory "peasant-to-peasant" or similar methodologies link with high mountain populations. This represents a possibility to strengthen rural extension systems in these countries.
- ✓ Important advances are being made to articulate the EbA (adaptation based on ecosystems) with disaster risk reduction, especially through the Ecosystem for Adaptation and Disaster Risk Reduction (PEDRR) platform. At the international level, it represents a practice of integrating international instruments such as the Convention on Biological Diversity, the UNFCCC, and the Sendai Framework for Disaster Risk Reduction. These advances represent a great opportunity for Peru, Ecuador and Colombia, which are putting forth policy instruments to promote public investment in ecosystem conservation and recovery.

- ✓ There is also greater articulation between public and private financing to scale up climate financing in the Andean sub-region. This collaboration has acquired different forms of private sector participation, in some cases with specific innovative products (the experience of the FMRA-PROSUCO in Bolivia); as certifier (in the case of CRIAR-PASA in Bolivia), as donor (in the case of GIRA-Peru and Haku Wiñay-Peru, or in public-private partnerships (such as Morropón in Peru) and SECOMPETITIVO (Peru).

- ✓ While global financial mechanisms are still fine-tuning their procedures to prepare countries, it is important to strengthen mechanisms for public financing, either through mechanisms such as public investment projects (PIPs) or budgetary programs for results (PPRs). In this way, it is possible to link financing of initiatives in a more systematic and long-term manner and prepare countries to apply to the GCF's Enhanced Direct Access mechanism. “Adoption of enhanced direct access (EDA) by the Green Climate Fund would enable national and sub-national actors to

[57] These comments were enriched by input from Rupa Mukerji, Co- head of Advisory Services and member of the Management Board of Helvetas Swiss Intercooperation, held December 7, 2016.

make decisions on individual investments within a broader initiative approved by the GCF Board. This process engages multiple stakeholders on an on-going basis, increasing broad political buy-in and building the institutional capacity needed to ensure policies will continue when funding ends. Moreover, EDA can encourage governments to put forward bolder programs with sector wide or national scope as opposed to requesting funding for one-off projects."[58]

- ✓ There is also an interest in cost-benefit analysis or measures at the impact and key results levels through various methodologies. An interesting example of benefit measurement is presented by the CRIAR-PASA project based on measurements with control and treatment groups with initial baselines that can show improvement in the assets of rural households.

- ✓ The experience of the FMRA of PROSUCO also shows at community level the use of demonstration and control plots to observe changes attributable to certain technologies. These cases show the importance of initiating measurements even on a small scale, in order to progress in linking adaptation and risk management measures to certain indicators of productivity, asset improvement, etc., to adaptation measures. Identifying the benefits and costs associated with such measures is still a very complex process and also includes regional and local characteristics that must be taken into account in the selection of methodologies.

7.3 Prospective At The Regional Level

PACC 2 Enhanced Model

PACC has demonstrated the feasibility of integrating adaptation to climate change in anti-poverty programs targeting high Andean populations. This or similar methodology can be applied to other programs focused on rural poverty or subsistence agriculture in Ecuador and Bolivia. However, the challenge is to look for evidence regarding the interaction between adaptation and mitigation, especially around water management in high mountains and carbon capture mechanisms. The working model to produce evidence from Huacrahuacho watershed developed by PACC is an example that can be used for replication in other countries to increase the role of science in public policy making. The PACC model of institutional development at the subnational level requires an improvement in its M&E systems to monitor and report the impact through others. Colombia's experience in territorial planning that includes an ecosystem prioritization could be useful.

Science in support of decision making

For all informants from Andean countries interviewed during this evaluation, the linkage between research, communities, and policy makers is increasing in Andean countries. A Ministry of Science has been created in Chile. Colombia reported that almost 99% of its research activities on climate change came from USA (245), United Kingdom (130), Spain (97), Australia (80), Germany (77), and Switzerland (32) between 2010 and 2015. Ecuador has increased postgraduate courses in its universities. Concrete experiences of a scientific consortium have been carried out between Peru and Chile, with both

[58] Center for Clean Air Policy (CCAP). July 2015. http://ccap.org/assets/CCAP-inputs-on-EDA July-2015, pdf Access on December 7, 2016.

countries able to share protocols and rules for scientific communication and control trials. Science is taking on new energy in the region and some support will be needed to ensure mainstreaming.

Water funds with public-private support

All Andean countries have reported directly or indirectly that water is a priority in their Nationally Determined Contributions (NDCs) to the UNFCCC, and this could provide grounds to integrate adaptation with mitigation. Questions are been asked about the relations between dams, reservoirs and reforestation in the highlands for securing water and carbon sinks, and ideas about "multipurpose engineering" are on the rise.

Almost all Andean countries have reported experiences in public -private endeavors, especially around water services in urban areas. Some of these schemes could provide insights to be applied in other contexts. Ecuador has a financial scheme called "Fondo Nacional de Quito," to attract private investors to Quito water service provision.

Rural promoters and farmer leaders with ACC capabilities

Almost all countries reported having some kind of yachachiq-like promoters that have been introduced to climate change training. Only a few countries provide a formal accreditation in ACC and Disaster Risk Reduction. A prototype to strength their capacities and means of sustainability could be developed in collaboration with other Andean countries and methods to involve private sector entities should be examined.

Private actors in adaptation

A strategy on how to incorporate the private sector in adaptation is highly needed. This collaboration could be based on public-private partnerships or tax incentives to private entities to invest in national or regional investment projects. A more successful approach could be achieved in integrating adaptation and mitigation with careful attention to its impact. This will require scientific community close monitoring of this development.

PART III: STRENGTHS AND PROGRESS ON CLIMATE CHANGE INTERNATIONAL REGULATION

8. Summary of the Available Means of Implementation under the UNFCCC for Adaptation

8.1 Finance

Climate finance is a central pillar of the UNFCCC and the Paris Agreement, because it directs the level of ambition developing countries can assume in mitigation and adaptation. The UNFCCC establishes that developed country Parties shall provide new and additional financial resources to meet the costs incurred by developing countries in complying with their obligations under the Convention.[59] Furthermore, the Paris Agreement in Article 9 reaffirms the ongoing commitments from the Convention, where developed countries shall provide financial resources to developing countries. In that manner, with the growing expectations of the actions needed to mitigate climate change, the availability of new and scaled up financial resources will be critical to fulfil and implement actions by developing countries.

To ensure financial flows for climate change actions, the Convention in Article 11 indicates the operation of the Financial Mechanism, partly entrusted to the Global Environment Facility (GEF). At COP 17, Parties decided to include the Green Climate Fund (GCF) as an operating entity of the Financial Mechanism of the Convention. In addition, under the new Paris Agreement, the Financial Mechanism of the Convention is established to serve as the Financial Mechanism of the Paris Agreement. This includes financing institutions previously established, including the GCF and GEF (including the LDCF and SCCF), as well as facilitation from the Standing Committee on Finance (SCF). It is worth noting that the Adaptation Fund was established under the Kyoto Protocol and it is currently being discussed if it can serve the Paris Agreement.

To highlight, decision 1/CP.21 includes guidance on the provision of support for developing countries for the preparation and communication of the NDCs and for the formulation of NAPs. These two processes will be key for developing countries in their implementation of the Paris Agreement.

8.2 Green Climate Fund (GCF): advances and challenges

The Green Climate Fund (GCF) was established at COP 16 by decision 1/CP.16 as an operating entity of the Financial Mechanism of the Convention under Article 11.[60] The purpose of the GCF is to support projects, programs, policies, and activities in developing countries.

The main pillars of the GCF are based upon its ability to catalyze climate financing by engaging directly with both the public and private sector, having a balanced allocation of funds for mitigation and

[59] UNFCCC, Convention, Article 4, paragraph 3. Available at <https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf>

[60] UNFCCC, Decision 1/CP.16, paragraph 102. Available at <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=17>

adaptation within a 50:50 proportion, and the recognition of the need to make sure that developing countries exercise ownership of climate change funding and integrate it with their own national action plans.[61] It is worth pointing out that direct access to the GCF is one of the key structures for country ownership.

Regarding access to funds, direct access entities nominated by countries can submit proposals to the GCF, which include public sector institutions (e.g., development bank, national fund, etc.) or private sector entities (e.g., commercial bank, investment fund, etc.) and non-governmental organizations operating at the regional, national, or subnational level. In the case of Peru, the National Designated Authority (NDA) was the Ministry of Environment and it was the one that nominated the Peruvian Trust Fund for National Parks and Protected Areas (PROFONANPE). Since August 2016, the Ministry of Economy and Finance of Peru (MEF) is the NDA for the GCF. This means that all entities that would like to be accredited to access funds from the GCF need to be approved by the MEF.

Currently, PROFONANPE is the only accredited national entity for Peru. The mandate of PROFONANPE includes the provision of stable and long term funding, as well as to develop and implement innovative strategies for conservation and management of protected areas. Currently, it has one project approved at the GCF focused on mitigation and adaptation within forest and land use. The project is called **Building the Resilience of Wetlands in the Province of Datem del Marañón** and it has a total project investment of US$ 9.1 million, 20,413 beneficiaries and 2.6 million tons of CO2 equivalent avoided.[62]

For National Adaptation Planning Processes

- ✓ The GCF reaffirms that it may support a voluntary country-driven national adaptation planning process through its readiness and preparatory support program, in coordination with other programs and channels.[63] The GCF approved up to US$ 3 million per country through the Green Climate Fund Readiness and Preparatory Support Program to support the formulation of national adaptation plans and/or other national adaptation planning processes.[64] This is a key opportunity for Peru to enhance its available funds for the process of formulation and implementation of its National Adaptation Plan directly through the NDA.
- ✓ The Green Climate Fund Readiness and Preparatory Support Program to support the formulation of national adaptation plans could also serve a larger program, including joining other countries as part of a larger program aimed to benefit cross-country learning. For that matter, accredited entities should put forward a programmatic, multi-country proposal for formulating NAPs or other national adaptation planning processes with the no-objection letters from countries covered in the proposals.

[61] Green Climate Fund. Insight/An introduction to the GCF. Available at <https://www.greenclimate.fund/documents/20182/194568/GCF_INSIGHT_2016/dc2b945f-d96a-4f6d-9eeb-3960beee919a>

[62] Green Climate Fund. Available at <http://www.greenclimate.fund/documents/20182/87610/GCF_B.11_04_ADD.01_-_Funding_proposal_package_for_FP001.pdf/f9929dbf-089c-48fd-bdb1-7e0e46388fef>

[63] Green Climate Fund Board document GCF/B.11/06.

[64] Green Climate Fund Board Decision B.13/09, paragraph (e). Available at <http://www.greenclimate.fund/boardroom/board-meetings/documents>

- ✓ Decision 1/CP.21 also includes guidance on provision of support for the preparation and communication of the INDC/NDC, support for the least developed countries and other developing country Parties for the formulation of NAPs, coordination and delivery of resources to support country-driven strategies through simplified and efficient application and approval procedures, and through continued readiness support to developing country Parties.

Other Relevant Actions Related to Adaptation

- ✓ The GCF actions should take into account in its priorities the Cancun Adaptation Framework, in particular the principles referred to in paragraph 12 and the activities referred to in paragraph 14 of decision 1/CP.16. These activities are also recognized in Article 7, paragraph 7, of the Paris Agreement.
- ✓ The GCF has the capacity to allow significant climate-related risk, permitting it to leverage and pull in additional financing. In addition, it offers a diverse array of financial products that enable it to match country project priorities.
- ✓ The GCF recognizes the need to ensure that developing country partners exercise ownership of climate change funding. This is a key opportunity to enhance and build national capacities in the National Designated Authority (NDA) that acts as the interface to the GCF.

Challenges

- ✓ Access to resources for countries like Peru is limited. A floor of 50% of the adaptation allocation is only for particularly vulnerable countries, including Least Developed Countries (LDCs), Small Island Developing States (SIDS), and African States.
- ✓ Regarding the Green Climate Fund Readiness and Preparatory Support Program to support the formulation of national adaptation plans, the main current challenge is to build the institutional capacities needed to access and use the funds. In addition, there is a lack of capacity within the GCF to disburse financial resources to the countries` accredited national entities (for example, PROFONANPE, the GCF project in Peru).
- ✓ It is a challenge for the public-sector institutions (e.g., development bank, national fund, etc.) or private sector entities (e.g., commercial bank, investment fund, etc.) and non-governmental organizations operating at the regional, national or subnational level to fulfil all requirements established in the concept note needed for accreditation by the GCF.
- ✓ The process of accreditation is complicated for developing country Parties. In that matter, the COP has urged the GCF Board to streamline the accreditation modalities and seek a balance of diversity in accredited entities.

8.3 Global Environment Facility (GEF)

The GEF is a financial mechanism for five major international environmental conventions: the Minamata Convention on Mercury, the Stockholm Convention on Persistent Organic Pollutants (POPs), the United Nations Convention on Biological Diversity (UNCBD), the United Nations Convention to Combat Desertification (UNCCD) and the United Nations Framework Convention on Climate Change (UNFCCC). Consistently, the relationship between the COP to the UNFCCC and the GEF was agreed in a

memorandum of understanding[65] where the COP provides guidance to the GEF on policies, programs, priorities and eligibility criteria for funding,[66]

The GEF is composed of 18 agencies working with 183 countries, and works closely with all relevant stakeholders such as the private sector and civil society organizations. It has the aim of innovating and catalyzing action by supporting multi-stakeholder alliances focused on preserving ecosystems globally.

The GEF mainly channel its support to climate change adaptation primarily through the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF). Through the LDCF and the SCCF, as well as the Strategic Priority on Adaptation (SPA), the GEF Adaptation Program has supported a pioneering, global portfolio of adaptation projects and programs increasing resilience in 124 countries with total grant resources amounting to some $1.18 billion.[67] While the LDCF was created to assist LDC Parties, the SCCF finances adaptation to climate change in all developing countries through highly innovative endeavors, including funding of climate risks and resilience projects.

Opportunities

- The LDCF and the SCCF are part of the Paris Agreement and will support climate change adaptation in developing country Parties to the Paris Agreement. In the case of Peru, funding could be requested through the SCCF, which targets:[68]
    - water resources management
    - land management
    - agriculture
    - health
    - infrastructure development
    - fragile ecosystems, including mountainous ecosystems
    - integrated coastal zone management
    - improving the monitoring of diseases and vectors affected by climate change
    - related forecasting and early-warning systems, and in this context improving disease control and prevention

- Also, under the GEF-6 for 2014-2018, the following priority areas for adaptation funding are included:
    - agriculture and food security
    - water resources management
    - coastal zone management
    - infrastructure, including transport and energy
    - disaster risk management
    - natural resources management
    - health

[65] UNFCCC, decision 12/CP.2. Available at <http://unfccc.int/resource/docs/cop2/15a01.pdf#page=55>

[66] UNFCCC, decision 12/CP.3. Available at <http://unfccc.int/resource/docs/cop3/07a01.pdf#page=43>

[67] GEF Programming Strategy on Adaptation to Climate Change. Available at <https://www.thegef.org/sites/default/files/publications/GEF_AdaptClimateChange_CRA_0.pdf>

[68] GEF Programming Strategy on Adaptation to Climate Change. Available at <https://www.thegef.org/sites/default/files/publications/GEF_AdaptClimateChange_CRA_0.pdf>

- climate information services
- climate-resilient urban systems

8.4 Adaptation Fund

The Adaptation Fund (AF) was established in COP 7 through decision 10/CP.7 with the aim of financing concrete adaptation projects and programs in developing country Parties that are Parties to the Kyoto Protocol. The AF provides developing Parties full ownership of their adaptation projects, from planning to implementation while ensuring monitoring and transparency at every step. Funds come from the share of proceeds of the Clean Development Mechanism and others sources of funding.

COP 21 recognizes that the AF may serve the Paris Agreement, subject to relevant decisions by the CMP and the CMA (1/CP.21). The CMP recommended that the CMA, in its first session, consider that the AF may serve the Paris Agreement, in accordance with paragraphs 59 and 60 of decision 1/CP.21. The AF is an entity that serves only Parties' that are members of the Kyoto Protocol, and the issue currently on the table is how the AF will serve the Paris Agreement. During COP 22, developing countries expected to have a sound decision allowing the AF to serve the Paris Agreement, signaling the importance of financing for adaptation. Finally, Parties decided the fund "should serve the Paris Agreement", pending decisions on governance and other issues that will continue to be discussed under the APA.

Opportunities

Peru and other Andean countries, as developing countries and members of the Kyoto Protocol, qualify to receive support from the AF. It focusses on vulnerable communities and has the ability to have direct access through a faster evaluation of projects. It accepts both small-size projects and programs (proposals requesting up to $1 million) and regular projects and programs (proposals requesting over $1million).

Limitations

The resources of the AF are conditional to the Clean Development Mechanism (CDM) and additional voluntary contributions. It is only subject to Parties of the Kyoto Protocol. It has a temporary cap limited to only US$10 million by country.[69] For Peru, it will be ideal for the Adaptation Fund to serve the Paris Agreement as several work and institutions have been created to design and implement projects under this approach. For example, in March 2016, after a tedious process the first Peruvian project in the Adaptation Fund was approved by the board: Adaptation to the Impacts of Climate Change on Peru's Coastal Marine Ecosystem and Fisheries. In that sense, the continuation of the fund will be a key and feasible opportunity for the country to access resources for adaptation priorities and needs.

8.5 Technology development and transfer

Technology development and transfer is a key factor in enabling the transition to low-carbon and climate-resilient development paths. The availability of efficient and clean technology is essential for the

[69] AF. ANALYSIS OF THE POSSIBLE MODIFICATION OF THE COUNTRY CAP. Available at <https://www.adaptation-fund.org/wp-content/uploads/2016/02/AFB.B.27.8-Analysis-for-the-possible-modification-of-the-country-cap.pdf>

effective implementation of mitigation and adaptation actions to climate change, especially the targets and contributions set by developing countries in the context of the Paris Agreement.

Among the main results in the Paris Agreement was the establishment of a long-term vision to accelerate, encourage and enable technological innovation to address climate change. It also strengthens cooperative action between the Parties, focusing on action for technological innovation, with emphasis on the early stages of the technological (research and development) cycle. It also establishes a Technology Framework to provide strategic guidance to the work of the Convention's Technology Mechanism, which did not previously exist under the Convention and is important for the Mechanism to respond adequately to the needs of developing countries. Finally, it has been established that financial support will be provided to developing countries to strengthen the above-mentioned cooperative actions.

Opportunities

- Peru and Andeans countries qualify to receive support for technology development and transfer. Decision 13/CP.21 provides the linkage between the Technology Mechanism and the Financial Mechanism of the Convention. This is an ongoing discussion that aims to link financing in a mutually beneficial and functional manner between the Technology Mechanism and the Green Climate Fund. The SCCF has a specific financing window on technology transfer (SCCF-B), which has contributed to the implementation of the Poznan Strategic Program on Technology Transfer through Technology Needs Assessments (TNA), as well as technology transfer pilot projects for mitigation and adaptation needs.[70]

Limitations

There may be limited availability of financial resources. Under the Paris Agreement, the Technology Mechanism gives special recognition to LDCs and SIDs. If the relationship with the GCF evolves, it may limit priority to LDCs, SIDs, and Africa.

8.6 Capacity building

Capacity building is a key component of the Convention as it allows for possible implementation of actions by developing countries. Under the new agreement, among the main results is the establishment of the Paris Committee on Capacity Building (PCCB). The PCCB will work on a work program from 2016-2020 with the aim of addressing gaps and needs in capacity-building for developing countries to implement the Paris Agreement. The Paris Agreement recognizes the important role of capacity building for the implementation of measures, mitigation and adaptation actions, development and access to technology, access to finance, and education and public awareness.

Opportunities

[70] GEF Programming Strategy on Adaptation to Climate Change. Available at <https://www.thegef.org/sites/default/files/publications/GEF_AdaptClimateChange_CRA_0.pdf>

Peru and Andean countries qualify to receive support for capacity building. The 2017 focus area of the PCCB will be capacity-building activities for the implementation of NDC in the context of the Paris Agreement. In the context of the Special Climate Change Fund (SCCF), there is an opportunity for capacity building, including institutional capacity, for preventive measures, planning, preparedness, and management of disasters relating to climate change, including contingency planning, for droughts and floods in areas prone to extreme weather events.[71]

8.7 Conclusions On Unfcc Constraints And Opportunities

The adaptation contributions and the NAP process are fully linked to the ongoing negotiation process. This new commitment under the Paris Agreement aims to help Parties identify their priorities, needs for actions and support, plans, and other relevant information that will help the country catalyze adaptation action. Adaptation communication will be the means by which developing countries should communicate and update periodically their priorities, needs, and plans. This will allow for a better allocation of available support and collaboration, as well as follow-up of the progress of adaptation under the UNFCCC.

Direct access to the GCF is one of the key structures for country ownership. The main pillars of the Green Climate Fund are based upon its ability to catalyze climate finance by engaging directly with both the public and private sector, having a balanced allocation of funds for mitigation and adaptation with a 50:50 proportion, and the recognition of the need to make sure that developing countries exercise ownership of climate change funding and integrate it with their own national action plans.

Andean countries as developing countries qualify to receive support for the implementation of these actions and commitments as established in Article 7, paragraph 13. In addition, the GCF has approved up to USD 3 million per country through the Green Climate Fund Readiness and Preparatory Support Program to support the formulation of national adaptation plans and/or other national adaptation planning processes.

ANNEX 1: Review of PACC 2 Effect & Product Achievement

Review of Effect and Product Achievement in Effect 1

#	Indicator/Objective	Status
Effect 1: Regional and local governments implement in an articulated and efficient manner strategies of adaptation to climate change.		
1	Number of actions and public investment projects in effect that are linked to strategic directions prioritized in the Regional Strategies of Apurimac and Cusco No target number is given for this indicator.	Progress has been made in 14 of 15 strategies of the Regional Strategy. Final PACC M&E report breaks out 464 projects, policies, areas, studies, organizations, centers, municipalities, published research, experience documented, coordination mechanisms, of which 381 are strengthened producer organizations. Sufficient accomplishment to justify 100% achievement (but

[71] GEF Programming Strategy on Adaptation to Climate Change. Available at <https://www.thegef.org/sites/default/files/publications/GEF_AdaptClimateChange_CRA_0.pdf>

		data not yet available for Apurimac). No target is given in M&E system.
Product 1: Human capacities and management processes strengthened		
1	Regional strategy implementation plans for Apurimac and Cusco approved (2 plans)	Plans for both regions are drawn up and approved. 100% achievement
2	Capacity strengthening plans formulated for Apurimac and Cusco (2 plans)	Plans for both regions are drawn up and approved. 100% achievement
3	Monitoring and evaluation systems created for Apurimac and Cusco (2 plans) with data gathering in 2015 and in 2016	2 M&E systems created but only one data gathering (2016) in Cusco and none in Apurimac 70% achievement
4	60 public functionaries and professionals in Cusco and 45 in Apurimac pass training courses on disaster risk management in CC in PIPS	169 public functionaries and professionals participate and complete courses as planned (106 in Cusco and 63 in Apurimac) 100% achievement
5	At least 1 institution offering training in public management incorporates ACC and RRD in its services to public officials of Cusco and Apurimac	MEF offered its course in PIP development in Cusco and Apurimac MCLCP in Apurimac gave a course on Public Policies for Sustainable Development (containing CC) in Apurimac (6 modules) 100% achievement
6	Creation of functional entities and platforms for CC management in the Cusco and Apurimac regional governments	Fully accomplished in both regions. 100% achievement
Product 2: Public Investment Considers Guidelines for Adaptation to Climate Change		
1	1 program containing 4 PIPS in Apurimac and 1 PIP in Cusco supported by PACC with feasibility studies completed	62.5% accomplished in Apurimac 50% accomplished in Cusco 56.25% overall achievement
2	7 PIPs in Cusco and 6 PIPS in Apurimac produced in MEF Course on PIP design and on road to implementation	Fully accomplished 100% achievement
3	1 document presenting the experience and lessons learned in MEF Course on PIP design	Fully accomplished 100% achievement
Product 3: Local Governments Linked and Aligned with Regional Governments in Adaptation to Climate Change		
1	10 coordinated local development plans (PDLCs) -- 4 in Apurimac, 6 in Cusco) -- incorporate ACC actions	100% accomplished in Apurimac 67% accomplished in Cusco 83.33 overall achievement
2	1 tool to incorporate a CC lens into local strategic planning drawn up with CEPLAN and MINAM	80% achievement
3	1 document on lessons learned in local district planning with CC with methodology	80% achievement
Product 4: Citizen Oversight and Advocacy Mechanism Implemented and Effective		
1	5 civil society institutions in both Cusco and Apurimac (10 total) participate in carrying out political advocacy and citizen oversight plans for the implementation of the Regional CC Strategies	Fully accomplished in both Cusco and Apurimac 100% achievement
2	2 advocacy plans to place into regional presidential candidates' agendas commitments to implement Regional CC Strategies (Cusco and Apurimac	Fully accomplished in Cusco and Apurimac 100% achievement
3	80% of candidates for regional presidency of Cusco and Apurimac include CC in their platforms and commitments to implement Regional CC Strategy	Fully accomplished in Cusco and Apurimac 100% achievement

4	2 citizen oversight plans for tracking the Regional CC Strategy (Cusco and Apurimac)	100% accomplished in Apurimac 50% accomplished in Cusco 75% overall achievement
5	1 citizen oversight annual report produced on progress in implementing the Regional CC Strategy in Cusco and Apurimac (2014 - 2016)	Not accomplished in either region 0% achievement

Review of Effect and Product Achievement in Effect 2

#	Indicator/Objective	Status
Effect 2: Rural high Andean populations of prioritized areas strengthen innovative adaptive responses and provide useful evidence for public policy decisions		
1	30 % of trained yachachiqs of Cusco and Apurimac integrate ACC orientations in productive technologies into the technical assistance they provide to beneficiary families of Haku Winay	45% of yachachiqs of Cusco and Apurimac in the Haku Winay project in 2013 and 2014 integrated ACC orientations in productive technologies into the technical assistance they provided to beneficiary families 100% achievement
2	At least one innovative rural adaptive response identified with useful evidence for public policies	35 innovative rural adaptive responses identified with useful evidence for public policies: 20 in the book "Lecciones de la Tierra" of MINAM; 15 in the publication "Rumbo a un programa nacional de siembra y cosecha de agua" of MINAGRI. 100% achievement
Product 1: Optimized proposal with replication potential that capitalizes on the PACC experience and of other actors		
1	One document capitalizes the experience of PACC 1.	A document produced in 2014 entitled: "Explorando respuestas adaptativas a la variabilidad y cambio climático con familias y comunidades altoandinas de Cusco y Apurímac." 100% achievement
Product 2: Adaptive responses incorporated into the FONCODES intervention generate additional impact		
1	FONCODES formalizes the incorporation of ACC issues in the planning and management tools of the Haku Winay project.	Accomplished in April 2015 through two memoranda incorporating ACC issues into its participatory rural diagnosis and technical dossier. 100% achievement
2	80% of beneficiary households in the pilot NECs of Cotaruse and Ocongate received technical assistance in productive technologies incorporating ACC issues.	100% of beneficiary households (1,294) of the two pilot NECs have received technical assistance from yachachiqs trained in incorporating ACC into Haku Winay productive technologies. 100% achievement
Product 3: Mechanism of knowledge management of methods and Andean adaptive technologies		
1	MINAM establishes a knowledge management mechanism for identifying and capitalizing on knowledge generated on methods and effective adaptive technologies with potential for replication by means of 2 cycles of national competitions (2014 and 2016).	In 2014 MINAM established a National Environmental Prize in the category of management of climate change. Prizes were awarded to 6 winners in COP 20. Knowledge generated was spread through publication of a book entitled "Lecciones de la Tierra" in 2015. This competition was repeated in 2015 in the category of water management with 2 winners, although no publication or report followed. 100% achievement
Product 4: Solid evidence consolidated on cause-effect and cost-benefit of innovative adaptive responses		
1	One report each year on water volumes of springs associated with practices of Sowing and Harvesting of water in Huacrahuacho micro-watershed in 2014, 2015, and 2016.	All three annual reports produced ending in 2016 with a volume produced on the interpretation and analysis of all the technical information generated, plus a study on environmental tracers. 100% achievement
2	One report each year on evidence of variation	All three reports produced on vegetation cover and

	in aquifer recharge and recuperation of biodiversity and biomass linked to practices of temporary closure and management of pastures in the Mollebamba micro-watershed in 2014, 2015, 2016.	hydrological variation. 100% achievement
	One annual report on knowledge generated and evidence on adaptive practices identified in the framework of the MINAM knowledge management mechanism in 2015 and 2016.	1 report on elements of value and knowledge generated by 20 pre-selected practices in the 2014 National Environmental Prize competition. 1 book produced entitled "Lecciones de la Tierra" that compiles stories from the 20 pre-selected practices in the 2014 National Environmental Prize competition. 1 report on characteristics and elements of value in the 29 practices competing in the National Environmental Prize of 2015. 100% achievement
4	One report on knowledge generated and evidence of benefits from incorporation of adaptive measures in the Haku Winay project produced in 2016.	1 qualitative study on the additional value (value added) of PACC measures in the pilot activities of NECs Cotaruse and Ocongate in the framework of the Haku Winay project. 100% achievement

Review of Product Achievement in Effect 3

#	Indicator/Objective	Status
Effect 3: Universities generate research and train professionals in accord with regional demand for management of adaptation to climate change.		
1	2 new research projects per year in UNSAAC and UNAMBA related to CC and in accord with regional demand (2014 - 2016)	Fully accomplished, but counts 5 undergraduate theses as well as 2 UNSAAC research projects. 100% achievement
2	20 postgraduate students graduated with a Master's in Climate Change and Sustainable Development exercising in their profession.	Fully accomplished (25 students graduated) 100% achievement
Product 1: Regional coordinated research agendas in climate change		
1	2 regional research agendas with specific CC content are developed and approved by regional governments and UNSAAC and UNAMBA	Fully accomplished 100% achievement
Product 2: Strengthened research capacity in climate change of professors and researchers		
1	2 research capacity plans developed in UNSAAC and UNAMBA and implemented	Fully accomplished UNAMBA removed from indicator 100% achievement
2	2 research projects in CC research designed and implemented by UNSAAC and UNAMBA	UNAMBA removed from indicator Fully accomplished in UNSAAC 100% achievement
3	2 groups of professors/researchers of UNSAAC and UNAMBA associated with research projects strengthen their capacities with assistance from SSEs	Fully accomplished 100% achievement
4	At least 30 professors/researchers of UNSAAC and UNAMBA strengthen knowledge of methodologies and tools for research in CC themes	Fully accomplished 100% achievement
5	10 undergraduate theses on CC are designed and approved	Fully accomplished number of theses (12) 11 only have been approved

		100% achievement
6	2 scientific articles produced by researchers in UNSAAC and UNAMBA with Swiss advisors presented for publication to journals	Accomplished in UNSAAC (UNAMBA withdrawn) 100% achievement
7	Advances and/or results of research with advisory support from the SSEs are presented in at least 2 events	Accomplished 100% achievement
8	1 annual publication of electronic scientific review on CC in the Andes (2014 - 2106)	Accomplished for all years(2014, 2015, 2016) 100% achievement
Product 3: Normative changes dynamize the use of the Canon in research		
1	1 proposal for normative improvements in the use of Canon formulated by MINAM, CONCYTEC and National Assembly of Rectors	50% accomplished 50% achievement
2	At least 1 normative improvement introduced in UNSAAC to dynamize procedures for the use of Canon funds in research projects	Fully accomplished 100% achievement
3	1 management model for the use of canon ready in UNAMBA	Fully accomplished 100% achievement
Product 4: Supply of Training at the undergraduate and graduate levels		
1	At least 3 faculties have strengthened their curricula with cross-cutting incorporation of CC	25 % accomplished. 25% achievement
2	1 master's degree program in Climate Change and Sustainable Development approved in UNSAAC with one class graduating.	Fully accomplished double indicator of program approved and 1 class already graduated (25 students in 2015). 30 more scheduled to graduate in 12/2016. 100% achievement

Review of Product Achievement in Effect 4

#	Indicator/Objective	Status
Effect 4: **National governmental entities scale up adaptive responses through public policies based on evidence and make contributions to global dialogue**		
1	1 national and/or regional public institution puts into action mechanisms and/or decisions to scale up adaptive actions in rural areas as a result of collaborative action with PACC	5 national public institutions have put into action mechanisms and/or decisions to scale up adaptive actions in rural areas as a result of collaborative action with PACC 100% achieved
2	MINAM progressively consents to priorities in the national climate agenda that are expressed in contributions in ACC communicated to the UNFCCC and in national adaptation planning	MINAM communicates to the UNFCCC commitments to ACC in terms of sectors, ecosystems, most vulnerable populations. 100% achieved
Product 1: Public rural development policies incorporate adaptation to climate change based on evidence		
1	At least 1 national rural development policy or program incorporates CC through action by the Rural Development Group of the Mesa de Concertación en la Lucha contra la Pobreza (MCLCP)	Participated in an event of Dialogue for Concertation in August 2015. Contributions made in late 2015 and 2016 to Rural Agenda 2016-2021 and Environmental Agenda 2016-2021. These are all promoted by the MCLCP. 100% achievement
Product 2: Existing Public Mechanisms Scale Up Rural Adaptive Responses		
1	Incentives Plan for the Modernization of Municipal Management of the MEF incorporate municipal	Proposal by PACC rejected by MEF and sent to MINAM for its action. No action has yet followed but

	objectives incorporating ACC	the plan is ready (objective considered 50% completed). 50% achievement
Product 3: Mechanisms of national- regional dialogue formulated in the face of climate change		
1	National InterClima institutionalized by political decision as evidenced by at least 2 events between 2013 and 2016	InterClima was held in 2015 in Cusco and in 2016 in Arequipa. (PACC in Organizing Committee) 100% achievement
2	Intergovernmental dialogue to strengthen climate risk management in which two events are realized with 1 report per event from 2013 to 2016.	Two events held related to intergovernmental dialogue to strengthen climate risk management (2013 and 2014). Reports also produced. 100% achievement
3	Regional InterClimas in Apurimac and Cusco institutionalized as annual events for dialogue and reporting on advances in climate change management (2013 to 2016).	Realized in Apurimac and Cusco each year from 2013 through 2016 (4 events in each region). 100% achievement
Product 4: Needs and adaptive responses in high Andean rural populations are made visible in global dialogue		
1	Public and private institutions with experience in work on mountain ecosystems generate interchange and debate on ACC in mountain ecosystems to put the theme into COP 20.	MINAM convened the group to position the issue of mountain ecosystems in the COP 20. 100% achievement
2	At least one document of analysis, position, and proposal based on experiences in ACC en mountain ecosystems produced and distributed in COP 20.	3 policy briefs on the experience of PACC distributed in a side event in COP 20 and organized by PACC with Swiss Development (SDC) ACC projects in China and India. 100% achievement

N.B. These levels of accomplishment have been calculated and provided in the final report of the PACC 2 M&E plan. These are the official PACC 2 indicators. They do not include the numerous publications produced by the SSE

Annex 2: Net Present Value Analysis for Global PACC 2 Economic Impact (PACC and all allies over 10 years)

	Inversión 2013-2016	Años después de terminado el Programa PACC									
Análisis Beneficio Costo (años)		1	2	3	4	5	6	7	8	9	10
1. Beneficios netos USD		14,673,981	15,407,680	16,178,064	16,986,967	17,836,315	18,728,131	19,664,538	20,647,765	21,680,153	22,764,161
1.A. Efecto 1_Familias beneficiarias de los PIP Regionales (Función ambiente) y de las ONG, en Cusco y Apurimac											
- Incremento de ingresos familias con negocios		5,108,167	5,363,575	5,631,754	5,913,341	6,209,009	6,519,459	6,845,432	7,187,703	7,547,089	7,924,443
- Incremento de ingresos familias sin negocios		6,129,800	6,436,290	6,758,105	7,096,010	7,450,810	7,823,351	8,214,518	8,625,244	9,056,506	9,509,332
1.B. Efecto 2: Familias Beneficiarias del Haku Wiñay Cusco y Apurimac											
- Incremento de ingresos netos familias con negocios		1,293,655	1,358,338	1,426,255	1,497,568	1,572,446	1,651,068	1,733,622	1,820,303	1,911,318	2,006,884
- Incremento de ingresos netos familias sin negocios		2,142,359	2,249,477	2,361,951	2,480,048	2,604,051	2,734,253	2,870,966	3,014,514	3,165,240	3,323,502
2. Costos USD	28,384,809	6,874,960	7,218,708	7,579,643	7,958,626	8,356,557	8,774,385	9,213,104	9,673,759	10,157,447	10,665,319
2.A. Costo del Programa PACC	4,436,063										
2.B. Costo PIP y ONG Cusco y Apurimac											
- Costo de los PIP Cusco	9,511,600										
- Costo de los PIP Apurimac	8,625,657										
2.C. Costo Proyecto Haku Wiñay Cusco y Apurimac											
- Costo de atención y Transferencias a las familias	5,811,489										
2.D. Incremento neto del mantenimiento Familias PIP y ONG											
- Costos de Mantenimiento Efecto 1 con negocio		2,451,920	2,574,516	2,703,242	2,838,404	2,980,324	3,129,340	3,285,807	3,450,098	3,622,603	3,803,733
- Costos de Mantenimiento Efecto 1 sin Negocios		3,269,227	3,432,688	3,604,322	3,784,539	3,973,765	4,172,454	4,381,076	4,600,130	4,830,137	5,071,644
2.E. Incremento neto del mantenimiento Familias Haku Wiñay											
- Costos de Mantenimiento Efecto 2 con Negocios		596,800	626,640	657,972	690,871	725,414	761,685	799,769	839,758	881,745	925,833
- Costos de Mantenimiento Efecto 2 sin Negocios		557,013	584,864	614,107	644,813	677,053	710,906	746,451	783,774	822,962	864,111
FLUJO ECONÓMICO USD	-28,384,809	7,799,021	8,188,972	8,598,421	9,028,342	9,479,759	9,953,747	10,451,434	10,974,006	11,522,706	12,098,841
VAN SOCIAL	29,757,184										
TIR SOCIAL	29.0%										

Annex 3: First Monitoring Report – ERFCC Cusco

No	ESTRATEGIA	INDICADOR	META (2021)	LB (2014)	REP 1 (jul-2016)	Por cumplir	% Logrado
1	Implementar un programa de afianzamiento hídrico regional entre el 2015 y el 2012	# de proyectos de afianzamiento hídrico en ejecución	34	17	2	15	11.8%
2	Promover el uso racional y eficiente del agua en sus diversos usos: poblacional, agrícola, pecuario, industrial, etc.	# de proyectos en ejecución que promueven el uso racional y eficiente del agua	146	97	2	47	4.1%
3	Fortalecer las políticas y estrategias de protección, conservación recuperación y restauración de ecosistemas naturales, en especial de la biodiversidad amenazada	# de políticas y estrategias para la protección, conservación, recuperación y restauración de ecosistemas naturales y de la biodiversidad amenazada en todos los niveles	32	21	7	4	63.6%
4		# de áreas de conservación establecidas a nivel regional	36	24	6	6	50.0%
5	Promover la gestión, manejo sostenible y recuperación de los recursos naturales, en especial de los humedales, bosques andinos y amazónicos	# de proyectos en ejecución que promueven la gestión, manejo sostenible y recuperación de suelos, humedales, bosques andinos y amazónicos a nivel regional	20	4	2	14	12.5%
6		# de proyectos de forestación, reforestación o de recuperación de superficies degradadas a nivel regional	28	14	6	8	42.9%
7	Promover el desarrollo e implementación de programas de manejo integrado de plagas y enfermedades de importancia económica, por pisos altitudinales/ecológicos	# de estudios de investigación sobre plagas y enfermedades en cultivos y crianzas que se incrementan por efectos del CC, a nivel regional	5	3	9	-7	450.0 %
8		# de proyectos y programas formulados y en proceso de implementación para el manejo de plagas y enfermedades en cultivos y crianzas, incrementadas por efectos de CC	14	12	2	0	100.0 %
9	Desarrollar capacidades y versatilidad en las habilidades productivas para	# de organizaciones de productores formalizadas y	126	126	207	-81	164.3 %

	adecuarse ante las situaciones de CC	fortalecidas en sus capacidades en diversificación productiva con valor agregado					
10		# de organizaciones de productores que han diversificado y/o incrementado sus actividades económicas productivas, a partir del desarrollo de capacidades	19	19	174	-155	915.8 %
11	Diversificar la producción agropecuaria de cada cuenca, que garantice la seguridad alimentaria de las familias vulnerables al CC	# de proyectos en ejecución que promueven la diversificación en la producción agropecuaria a nivel regional	24	12	3	9	25.0%
12		# de proyectos que promueven el uso de energías renovables no convencionales	20	10	1	9	10.0%
13	Proteger el capital genético, productivo y biocultural vulnerable al CC, como estrategia de soberanía alimentaria y seguridad alimentaria	# de proyectos que promueven la protección, conservación y valoración de la agrobiodiversidad a nivel regional	16	8	1	7	12.5%
14		# de centros de investigación que cumplen en proteger el capital genético, productivo y biocultural	9	9	9	0	100.0 %
15	Implementar políticas de protección y prevención para promover la adecuacuón, cobertura suficiente y el fortalecimiento de capacidades institucionales de los servicios de salud, para enfrentar las enfermedades emergentes por el CC	% de agentes comunitarios con competencias para promover conductas adecuadas ante las variaciones climáticas extremas	1040	0	0	1040	0.0%
16	Promover la reubicación, ubicación segura, orientación óptima, diseño constructivo adecuado en las viviendas y asentamientos humanos, urbanos y rurales, en el marco de la planificación y ordenamiento territorial frente al CC	# de municipalidades provinciales que cuentan con plan de desarrollo urbano y/o plan de acondicionamiento territorial u ordenamiento territorial que incorporan enfoque de CC y/o GdR	4	4	5	-1	125.0 %
17		# de municipalidades provinciales que cuentan con planes de prevención y RRD y/o planes referidos a la gestión reactiva (preparación, rehabilitación y operaciones de emergencia)	13	2	4	9	30.8%
18	Articular los ejes transversales a la situación del CC en la propuesta educativa regional (Proyecto Educativo	# de instrumentos educativos que incorporan transversalmente la temática de CC	3	0	2	1	66.7%

	Regional, Proyecto Educativo Local,Proyecto Educativo Institucional)						
19	Adecuar los instrumentos de gestión y desarrollo regional al contexto del CC y a la ERFCC	# de instrumentos de gestión y desarrollo que han sido formulados y/o actualizados incorporando el contexto de CC, a nivel regional al 2021	28	21	13	-6	185.7 %
20	Fomentar la gestión y producción de conocimiento sistemático e interdisciplinario, e información sobre el CC	# de investigaciones publicadas y difundidas, a través del SIAR Cusco o de otros medios, en temas relacionados a CC a nivel regional	128	64	8	56	12.5%
21		# de sistematizaciones de experiencias publicadas y difundidas, a través del SIAR Cusco y de otros medios, en temas relacionados a CC a nivel regional	20	8	3	9	25.0%
22	Promover alianzas estratégiccas y potenciar el trabajo conjunto y articulado entre instituciones, gobiernos locales, organizaciones y otras plataformas para implementar mecanismos de ACC o MCC	# de espacios de concertación articulados al CORECC a nivel regional	12	6	2	4	33.3%

Based on: Primer Reporte de Monitoreo del Plan de Implementación de la ERFCC . CORECC, Cusco, Octubre, 2016

Annex 4: Regional Research Agenda (ARIN) - CUSCO

EJE TEMATICO	SALUD	
OBJETIVO	**Generar conocimiento para comprender mejor los problemas que afectan la salud de la población …**	
Tema de investigación: prevención de riesgos y amenazas a la salud	Construcción de mapas de vulnerabilidad ante desastres	Gerencia de RRNN. PREDES.DIRESA, Instituto de Investigación en salud. UNSAAC
	Recrudecimiento y ampliación de zonas de incidencia de algunas enfermedades (malaria, dengue, etc.).	
EJE TEMATICO	**Recursos Hídricos para la agricultura y la ganadería**	
OBJETIVO	**Generar conocimiento tecnología y técnicas para utilizar con eficiencia los recursos hídricos de alta montaña disminuidos por efectos del cambio climático.**	
Tema de investigación: Agua y riego	Adaptación del riego tecnificado moderno a las condiciones de producción alto andina	UNSAAC, IIUR, INIA, PLAN MERIS
	El riego por aspersión y sus implicancias en la erosión de los suelos – Tres sistemas de riego evaluados	UNSAACC, INIA, IMA, PLAN MERIS, IIUR
	Estudio de optimización del riego por gravedad (por surcos)- dos sistemas optimizados	UNSAACC, INIA, IMA, PLAN MERIS, IIUR
	Estudios de riego en laderas, tipologías, eficiencia, erosión de suelos- tres sistemas evaluados	UNSAACC, INIA, IMA, PLAN MERIS, IIUR
	Estudios de identificación y rehabilitación de canales precolombinos asociados a andenes	UNSAACC, IMA, PLAN MERIS, IIUR
	Estudios de sistemas de cosecha de agua tradicional- tres sistemas exitosos estudiados	UNSAACC, INIA, IMA, PLAN MERIS,
	Estudios de sistemas de cosecha de agua no convencional-	UNSAACC, INIA, IMA, PLAN MERIS,
	Estudios de lagunas con potencial de almacenamiento	UNSAACC, IMA, PLAN MERIS
	Estudios de cargas y descargas de agua en lagunas	UNSAACC, IMA, PLAN MERIS
EJE TEMATICO	**Recurso Suelo**	
OBJETIVO	**Generar conocimiento, tecnología y técnicas para mejorar el uso y el manejo del recurso suelo**	
Tema de investigación: cambio climático	Efectos del cambio climático sobre los ciclos biogeoquímicos de los nutrientes en el suelo	INIA, PLAN MERIS, UNSAAC. Facultad de Agronomía y Zootecnia
EJE TEMATICO	**Energía**	
OBJETIVO	**Generar conocimiento tecnología y técnicas para mejorar el uso de tecnologías renovables sobre la base de potencialidades regionales**	
Tema de Investigación: Energías renovables	Potencial de residuos agrícolas para generación de biocombustibles;	UNSAAC, DREM, ELECTROSUR ESTE, EGEMSA.
	Potencial de bosques y bosquetes reforestados para generación de biocombustibles	
	Identificación de espacios territoriales con potencial para desarrollar energía solar, eólica, hidroenergía.	
	Aprovechamiento de energía solar en viviendas climatizadas, Fito toldos e instalaciones pecuarias	
	Aprovechamiento de residuos ganaderos y basura municipal para generación de biogás	
	Aprovechamiento de hidroenergía para actividades agropecuarias	
	Espacios territoriales con potencial para desarrollar energía geotérmica de volcanes y aguas termales	
	Tecnologías para aprovechamiento de energía geotérmica y de aguas termales	
EJE TEMATICO	**Ambiental**	
OBJETIVO	**Generar conocimiento que permita la gestión integrada y sostenida de los recursos naturales, la conservación de la biodiversidad y los saberes culturales asociados y calidad ambiental para un desarrollo integral sostenible en la región**	

Tema de investigación: Agua Vulnerabilidad Hídrica	Estudios de Balance hídrico, oferta y demanda a nivel de microcuencas y cuencas- 15 estudios	IMA, PLAN MERIS, ALA, UNSAAC, SENAMHI, UNIVERSIDADES
	Estudios de hidrología: disponibilidad de agua superficial	
	Estudios de hidrogeología: disponibilidad de agua subterránea	
	Régimen de lluvias y escasez de agua	
	Glaciares y cambio climático	
Tema de investigación: Gestión del recurso hídrico	Manejo integral de cuencas	
	Implementación de la gestión integrada de recursos hídricos en microcuencas y subcuencas	
	Especies vegetales retenedoras de agua, relación planta, suelo, agua.	
	Saberes ancestrales en gestión de recursos hídricos	
	Cosecha de agua: validación de tecnologías ancestrales y modernas	
	Conflictos sociales en torno al uso del agua	
	Reforestación y su aporte a la captación del recurso hídrico	
	Impactos ambientales de las presas y represas	
Tema de investigación: Impactos del cambio climático	Impactos del cambio climático en pastos naturales y tierras de protección en zonas andinas y alto andinas: aspectos biofísicos, biogeoquímicos y cambios en la fertilidad	
	Cambio de uso de suelo y sucesiones vegetales	
EJE TEMATICO	**INVESTIGACIONES TRANSVERSALES**	No indica
OBJETIVO	**Generar conocimiento sobre el riesgo de desastres en la región que tienen un carácter transversal a varios ejes de interés para la investigación**	
Tema de investigación: Escenarios climáticos e hidrológicos	Estudios de escenarios climáticos a nivel de cuenca y microcuencas	No indica
	Estudios sobre escenarios hidrológicos a nivel de cuenca y microcuencas	No indica No indica
Tema de investigación: Gestión del Riesgo de desastres	Monitoreo y tendencias del clima y la variabilidad climática. Evolución del clima y las modificaciones en la variabilidad climática.	
	Efectos e impactos locales producidos por fenómenos atmosféricos que ocurren localmente y en zonas remotas	
	Estudios de vulnerabilidad y riesgo ante eventos climáticos extremos a nivel de cuencas, microcuencas y centros poblados	
	Estudios de Vulnerabilidad y riesgo ante movimientos de remoción en masa a nivel de cuencas microcuencas y centros poblados	

Annex 5: Regional Research Agenda (AIR) – APURIMAC

	INVESTIGACION BASICA	INVESTIGACION APLICADA
EJE TEMATICO	**COMPONENTE DESARROLLO AGRARIO**	
Tema de Investigación: Agrario	Evaluación de la adaptabilidad de cultivos y variedades en contexto de cambio climático	Mejoramiento genético y manejo tecnificado de principales granos y tubérculos y frutales andinos y los productos resilientes al clima
EJE TEMATICO	**COMPONENTE: DIVERSIDAD BIOLOGICA**	
Tema de investigación: Agro biodiversidad	.	Evaluación de pérdida de agro biodiversidad como consecuencia del cambio climático y sus impactos en la seguridad alimentaria
EJE TEMATICO	**COMPONENTE BOSQUES Y PRADERAS**	
Tema de investigación: Bosques	Identificación de áreas potenciales para implementar forestería comunitaria como estrategia ante el cambio climático	Evaluación de especies forestales y captura de carbono para proyección hacia mercados de carbono.
		Respuesta de bosques alterados a procesos de recuperación forestal
		Evaluación de inserción de proyectos de forestación en los Mecanismos de Desarrollo Limpio (MDL) y otros mecanismos de venta de carbono.
Tema de investigación: Praderas		Potencial de las praderas en la captura de carbono
		Dinámica del cambio de uso del suelo
Tema de investigación: Agrosilvopatoril	Grado de infiltración –cosecha de agua de pastos, arbustos y árboles en cabeceras de cuenca	Identificación de prácticas agro silviculturas relevantes para la mitigación y adaptación al CC
EJE TEMATICO	**COMPONENTE RECURSOS HIDRICOS Y CUENCAS**	
Tema de Investigación: Recursos hídricos y cuencas hidrográficas	Desarrollo de tecnologías de siembra y cosecha de agua para el afianzamiento hídrico basado en conocimiento tradicional	Evaluación del costo-beneficio de actividades de siembra y cosecha de agua en cabeceras de cuenca
	Tasa de erosión y desertificación por efectos climáticos y uso del suelo de las cuencas de la región	Estudiar la posibilidad de implementación de mecanismos de pago por servicios ambientales
EJE TEMATICO	**COMPONENTE: CAMBIO CLIMATICO**	
Tema Adaptación- Resiliencia	Monitoreo climático y predicción climática basada en información hidrometereológicas y conocimiento tradicional	Alerta temprana frente a amenazas de origen climático (sequias heladas, deslizamientos)
	Vulnerabilidad de poblaciones urbanas y rurales ante amenazas de origen climático o hidrometereológicas	Sistematización y difusión de saberes ancestrales de manejo de recursos naturales y sistemas productivos
	Vulnerabilidad hídrica regional ante el cc en las diferentes cuencas de la región y sus efectos en los sistemas agropecuarios	Tecnologías y sistemas integrales de afianzamiento hídrico con énfasis en cabeceras de cuenca
	Vulnerabilidad e impactos del CC sobre el sector salud y los sistemas agropecuarios	Identificación y difusión de cultivos andinos resistentes a cambios climáticos extremos (sequias y heladas)
	Vulnerabilidad de las poblaciones alto andinas ante los	Desarrollo y transferencia de tecnológica para la adaptación en el

	fenómenos del friaje.	sector de salud transporte y otros
	Evaluación de los impactos económicos del CC	Adaptación y mejoramiento participativo de los recursos genéticos frente al CC
	Inventario de flora y fauna y ecosistemas amenazados por el cambio climático	Aplicación o adaptación de tecnologías para la generación de biocombustibles energías renovables y gas metano derivado de rellenos sanitarios.
	Evaluación de los efectos del CC en los medios de vida de las personas	Desarrollo e implementación de tecnologías para la generación de calefacción ante fenómenos de frio extremo o friaje en zonas alto andinas
	Nuevas plagas, enfermedades, y vectores por efecto del CC	Identificación de estrategias locales de adaptación para la seguridad alimentaria frente al CC
	Monitoreo hídrico de principales ríos y cuencas de la región	Identificación de oportunidades y ventajas económicas del CC en el sector productivo
	Evaluación de la desglaciación y sus consecuencias en la disponibilidad de recursos hídricas.	Evaluación costo-beneficio de las medidas de adaptación al CC implementadas
		Estudio de las opciones de pago por servicios ecosistémicos (PSE) en el ámbito regional para recursos hídricos, bonos de carbono, biodiversidad, etc

Annex 6: Funciones del PACC en los subsistemas (PRODOC)

Sub	FUNCIÓN PRINCIPAL	FUNCIONES DE SOPORTE apoyadas por PACC	Actores (Oferta)	Actores (Demanda)	Comentarios
1	Gestión pública eficaz en la implementación de las ERFCC* Este subsistema interactúa con el 4.	(14) Actualización de capacidades. (15) Articulación local y regional (16) Inversión Publica (17) Vigilancia Social	Gobiernos regionales, Gerencias, Direcciones sectoriales, regionales, proyectos especiales. Gobiernos locales, OPDs, REMURPE, MCDLCP, ONG locales, Medios de Comunicación, Cámara de Comercio.	(1) Poblaciones rurales (2) Sector privado (3) Asociaciones de Productores (4) (4) Organizaciones Políticas	La colaboración entre actores de la oferta y la demanda se ha pr parcialmente. Las funciones de inversión pública y vigilancia no fortalecido. Los actores ausentes en la implementación fueron e privado y el MEF/inversiones. Se requiere una mejor identificació actores y su rol especifico en el logro de la función y las reglas que se cambiar. Sector privado no conoce el nivel de afectación frente al A business. En este subsistema se pudo incluir a CEPLAN. No se iden las reglas que se querían cambiar. Ver (*)
2	Fortalecer y consolidar conocimiento sobre respuestas adaptativas rurales efectivas, con potencial de réplica. Este subsistema interactúa con el 4.	(1) Identificación de tecnologías campesinas efectivas. (2) Metodología de tecnologías apropiadas. (3) Innovación y adecuación (4) Gestión del conocimiento y monitoreo,	Gobiernos regionales, Gerencias, Direcciones sectoriales, regionales, proyectos especiales. Gobiernos locales, OPDs. INIA, SENASA, AGRORURAL, FONCODES, Asociaciones Yachachiqs, Instituciones Técnicas de Servicios Rurales, PERCSA, IMA Cusco.	(1) Poblaciones rurales (2) Sector privado (3) Asociaciones de Productores. (4) Organizaciones Políticas	La colaboración solo ha ocurrido con un actor y no se ha profundiz medición de los impactos en las zonas piloto (función de monitoreo). no tuvo un rol visible para aprendizaje para otros sectores. subsistema se pudo incluir a MINAGRI. No se actuó con todos los identificados en el subsistema. No se identificaron las reglas que se cambiar. Ver (**) Se requiere una mejor identificación de los actores y su rol especifi logro de la función y las reglas que se quieren cambiar.
3	Información y estudios para dar respuesta a necesidades de conocimiento para la ACC Este subsistema interactúa con el 1	(a) Articulación universidad /sociedad. (b) Control de rigor científico. (c) Formation of researchers. (d) Rearch Methodologies (e) Pertinencia y priorización de temas	Universidades de Cusco y Apurímac. Y Lima (UNALM, PUCP, U. Pacifico). SSE. Redes Académicas de investigación, nacionales y extranjeras.	Gobiernos regionales, Gerencias, Direcciones sectoriales, regionales, proyectos especiales. Gobiernos locales, Formuladores de PIPs. Organizaciones de Productores. Empresas	La colaboración entre los actores de la oferta y la demanda no producido. No se han logrado mejoras en las funciones de apoyo Universidades no interactúan con policy makers para su age investigación. Este subsistema requiere un mejor diseño y objetivo definidos. Las SSE no participaron en preparación de ager investigación. CONCYTEC no ha sido convocada Se actuaron so reglas. Ver (***).
4	Incidencia en políticas y mecanismos nacionales para catalizar ACC a nivel rural. Este subsistema interactúa con el 1 y 2	Articulación y Consolidación de propuestas	Actores locales. Proyectos de Cooperación Internacional (bilaterales, multilaterales) y de ENIEX	MIDIS. MINAGRI. MINAM.MEF. CENEPRED,GORE de Cusco y Apurímac. Grupo de Desarrollo Rural de la MCDLCP. GID. REMURPE. Programa de Escalamiento de Innovaciones Rurales PEIR de IDRC-FIDA-IEP	Solo se ha actuado sobre tres actores MINAGRI, MIDIS vía FONC CEPLAN. La incidencia sobre el plan de incentivos municipales no se r tampoco se actuó sobre PROCOMPITE. En lo que respecta a la o PACC ha actuado sin el concurso de los otros actores. No se ha re que proyectos de cooperación internacional o bilateral ha contribui efecto 4.

(*) Las reglas mencionadas, no seleccionadas fueron (1) la ENCC, (2) el PLANGRACC, (3) ERCC, (4) Planes de Desarrollo Concertado, (5) Normatividad de sistemas de gestión pública, (6) Criterios políticos de asignación de r (7) costumbres y derecho consuetudinario en comunidades altoandinas.

(**) Las reglas identificadas mas no seleccionadas para intervención del PACC fueron: (1) marco legal que limita la inversión pública en desarrollo productivo, (2) Ley de PROCOMPITE en gobiernos regionales y loc Normatividad para PIPs productivos; Ley de Comunidades Campesinas, (4) costumbres y derecho consuetudinario en comunidades altoandinas.

(***) Las reglas a influir fueron: Agenda regional de investigación, normatividad nacional para el uso de canon en investigación.

(****) Las reglas para influir fueron el Plan de Incentivos a la Modernización de la Gestión Municipal. (2) Política de Desarrollo Productivo e Inclusión Social del MIDIS (3) Ley y Reglamento de PROCOMPITE

Annex 7: List of Persons Interviewed

Ciudad	Institución/Persona	Tipo de entrevista	# de personas
Lima	PACC	Personal – A profundidad	1
Lima	Helvetas	Personal – A profundidad	1
Lima	SDC	Personal – A profundidad	1
Lima	FONCODES	Personal – A profundidad	3
Lima	(MINAGRI)	Personal – A profundidad	2
Lima	AGRORURAL	Personal – A profundidad	2
Lima	Estratégico (CEPLAN)	Personal – A profundidad	3
Lima	Ministerio de Economía y Finanzas (MEF)	Personal – A profundidad	2
Lima	Ministerio del Ambiente (MINAM)	Personal – A profundidad	2
Lima	CARE	Personal – A profundidad	1
Lima	IPACC	Personal – A profundidad	1
Lima	PREDES	Personal – A profundidad	1
Lima	Libélula	Personal – A profundidad	1
Lima	César Sotomayor-Consultor en Siembra y Cosecha de Agua	Personal – A profundidad	1
Lima	Agua	Personal – A profundidad	1
Lima	GIZ	Personal – A profundidad	1
Cusco	UT FONCODES	Grupo Focal	4
Cusco	Corcytec	Personal – A profundidad	1
Cusco	CORECC – GRRRNNGMA	Personal – A profundidad	1
Cusco	CORECC	Grupo Focal	11
Cusco	UNSAAC – VRIN	Personal – A profundidad	3
Cusco	NEC Ocongate – Yachachiqs	Grupo Focal	6
Cusco	PACC	Personal – A profundidad	7
Cusco	Carmen Giusti – Consultora	Personal – A profundidad	1
Apurímac	PACC	Personal – A profundidad	4
Apurímac	CAR	Grupo Focal	4
Apurímac	Gobierno Regional	Grupo Focal	3
Apurímac	UT FONCODES	Grupo Focal	4
Apurímac	Participantes Curso PIP	Grupo Focal	5
Apurímac	NEC Cotaruse – Yachachiqs	Grupo Focal	8
Ecuador	Gabriela Encalada	Banco Mundial- Ecuador	1
Chile	Guillermo Donoso	Centro de Derecho y Gestión del Agua PUC Chile	1
Suiza	Rupa Mukerji	Co-Head, Advisorry Services Member Management Board- HELVETAS- Suiza	1
Ecuador	Robert Hofstede	Consultor internacional- Ecuador	1
Bolivia	Dirk Hoffmann	Instituto Boliviano de Montañas- Bolivia	1
Ecuador	Bert De Bievre	Secretario Técnico de FONAG Ecuador	1
Ecuador	Manuel Peralvo	Coordinador de Investigación del Programa Bosques Andinos. CONDESAN Ecuador	1
Chile	Laura Meza	FAO oficina regional- Chile	1
Chile	Paulina Aldunce	Centro del Clima y la Resiliencia - Universidad de Chile	1
Bolivia	Raul Delgado	Universidad de San Simón - Bolivia	1
# Total de personas entrevistadas			**96**

Annex 8: Bibliography

Aldunce P., Lillo G., Bórquez R., Farah ML., Indvik K., Montenegro N., Rebolledo I., Reveco C., Paneque M., Román Figueroa C., Guijón R., Rojas M. y Rudnick A. (2016). *Diagnóstico de la Situación de Cambio Climático en Chile. Resumen Evaluación de término del Plan de Acción Nacional de Cambio Climático*. *PANCC 2008-2016*, Licitación N° 608897-101-LE14 del Ministerio del Medio Ambiente 13p.

Escobal J. y Ponce C. (2016) *Combinando protección social con generación de oportunidades económicas: una evaluación de los avances del Proyecto Haku Wiñay.* Lima: GRADES [Recuperado de www.grade.org.pe/wp-content/uploads/LIBROGRADE_FORDHakuWinay.pdf]

CDB, Technical series Nro. 85. Synthesis report o experiences with ecosystem-based approaches to Climate Change Adaptation and Disaster Risk Reduction, October, 2016. https://www.cbd.int/doc/publications/cbd-ts-85-en.pdf

FAO, 2011. Informe de Giras técnicas demostrativas de Reducción del Riesgo. Santiago, marzo, 2011

FONCODES (2015). *Despliegue del Proyecto Haku Wiñay en el Perú. [Recuperado de:* http://www.Foncodes.gob.pe/portal/index.php/programas/programas-chacra]

FONCODES (2015). *Manual Técnico #6 Siembra y cosecha de agua. Proyecto Haku Wiñay/ Noa Jayatai". FONCODES:* Lima, Perú.

FONCODES (2014). *Manual Técnico #1 Pequeños Sistemas de riego por aspersión a nivel familiar. Proyecto" Mi Chacra Emprendedora-Haku Wiñay".* FONCODES: Lima, Perú

FONCODES (2014). *Manual Técnico #2 Biohuertos familiares para la producción de hortalizas. Proyecto "Mi Chacra Emprendedora-Haku Wiñay".* FONCODES: Lima, Perú

FONCODES (2014).). *Manual Técnico #3 Siembra y manejo de pastos cultivados para familias rurales. Proyecto" Mi Chacra Emprendedora-Haku Wiñay".* FONCODES: Lima, Perú.

FONCODES (2014). *Manual Técnico #4 Crianza de cuyes. Proyecto" Mi Chacra Emprendedora-Haku Wiñay".* FONCODES: Lima, Perú.

FONCODES (2014). *Manual Técnico #5 Producción y uso de abonos orgánicos: biol, compost y humus. Proyecto" Mi Chacra Emprendedora-Haku Wiñay".* FONCODES: Lima, Perú.

Gobierno Regional de Apurímac (2015). *Agenda de Investigación- AIR de la Región Apurímac.* Cusco: PACC PERÚ

Gobierno Regional de Apurímac (2012). *Estrategia Regional Frente al Cambio Climático.* Cusco: Gobierno Regional de Apurímac

Gobierno Regional del Cusco, y Consejo Regional de Cambio Climático Región Cusco (2015*). Plan de Implementación de la Estrategia Regional Frente al Cambio Climático, Plan de Monitoreo y Evaluación de la Implementación de la Estrategia Regional Frente al Cambio Climático, Plan de Monitoreo y Evaluación de la Implementación de la Estrategia Regional Frente al Cambio Climático.* Cusco: Gobierno Regional de Cusco

Gobierno Regional del Cusco, y Universidad Nacional de San Antonio Abad del Cusco (2015). *Agenda Regional de Investigación Cusco al 2021.* Cusco: PACC PERÚ.

Gobierno Regional del Cusco, y Consejo Regional de Cambio Climático de la Región Cusco (2016). *Primer Reporte de Monitoreo y Evaluación de la Implementación de la Estrategia Regional frente al Cambio Climático de la Región Cusco.* Cusco: PACC-Perú.

Huggel C., Rohrer M., Calanca, P., Salzmann N., Vergara, W., Quispe, and Ceballos, J.L. (2012) *Early Warning Systems: The" Last Mile" of Adaptation*. Eos, Transactions, American Geophisical Union, Vol.93 N°22, 29 May 2012 pp.209-216

Lavell, Allan (2012). La Adaptación al cambio climático y la gestión del riesgo: Reflexiones en implicancias. Lima: Proyecto de Inversión Pública y Adaptación al Cambio Climático GiZ- FLACSO

Magrin G. (2015). *Adaptación al cambio climático en América Latina y el Caribe*. Santiago de Chile: Naciones Unidas

MEF. Ministerio de Economía y Finanzas del Perú. Dirección General de Inversión Pública (2014*). Guía general para identificación, formulación y evaluación social de proyectos de inversión pública a nivel de perfil.* Lima: Dirección General de Inversión Pública.

MEF. Ministerio de Economía y Finanzas del Perú y GIZ, 2011. Lecciones Aprendidas de la Gestión del Riesgos en Procesos de Planificación e Inversión para el Desarrollo. Memoria del Taller Internacional Julio, 2010.

MEF, MINAGRI, MINAM, GIZ (2012). Seguros para la adaptación al cambio climático en el sector público, productivo y financiero. Memoria Taller Internacional, Lima, Octubre, 2011.

MINAGRI. Ministerio de Agricultura y Riego del Perú (2016). *Talentos Rurales del Desarrollo, Yachachiqs, Yachaqs y Kamayocs*. Lima: GMC Digital.

MINAGRI. Ministerio de Agricultura y Riego del Perú (2016). *Rumbo a un Programa Nacional de Siembra y Cosecha de Agua: Aportes y reflexiones desde la práctica*. Lima: MINAGRI.

MINAGRI. Ministerio de Agricultura y Riego del Perú (2016). *Estrategia Nacional de Agricultura Familiar 2015-2021.* Lima: Minagri.

MINAM. Ministerio del Ambiente del Perú (2016). *El Perú y el Cambio Climático. Tercera Comunicación Nacional del Perú.* Lima: Ministerio del Ambiente.

MINAM. Ministerio del Ambiente del Perú (2016). *La Contribución Nacional del Perú-iNDC: agenda para un desarrollo climáticamente responsable.* Lima: MINAM

MINAM. Ministerio del Ambiente del Perú (2015). *Estrategia Nacional ante el Cambio Climático.* Lima: Ministerio del Ambiente. Viceministerio de Desarrollo Estratégico de los Recursos Naturales. Dirección General de Cambio Climático, Desertificación y Recursos Hídricos.

MINAM. Ministerio del Ambiente del Perú (2015). *2013 Informe de Balance de la Gestión Regional Frente al Cambio Climático en el País*. Lima: Ministerio del Ambiente. Viceministerio de Desarrollo Estratégico de los Recursos Naturales. Dirección General de Cambio Climático, Desertificación y Recursos Hídricos.

MINAM. Ministerio del Ambiente del Perú. Dirección General de Cambio Climático, Desertificación y Recursos Hídricos y Programa de Adaptación al Cambio Climático Perú (2015). *Lecciones de la tierra [Una travesía de aprendizaje por comunidades rurales del Perú que enfrentan con éxito al cambio climático].* Lima: MINAM.

Ministerio de Desarrollo Rural y Tierras de Bolivia (2014) *Plan del Sector Desarrollo Productivo.* La Paz, Bolivia. [Recuperado de Bolivia productiva www.ruralytierras.gob.bo/download.php?file.]

Noble, I.R., S. Huq, Y.A. Anokhin, J. Carmin, D. Goudou, F.P. Lansigan, B. Osman-Elasha, and A. Villamizar (2014), Adaptation needs and options. In: Climate Change 2014: Impacts, Adaptation,and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B.,V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi,Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R.

Mastrandrea,and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York,NY, USA, pp. 833-868.

PACC PERÚ (2016). *Siembra y Cosecha de Agua en el Marco de los Proyectos Haku Wiñay en Cusco y Apurímac. Informe Consolidado 2014-2016.*[Documento de trabajo]

PACC PERÚ (2016) Términos de Referencia Análisis de Impacto a través de Intercambio y Reflexión entre Pares.[Documento de trabajo]

PACC PERÚ (2016). *Propuesta de Plan de Segunda Fase (1 Mayo 2013-31 Diciembre 2016).* [Documento de trabajo]

PACC PERÚ (2016). *Informe Semestral Enero-Junio 2016.* [Documento de trabajo]

PACC PERÚ (2016). *Plan Operativo de Actividades Enero-Diciembre 2016.*[Documento de trabajo]

PACC PERÚ (2016). *Informe Preliminar de Monitoreo y Evaluación Final a nivel de productos y efectos del PACC Perú fase II.* [Documento de trabajo]

PACC PERÚ (2015). *Informe Anual 2015.* [Documento de trabajo]

PACC PERÚ (2015). *Manual Técnico 2: Manejo de pastos naturales altoandinos.*Cusco> PACC.

PACC PERÚ (2014). *Explorando respuestas adaptativas a la variabilidad y cambio climático con familias y comunidades altoandinas de Cusco y Apurímac.* Lima: PACC

PACC PERÚ (2014). *Informe Consolidado (Mayo 2013-Diciembre 2014).* [Documento de trabajo]

PACC PERÚ (2014). *Manual Técnico 1: Las Qochas Rústicas, una alternativa en los andes para la siembra y cosecha de agua en un contexto de cambio climático.* Cusco: PACC

PACC (2013). *Diagnósticos locales integrados de Vulnerabilidad y adaptación a la variabilidad Climática y Cambio Climático: Aprendizajes para una construcción metodológica, Microcuencas altoandinas: Huacrahuacho (Cusco) y Mollebamba (Apurímac).* Serie de Gestión de Conocimientos #1. Cusco: PACC.

PACC PERÚ (s/f). *Fortaleciendo acciones, escalando respuestas. Para la mejora sostenible de la vida de las poblaciones rurales altoandinas frente a un clima cambiante.* [Recuperado de: http://paccpru.org.pe/publicaciones/pdf/159.pdf]

PACC y FONCODES CUSCO (2015). *Memoria del II Curso Taller Cambio Climático y Criterios Adaptativos en el Proyecto Haku Wiñay.* [Documento de trabajo]

PACC y FONCODES (2015). *II Taller Cambio Climático y Criterios Adaptativos en el Proyecto Haku Wiñay, Memoria Yachachiq de los NEC Cotaruse, Juan Espinoza Medrano, Huancarama y Huancarama-Ccorawire en Apurímac.*[Documento de trabajo]

PACC y FONCODES (2015). *Talleres Macro Regionales de capacitación, prevención y preparación para reducir riesgos y aprovechar oportunidades asociadas al Fenómeno El Niño 2015 en la Intervención del Proyecto Haku Wiñay/ Noa Jayatai* [Documento de trabajo]

Salazar L., Aramburú J., González-Flores M. y Winter P. Seguridad Alimentaria y productividad: El Impacto de la adopción de tecnología en pequeñas explotaciones de subsistencia en Bolivia. [Recuperado de https://publications.iadb.org/handle/11319/6783?localeattribute#sthash.JcOFJgc1.dpuf]

SINEACE. Sistema Nacional de Evaluación, Acreditación y Certificación de la calidad Educativa (2015). *24 Historias de Éxito de Certificación de Competencias*. Lima: SINEACE

SINEACE. Sistema Nacional de Evaluación, Acreditación y Certificación de la calidad Educativa (2015). *Normas de Competencia del Extensionista Rural en Camélidos.* Lima: SINEACE

SINEACE. Sistema Nacional de Evaluación, Acreditación y Certificación de la calidad Educativa (2015). *Normas de Competencia de Productores en el Sector Agroexportación*. Lima: SINEACE

Trivelli, Carolina; Escobal, Javier; Revesz Bruno (2006). Pequeña Agricultura Comercial: Dinámica y retos en el Perú. Propuesta 24. IEP. CIES, CIPCA y GRADE.

Universidad Nacional de San Antonio Abad del Cusco (2015). Informe de Gestión 2011-2015. Lima-Perú: Tarea Asociación Gráfica Educativa.

Universidad Nacional de San Antonio Abad del Cusco (2016). *V Semana de la Investigación UNSAACC 2016. Programa General.* Cusco: UNSAAC

ANNEX 9: Publications Written or Supported by the SSEs

Orlowsky, B., Andres, N., Salzmann, N., Huggel, C., Jurt, C., Vicuña, L., Rohrer, M., Calanca, P., Neukom, R., Drenkhan, F. 2016. Science in the context of climate change adaptation - case studies from the Peruvian Andes. In: Salzmann N, Huggel C, Nussbaumer S, Ziervogel G (eds), Climate Change Adaptation Strategies - an upstream-downstrem lens, Springer (2016)

Molina E., Schauwecker S., Huggel C., Haeberli W., Cochachin A., Condom T., Drenkhan F., Giraldez C., Salzmann N., Jiménes L., Montoya N., Rados M., Chaparro N., Samanta J., Suarez W., Arias S., & Sikos F. (2015). Iniciación de un monitoreo del balance de masa en el glaciar Suyuparina, Cordillera Vilcanota, Perú. Climate Change in the Tropical Andes, 2015.

Vegas Galdos, F., Andres, N., Zappa, M., Lavado Casimiro, W. S., & Hilker, N. (2015). Simulación y caracterización del régimen natural de descargas diarias en los andes del sur del Perú: región de Apurímac y Cusco. Revista Peruana Geo-Atmosferica, 4, 1–18

Neukom, R., Rohrer, M., Calanca, P., Salzmann, N., Huggel, C., Acuña, D., Christie D. A., Morales, M. S. 2015. Facing unprecedented drying of the Central Andes? Precipitation variability over the period AD 1000-2100. Environmental Research Letters. Doi:10.1088/1748-9326/10/8/084017.

Huggel C, Scheel M, Albrecht F, Andres N, Calanca P, Jurt C, Khabarov N, Mira-Salama D, Rohrer M, Salzmann N, Silva Y, Silvestre E, Vicuña L, Zappa M. 2015: A framework for the science contribution in climate adaptation: Experiences from science-policy processes in the Andes. Environmental Science & Policy 47:80–94. doi: 10.1016/j.envsci.2014.11.007

Huggel C, Raissig A, Rohrer M, Romero G, Diaz A, Salzmann N. 2014: How useful and reliable are disaster databases in the context of climate and global change? A comparative case study analysis in Peru. Nat Hazards Earth Syst Sci Discuss 2:4331–4362. doi: 10.5194/nhessd-2-4331-2014

Salzmann, N., Huggel, C., Rohrer, M., Stoffel, M. 2014: Data gaps and research needs on glacier and snow cover change and related runoff – a climate change adaptation perspective. Journal of Hydrology (inpress; available online) DOI: 10.1016/j.jhydrol.2014.05.058

Sanabria, J., Calanca, P., Alarcón, C., Canchari, G. 2014: Potential impacts of early twenty-first century changes in temperature and precipitation on rainfed annual crops in the Central Andes of Peru. Reg Environ Change 1–16. doi: 10.1007/s10113-014-0595-y

Andres, N., Vegas Galdos, F., Lavado Casimiro, W. S., Zappa, M. 2014: Water Resources and Climate Change Impact Modelling on a Daily Time Scale in the Peruvian Andes. Hydrological Sciences Journal 59: 2043–59. doi:10.1080/02626667.2013.862336

Rohrer, M., Schauwecker, S. 2014: Cambio climático Global. Resumen para responsables de políticas - Compilación de los principales resultados de la temperatura y cambios en las precipitaciones y el forzamiento radiativo. Cambio Climático en los Andes tropicales 1

Huggel, C., Stone, D., Auffhammer, M., & Hansen, G. (2013). Loss and damage attribution. Nature Clim. Change, 3(8), 694–696.

Salzmann, N., C. Huggel, M. Rohrer, W. Silverio, B. G. Mark, P. Burns, and C. Portocarrero. 2013. Glacier Changes and Climate Trends Derived from Multiple Sources in the Data Scarce Cordillera Vilcanota Region, Southern Peruvian Andes. The Cryosphere 7 (1): 103–18. doi:10.5194/tc-7-103-2013.

Rabatel, A., Francou, B., Soruco, A., Gomez, J., Cáceres, B., Ceballos, J. L., Wagnon, P. (2013). Current state of glaciers in the tropical Andes: a multi-century perspective on glacier evolution and climate change. The Cryosphere, 7(1), 81–102. http://doi.org/10.5194/tc-7-81-2013

END