

# Potato Park-International Potato Center-ANDES Agreement

Climate Change Social Learning (CCSL) case study on the repatriation of native potatoes

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## 1. Key findings

- **Overview.** This case study explores the social learning processes of a ten-year agreement for native potato repatriation and collaborative research between CIP and indigenous communities of the Potato Park in the Peruvian Andes, and assesses their impact on food security, climate adaptation and sustainable development.
- **Engagement.** A targeted, tailored engagement approach secured active engagement of community members — including women and youth — in designing the agreement, and thereafter in implementing and designing activities. Access to new knowledge by each stakeholder group, and comparison and validation of knowledge, led to improved understanding of problems and solutions, helped to build trust, and led to greater awareness and valuing of the knowledge and practices of other groups.
- **Iterative learning.** Several examples of collective, iterative learning can be found in the activities leading up to the development of the agreement and in the research activities conducted under the agreement. The agreement itself is structured flexibly to allow incorporation of new findings, ideas, and understanding that emerge.
- **Capacity development.** Initial capacity building provided to communities to help them negotiate the agreement were crucial. During the project, capacity building was a two-way process between scientists and farmers; farmers then provided capacity building to farmers in other communities not directly involved.
- **Challenging institutions.** The agreement has led to effective challenging of institutions and norms: scientists now recognise the value of traditional knowledge and collaborative research with communities, and community members beyond those directly involved with the project have adopted conservation plans. Remaining limitations include no institutional funding for the agreement and limited spread of the effects of institutional challenging to other CIP offices.
- **Conclusion.** Social learning processes have contributed to a number of important conservation and development outcomes. Key factors in the success of the agreement include the ability of a CIP scientist to speak the local communities' language, which was crucial for integrating traditional knowledge; investment in capacity building; and facilitation by the NGO ANDES, which ensured active farmer participation and an equitable partnership.

## 2. Project map



## 3. Project description

This case study explores the social learning processes of a ten-year agreement for native potato repatriation and collaborative research between CIP and indigenous communities in the Peruvian Andes, and assesses their impact on food security, climate adaptation and sustainable development.

The Agreement for the Repatriation, Restoration and Monitoring of Agrobiodiversity of Native Potato and Associated Community Knowledge Systems between CIP, ANDES and the Association of Potato Park Communities (in Pisac, Cusco, Peru), was first signed in December 2004. Through this historic five-year agreement, the CIP gene bank has returned 410 germ-free native potato cultivars to the six Potato Park (PP) communities for food security and in-situ conservation of genetic resources. These varieties were collected by CIP scientists from communities in the area in the 1960s, but had since been lost from the communities through genetic erosion. This is the first such repatriation from a gene bank to communities, recognising the importance of in-situ-ex-situ links for food security and climate adaptation.

A second five-year agreement was signed in 2010, which involved collaborative research activities to monitor and test the repatriated potato varieties and this is where most of the social learning took place. The Repatriation Agreement has enabled social learning through knowledge sharing and direct research collaboration between scientists and indigenous farmers, two groups which do not normally interact as co-researchers. Asociacion ANDES, an NGO that works closely with the Potato Park

communities, is also party to the agreement and has played an important role in capacity building and facilitation to enable the indigenous farmers to engage in collaborative research with CIP scientists.

The agreement has enabled CIP to contribute directly to development outcomes, by enhancing food security, climate change adaptation, economic opportunities, scientific understanding and social cohesion of poor indigenous farmers in the high Andes. It has restored genetic diversity, establishing an evolving gene bank for adaptation, with about 650 different potato varieties (or about 1344 varieties according to traditional morphological classification). The agreement is historically significant because for the past 200 years or more, the flow of genetic material has largely been from communities to gene banks, and, once transferred, communities have had very little access to the traditional varieties they have domesticated, improved and conserved over centuries. In some cases, genetic resources have been used for research and development or transferred to third parties, sometimes resulting in the acquisition of private intellectual rights over traditional varieties or new varieties bred using them. Thus, for the Potato Park communities, a key objective was to enable a reciprocal (ie two-way) exchange, and enhance the recognition of their rights over native potatoes collected from their communities. CIP has also gained about 200 native potato varieties for its collection and is advancing its own scientific agenda through collaborative research with the Potato Park communities.

The agreement is one of the few examples where the usually separate formal and informal seed systems are collaborating directly for mutual benefit, with active community participation in research processes, from design to analysis. This equitable research partnership between indigenous farmers and scientists has linked science and traditional knowledge, and global and local knowledge, for a better understanding of climate change and food security problems and solutions. Active participation of farmers has also ensured a high level of commitment to reaching the project goals, a key factor in ensuring the project's success. Social learning has been an inherent and necessary part of this process.

This social learning assessment provided an opportunity for the Potato Park and CIP to discuss and evaluate the outcomes of the Repatriation Agreement, and to inform a possible new five-year agreement. The assessment focused on the social learning impacts of the agreement, bringing together key actors from CIP, the Potato Park and ANDES, to identify key moments of knowledge exchange and co-creation of knowledge, evaluate the impacts of such actions on practice and institutions, and assess whether using different types of knowledge benefits the achievement of development outcomes (rather than using academic research alone).

## 4. Snapshot against CCSL indicators

	Engagement				Iterative Learning					Capacity Development				Challenging Institutions			
Process	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17
Learning Outcomes	L1	L2	L3		L4	L5	L6			L7	L8	L9		L10	L11	L12	
Value/Practice Outcomes	V1	V2			V3	V4	V5	V6		V7	V8			V9	V10	V11	
AVERAGE	2.8				2.8					2.7				2.5			

## 5. Social learning results

The indicator table below provides the detailed results of the assessment against each indicator, and the key findings are summarised in this section.

The pre-agreement activities involved all parties in developing the idea, content and format of the agreement. The agreement includes objectives on conservation, protection of community resources and knowledge, collaborative research, and rural development. In the development of the first phase of the agreement, capacity building and social learning were intended to be key components in dynamic

conservation<sup>6</sup> and collaborative research, and it was in implementing these aspects of the agreement during the second phase that most of the social learning processes took place.

CIP and the PP are jointly responsible for dynamic conservation, combining activities *in situ* and *ex situ*. Both organisations recognised the contributions of scientific and traditional knowledge (TK) to potato diversity characterization, conservation, climate change research, and to the related learning processes. Fieldwork was conducted in Quechua, as an important carrier of TK.

## Engagement

Score: 2.8

P1	P2	P3	P4	L1	L2	L3	V1	V2
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A targeted, tailored engagement approach secured active engagement of communities in designing the agreement, and thereafter in implementing and designing activities. Farmers involved included women and youth. Access to new knowledge by each party, and comparison and validation of knowledge, has led to improved understanding of problems and solutions. The agreement has helped to build trust between CIP scientists and indigenous farmers and led to greater awareness and valuing of the knowledge and practices of farmers by CIP scientists and vice versa. It also led to stronger cohesion, knowledge sharing and collaboration among the PP communities.

The agreement secured active engagement of five Potato Park communities in implementing and designing activities, with technical support and training from ANDES and CIP. In total 49 indigenous farmers were directly involved, including women and youth.

CIP's micro-level approach to potato breeding and cultivation was complemented by the holistic approach taken in the PP, where the spiritual, natural, social and economic aspects of food systems are considered important — with mutual learning taking place between the two organisations during the process. Similarly, CIP's scientific characterisation of potatoes was complemented by TK of names, mythology, rituals, uses, agricultural practices, soil and climate conditions. The Potato Park farmers provided complementary knowledge, for example on where potatoes used to grow, and which type of soil favours different varieties. Access to new knowledge by each party, and comparison and validation of knowledge, has led to improved understanding of problems and solutions.

ANDES played an important role in ensuring active community participation, including in designing the agreement, by using indigenous research methodologies, and communications systems and formats compatible with indigenous knowledge. Oral and visual approaches to research — such as storytelling, songs, poems and legends that reflect customary laws and do not separate the artistic from the functional — were used to identify concepts and values associated with equity, which were then used as the basis of the development of the agreement. ANDES also supported previous and parallel farmer-led action-research processes, which strengthened farmers' capacity to engage in co-research with CIP scientists. CIP actively engaged the farmers in designing some activities, such as transects. The agreement has helped to build trust between CIP scientists and indigenous farmers and led to greater awareness and valuing of the knowledge and practices of farmers by CIP scientists and vice versa. It

<sup>6</sup> Dynamic conservation refers to the complementarity between approaches *in situ* and *ex situ*. *In-situ* conservation allows genetic diversity to be maintained in farmers' fields and landscapes within evolutionary processes for crop adaptation, while *ex situ* conservation strategies, such as community seed banks, allow for longer-term storage to maintain the availability of quality seeds.

also led to stronger cohesion, knowledge sharing and collaboration among the PP communities through a new inter-community group of potato experts to manage the potato collection; and with other communities in Lares, Vilcanota, Lamay and Paruro, through sharing of potatoes.

## Iterative learning

Score: 2.8

P5	P6	P7	P8	P9	L4	L5	L6	V3	V4	V5	V6
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Several examples of collective, iterative learning can be found in the research activities conducted under the agreement between CIP and the Potato Park, and in the activities between ANDES and the Potato Park leading up to the development of the agreement. The agreement itself is also structured flexibly to allow incorporation of new findings, ideas, and understanding: the organisations involved commit to projects annually but the design of these projects is dynamic.

Specific examples of iterative learning in the agreement between CIP and the PP include:

- Dynamic conservation activities, involving:
  - collaborative learning on climate conditions and trends, movement of pests and diseases in relation to crops and altitudinal ranges, pest control using traditional and modern methods, use of new technologies and TK for evaluating ideal conditions for crops, and
  - integration of new techniques for positive selection, pollination, seed production, and seed storage in traditional agricultural systems.
- Increased crop diversity resulting from the agreement has provided more options in the face of increased pest infestation, and other changing climate conditions. In the past 30 years, the lower planting line at which potatoes can grow has moved up by 200 metres due to increased pests, correlated with rising temperatures. Elimination of lower plots has been based on co-research demonstrating poor production at lower altitudes. The trial plot results are jointly analysed after the harvest is weighed, with both farmers and scientists providing the reasons they believe explain the results. Thus, both traditional and scientific knowledge inform the understanding of both parties, and this enriched understanding is used to define the next steps. This is a clear example of iterative learning.
- Flexible planning and review: Yearly new challenges arise which were either not thought about or were a result of exchanges from the previous year. PP communities, ANDES and CIP commit to projects annually, but the projects are never so fixed in design that they cannot accommodate new ideas or interests. Adding plots of wild relatives of potatoes in 2016 along the transect is a good example of this dynamic and flexible approach to understanding, as well as redefining, the questions posed. Through the agreement, CIP scientists have learned to better appreciate the value of using an idea as a spark to build a project rather than developing an idea into a project and presenting this to the communities; and to take a broader landscape approach and not be blinded by conventional needs for data collection methods. They have learned from looking at and analysing the results through a different lens, which has also been beneficial to other projects.
- The agreement also led to collective learning between ANDES and the Potato Park communities, for example through the co-development of a community biocultural protocol for benefit sharing based on customary and formal laws, to guide the distribution of repatriated potatoes. This process

included identifying and documenting core customary norms and values that guide sharing of resources and knowledge within and between communities, and traditional mechanisms for redistribution. Collective learning among the different communities of the Potato Park was fostered by identifying and analysing customary norms and values, building consensus and developing the agreement collaboratively, and by allocating responsibilities to the Association of Communities of the Potato Park, as the inter-community institution responsible for implementing the agreement.

## Capacity development

Score: 2.7



ANDES provided initial capacity building to Potato Park communities to help them negotiate the agreement and understand concepts relevant to working with CIP. During the project, capacity building was a two-way process between CIP scientists and Potato Park farmers. Farmers then provided capacity building to farmers in other communities.

Capacity building has been a two-way process. CIP has provided scientific training to the farmers (on potato conservation, characterisation, pollination, integrated pest management, natural fertilisers, botanical seed production and seed storage). Through the collaborative research process, farmers have taught CIP scientists about the Andean holistic worldview and the importance of macro-level factors, concepts of reciprocity, and cultural aspects of potato cultivation. ANDES provided capacity building to the PP communities for negotiating the agreement and on associated conservation, rights and economic development aspects. ANDES also worked with PP members to develop new products based on reintroducing repatriated varieties. The Potato Park farmers trained another 187 farmers in twelve communities with whom they shared the repatriated seeds.

## Challenging institutions

Score: 2.5



The agreement has led to effective challenging of institutions and norms: CIP scientists in Lima now recognise the value of traditional knowledge and collaborative research with communities, and some Potato Park families beyond those directly involved with the project have adopted conservation plans. Remaining limitations include no institutional funding for the agreement, which is an obstacle to promoting institutional change within CIP, and limited spread of the effects of institutional challenging to other CIP offices.

The agreement has started to challenge institutions and norms, by raising awareness among wider stakeholder groups, beyond the direct participants. Although only two people in CIP have been directly involved — the director of the gene bank and curator of cultivated potato — they are involved in awareness-raising on the importance of traditional knowledge and in-situ conservation. Within CIP, most scientists now recognise the value of traditional knowledge and collaborative research with communities, particularly those in Lima. Institutionally, the agreement has raised awareness of the benefits that can be derived from working with communities. CIP sponsored PP farmers to visit CIP in Lima to exchange seeds, so there is now institutional recognition of the agreement, and the potato repatriation programme at CIP has been extended to other Andean communities in Peru. But there is no institutional funding for the agreement, which is an obstacle to promoting institutional change within CIP; and recognition of the value of TK may be more limited in other CIP offices (for example, in Africa). Within the Potato Park, a number of families — not only those directly involved — have adopted conservation plans and strategies because of the agreement, totalling 351 families in five communities. The agreement has also helped to shift the values and practices of other institutions not directly involved, by opening spaces for ANDES and the PP communities to work with government agencies in Peru, international processes (such as the FAO Treaty) and scientists from other institutions and universities.

## 6. Summary: social learning challenges and lessons learned

The repatriation agreement and associated collaborative research and social learning processes have led to a number of important conservation and development outcomes:

- **Biodiversity and in-situ conservation.** The reintroduction of 410 repatriated varieties has increased potato diversity in the Potato Park from around 240 to 650 varieties, creating one of the highest levels of potato diversity anywhere in the world, which has been conserved by the communities.
- **Best practices.** Co-management of native potatoes has generated best practices for in-situ conservation, sustainable use, increasing productivity and diversity, in-situ-ex-situ links and dynamic conservation.
- **Increased yields.** CIP reports a 21 per cent increase in yield due to repatriated varieties and production based on clean seeds, while farmers estimate as much as a 50 per cent increase.
- **Food security and climate adaptation.** The agreement has established a large evolving gene pool for climate adaptation, and enabled farmers to increase on-farm crop diversity to reduce the risk of crop failure. It also facilitated seed production for depositing the Potato Park's seed collection in the Svalbard Global Seed vault, for food security of the communities and the world as a whole. This concrete outcome has also enabled recognition of the PP communities in the global stage of conservation of genetic resources.
- **Traditional knowledge and cultural practices.** The return of traditional potato varieties that the communities had lost has led to a revival of the traditional knowledge, beliefs and practices associated with the repatriated potatoes, through the memory of the elders. It has also promoted traditional agriculture by diversifying the native varieties available. The use of local researchers as leaders and Quechua language in the activities has helped to maintain traditional knowledge and language.
- **Economic development.** 61 repatriated potato varieties are being used to develop 11 new 'biocultural' products: chocopapa (chocolate with potato flour), starch, papa sour, prepared food and drinks, and natural products (including potato shampoo). The agreement has also contributed to enhanced revenues from tourism, the Potato Park's largest and growing revenue stream. These economic impacts are reflected in a recent survey of four Potato Park



communities, which found a steady increase in income between 2003 and 2012, when income exceeded expenditure for the first time<sup>7</sup>.

- **Rights and benefit sharing.** Ensuring genetic resources and knowledge remain under the custody of the communities and do not become subject to IPRs in any form is an objective of the agreement. The agreement has increased the Potato Park communities' understanding of their rights to genetic resources and traditional knowledge and related policies; their capacity to protect their rights through community register databases of TK developed by ANDES; and led to an inter-community agreement for benefit sharing.

## Lessons learned

Key factors in the agreement's success include: the ability of a CIP scientist to speak Quechua, which was crucial for integrating traditional knowledge; investment in capacity building by both CIP and ANDES; and the facilitation role of ANDES, which ensured active farmer participation and an equitable partnership.

While the agreement has increased understanding between scientists and farmers of their different needs and perspectives, there are still some challenges in facilitating co-learning processes, sharing of information, and joint decision making. Regular communication through monthly meetings, and working together, supports information sharing and increased understanding, although CIP's time in the field is quite limited. A more systematic process for documenting, storing and sharing information and results of collaborative research is needed. The PP farmers feel that more efforts are needed to ensure traditional knowledge is clearly documented and accessible, as well as scientific knowledge. The farmers also feel that access to information, especially on the purpose and results of collaborative research managed by CIP, could be improved, and that this would strengthen social learning and enable research results to be more broadly tested and implemented.

## Next steps

The agreement's benefits and challenges as identified in this social learning review are being considered in ongoing negotiations on the signing of a third agreement. Although the agreement is quite broad and includes areas on learning, policy and research, most of the focus so far has been on repatriation and diversity conservation. For a third phase, the parties are considering maintaining the same basic terms of the agreement, but also developing a work plan that focuses more on longer-term collaborative research. The work plan would also address issues such as improved facilitation of the learning processes and more complete and systematic sharing of information resulting from the collaboration.

The repatriated potato varieties continue to be maintained in the Potato Park collection, and shared among communities in and beyond the park. Farmers will also use their new knowledge of botanical seed production to produce clean seeds for commercial purposes (through a community seed enterprise).

The learning that took place through implementing the agreement has been shared more widely through farmer-to-farmer exchanges and educational visits to the Park, as well as in national and international policy workshops. It could also serve to support farmers interested in accessing genetic resources from other gene banks, for example for corn or rice, and as a model for replication by CIP and other CGIAR institutes to enhance food security and climate adaptation by indigenous farmers and national agricultural systems.

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<sup>7</sup> Asociacion ANDES (2016) Resilient farming systems in a time of uncertainty: Biocultural innovations in the Potato Park, Peru.

## Indicator table

#	Process indicators	CIP-ANDES-Potato Park results	
ENGAGEMENT	P1	<p>The target groups/individuals are identified through an inclusive process, and women, youth and other disadvantaged groups are identified and targeted</p>	<p><b>Yes.</b> The participants in the repatriation agreement activities were identified through an inclusive participatory process by community assemblies, and the activities involved indigenous peoples, women and youth. In total, 49 indigenous community members participated directly in repatriation activities: 10 potato experts from the 'Papa Arariwa' group, 8 local research coordinators ('Técnicos Locales'), 15 community leaders/authorities from 5 Quechua communities in the Potato Park, and 16 members of the gastronomy and other potato related micro-enterprises.</p> <p>The communities chose the local research coordinators and potato experts. These groups include men and women, elders and youth, but these actors are not evenly distributed among the diverse groups. For example, Papa Arariwa and local technicians are predominantly men, while gastronomy participants are mainly women.</p>
	P2	<p>Groups/individuals identified are engaged through appropriately tailored means</p>	<p><b>Yes.</b> CIP scientists and farmers engaged in agricultural practices under the agreement according to the community's social norms; for each activity implemented, approval was given by the Association of Potato Park Communities and by individual communities.</p> <p>ANDES explained research and legal issues to the communities using local concepts and methods. Use of indigenous methodologies, visual and oral tools and methods, translation, and regular use of Quechua language, by both ANDES and CIP, made activities appropriate for different language and literacy skills.</p>
	P3	<p>All target groups are actively participating in the project Indicator used: All target groups actively participated in the definition of the problem, design and implementation of the research, analysis and decision making</p>	<p><b>Yes.</b> Potato Park communities participated actively in defining the problem and developing the agreement. Before the agreement was signed, ANDES held discussions on the importance of potato diversity with several communities, and organised workshops on related intellectual property and access and benefit-sharing issues. ANDES also held discussions with the communities on the guiding principles for the agreement, and to review the draft agreement. The communities participated actively in implementing repatriation activities, with technical support and training from ANDES and CIP; and in designing some activities (such as transects), but felt that their participation was not very active in the design of other research activities. Communities participated in the collection of local cultivars, determination and conservation of genetic diversity, determination of production and yield of seed banks; construction of basic facilities for conservation; and implementation of field trials.</p> <p>CIP: active participation in designing research, analysis, and decision making.</p> <p>ANDES: active participation in defining problems and developing the agreement.</p>

P4	<p>Emergence of champions is fostered (for engagement to be self-sustaining) Indicator used: Investment in capacity building for effective participation of community members in the implementation of the agreement at all levels</p>	<p><b>Yes.</b> CIP personnel active in capacity building processes in agricultural practices. ANDES provided funding and personnel for capacity building activities throughout process (on rights, conservation, economic development).</p>
L1	<p>[Cognitive]</p> <ul style="list-style-type: none"> <li>a. Knowledge of the problem enhanced by interactions</li> <li>b. Increased level of understanding of themes of rights/laws</li> </ul>	<p>i) <b>Yes.</b> Farmers and scientists gained a better understanding of how soil pests are affecting potatoes at different altitudes through interaction.</p> <p>ii) <b>Partial.</b> Farmers have increased understanding of their rights over genetic resources and traditional knowledge, and are aware of a number of relevant regional, national and international policies through capacity development activities by ANDES. Participants shared learning at community assemblies, raising awareness in their communities. Learning modules on issues related to repatriation were developed for Farmer Field Schools. Understanding is increased among active participants, but less so among other community members, despite the awareness-raising activities at the community level.</p>
L2	<p>[Relational]</p> <ul style="list-style-type: none"> <li>s. Engagement has led to better relations between target groups/individuals</li> <li>t. Trust created</li> <li>u. Engagement has led to awareness and valuing of other stakeholders</li> </ul>	<p>d. <b>Yes.</b> The agreement led to stronger coordination and relationships among the Potato Park communities. Communities that previously had conflictive relations had already joined together to collectively manage the Potato Park by establishing an Association of Potato Park Communities, and within that entity, came to collective agreement on managing and distributing the repatriated potato varieties. The repatriation agreement led to a new inter-community group of potato experts linking the communities and bringing them closer together. Papa Arariwa was formed to manage collection, with membership from all communities of the Potato Park, although more from communities at higher altitudes, where potatoes are more important and there is more diversity of potatoes. The agreement also strengthened relations between park communities and other communities, through the wider sharing of repatriated potatoes. Communities in Lares, Vilcanota, Lamay and Paruro have received seeds and technologies from the Potato Park.</p> <p>e. <b>Partial.</b> The agreement has helped build trust between the farmers and CIP scientists, and strengthened trust between farmers from different communities. The perception of farmers from the Potato Park is that there has been limited information sharing on the part of CIP, especially on the purpose and results of some of the collaborative research activities CIP managed. Data downloaded by CIP from the weather station in the Potato Park over several years and the results of the transect research have not been shared with the Potato Park or ANDES, despite repeated requests.</p>

		f. <b>Yes.</b> Participation in the agreement activities has led to greater awareness and valuing of CIP scientists by PP farmers, and vice versa. CIP scientists better understand the value of TK and the importance of native language as a carrier of TK.
L3	<p>a. Different knowledge types successfully integrated</p> <p>b. Engagement has led towards a change in collective understanding of the problem and solutions</p>	<p>a. <b>Yes.</b> Both CIP and the PP communities recognised the contributions of scientific and traditional knowledge for potato characterisation, conservation and climate research. CIP's scientific characterisation of potatoes was complemented by TK of names, mythology, rituals, uses, agricultural practices, soil and climate conditions. Repatriated material was grouped according to TK on uses (for example, cooking methods, taste, texture) and information on uses was documented for CIP databases. Traditional and scientific knowledge were used together to explain the test plot results, and to design a community genebank. CIP's micro-level understanding and approach to cultivation and breeding was complemented by the farmers' holistic macro-level understanding, to incorporate both science and a holistic worldview that considers the interaction of the sky, earth, water, family, and spiritual world – all of which impact how an object, concept or conclusion is perceived. Fieldwork was conducted in Quechua as an important carrier of TK. Use of communication systems and formats compatible with indigenous knowledge helped TK-holders engage in research.</p> <p>b. <b>Yes.</b> Access to new knowledge by each party, and comparison and validation of knowledge, has improved collective understanding of problems and solutions relating to agriculture and climate change, for example, through joint analysis of potato transect plot results. Potato Park farmers explained the Quechua names of native potatoes, the reasons for them, and the myths, histories and local uses of each variety. They showed their spirituality related to potatoes, the mountain gods and Mother Earth; and explained where the native potatoes used to grow at the lower, mid and high altitudes and why; and which type of soil favors different varieties. Co-management of native potatoes generated best practices for conservation, sustainable use, increasing productivity and diversity, in-situ-ex-situ links and dynamic conservation.</p>
V 1	[Value] Engagement leads to increased commitment on the part of target groups/individuals in reaching the goal of the project	<b>Yes.</b> The repatriation of potatoes from CIP increased the commitment of the communities to work together within the Potato Park and with other indigenous communities to conserve the existing diversity of potatoes in their communities together with the repatriated varieties. On the part of CIP, without the engagement with the communities, the project would likely not have continued at the level it has. Part of the goal has been to build capacity within the communities to evaluate and use potato sources and types of diversity not presently used in the Park. The evaluation of this diversity is ongoing and the goal of repatriating native potato varieties has been successfully met. Facilitating the production of seed so that the communities' genetic resources could be securely stored at the Svalbard Global Seed Vault has also been successful.

V2	<p>[Practice] 3 parts:</p> <ul style="list-style-type: none"> <li>a. New social networks established</li> <li>b. New initiatives and projects</li> <li>c. Empowerment of most vulnerable beneficiaries (communities) including women and children</li> </ul>	<ul style="list-style-type: none"> <li>a. <b>Yes.</b> A new network of potato experts in different PP communities was established (Papa Arariwa). The conservation of potato diversity, including repatriated varieties, has also strengthened the PP's relationship with other communities, farmers' federations, and municipal and regional governments.</li> <li>b. <b>Yes.</b> Plans are underway to sign a collaborative agreement with INIA (the National Institute for Agricultural Innovation in Peru) with a focus on participatory plant breeding for drought- and frost-tolerant varieties, training, expert support and transfer of high value materials. The first transfer of five commercially valued potato varieties from INIA took place in 2016.</li> <li>c. <b>Yes.</b> Indigenous farmers have been empowered through new scientific knowledge and new understanding of their rights; and through improved capacity to conduct collaborative research directly with scientists. Indigenous women have been empowered through new economic opportunities resulting from the repatriated potatoes.</li> </ul>
P5	<p>Cyclical, inclusive learning and evaluation 'moments' are available for the group</p>	<p><b>Partial.</b> Most iterative learning took place in conservation and collaborative research activities: co-management of local potato collection; dynamic conservation; integrated crop and pest management; potato diversity characterisation; design and implementation of seed facilities; research on climate change; development of biocultural products; and rights, customary laws and policy. For example, for transect plots, the results were evaluated jointly and decisions about next steps were made together by farmers and CIP. Lower plots were eliminated after collective evaluation. The first year of transects led to the design for the second year based on collective discussion, and the third year design has been modified based on collective discussion of the second year results. The farmers, however, felt that there was limited access to information, especially on the purpose and results of collaborative research managed by CIP. Another example of cyclical learning is ANDES and PdP's co-development of biocultural protocols for access and benefit sharing based on customary law and national and international norms, to guide the sharing of repatriated potatoes and of revenues from economic collectives among the PP communities. Regular workshops for exchanging information have occurred, for example a one-day workshop on potato anatomy and physiology and another on El Niño. These workshops provided an opportunity for an exchange of ideas and knowledge sharing.</p>
P6	<p>Learning and evaluation processes are supported and facilitated</p>	<p><b>Yes.</b> A number of experiments and collaborative research activities have been undertaken and have generated useful information: 1) characterisation of potatoes; 2) research on calcium in soil; 3) transects (growing potatoes at different altitudes); 4) integrated pest management techniques; 5) seed production and storage techniques. ANDES facilitated interaction between the Potato Park communities and CIP, for example to negotiate the agreement and do research activities.</p>
P7	<p>Systems are in place to foster and implement new ideas</p>	<p><b>Yes.</b> Adjustments were made jointly in activities after reflection: removal of the lowest plots from the rotation system, after evaluating pests and productivity at lower altitudes; and changes to seed production and storage techniques. Yearly new challenges arise which were either not</p>

## ITERATIVE LEARNING

		thought about or were a result of exchanges from the previous year. PP communities, ANDES and CIP commit to projects annually; however, the projects are never so fixed in design that they cannot accommodate new ideas or interests. Adding plots of wild potato relatives in 2016 along the transect is a good example of this dynamic and flexible approach to understanding, as well as redefining the questions posed.
P8	Questioning the TOC itself and key assumptions is valued and happening regularly	<b>Partial.</b> Questions posed are redefined based on new understanding (see P7 above). In considering the renewal of the agreement between CIP, the Potato Park and ANDES, partners reflected upon new areas for research, capacity building and collaboration, which could be explored within the existing framework. For example, a specific programme on climate change will be implemented in the period of the new agreement.
P9	Questioning of values, norms and governance underlying the problem is valued and happening regularly	<b>Partial.</b> ANDES and the PP regularly question dominant values, norms and governance in conservation paradigms, such as sectoral approaches. This questioning has led to the development of a holistic landscape approach to conservation that integrates Andean concepts such as Ayllu, and buen vivir (wellbeing) in the Biocultural Heritage Territory model. Sometimes members of CIP, ANDES, and the PP seem to prioritise scientific knowledge and a micro-level approach to conservation.
L4	[Cognitive]: a. Results of learning/evaluation are incorporated into the project strategy b. Creative solutions and innovations developed	c. <b>Yes.</b> Changes were incorporated into agricultural practices, planning and strategies for resilience after reflection, including activities directly related to the agreement (for example, into the design of transects). See P7 above.  d. <b>Yes.</b> A number of potato management practices and innovations were tested and adopted by farmers: increased number of native potato varieties cultivated; fields at lower altitudes not used for potato cultivation; production of botanical seeds for conservation; clean seeds produced for distribution to own communities and others.
L5	[Relational] Evidence as learning/evaluation takes place that people understand the reason to change relations and behaviours between people and groups	<b>Yes.</b> Communities of the Potato Park agreed to work more closely on conserving potato diversity by repatriating varieties from CIP. Reasons for this include realising the value of the existing diversity for present and future generations, and understanding the potential of working together to affect change in policy and practice. The learning from the repatriation process has helped ANDES, CIP and the Potato Park develop a shared vision and objectives related to dynamic conservation, and the Potato Park is used as showcase of how in-situ and ex-situ approaches can effectively complement each other, ensuring greater predictability, accountability and transparency in partnerships.
L6	[Normative] Participants understand the need for alternatives and room to fail	<b>Yes.</b> CIP and PP farmers gained a better understanding of problems and solutions, and of the value of collaborative research and dynamic conservation practices; and there was better uptake of research results when done collaboratively. One of the difficulties with the repatriation agreement is that it has no funding. Each one of the partners understands that the agreement requires considerable resources, and that each must make efforts to respond to the needs

		internally: the Potato Park provides in kind support; CIP provides for transfer of materials and technical support with existing programs and staff; and ANDES has secured alternative funding sources by including the repatriation activities within other project proposals.
V3	[Value] Wider stakeholder groups understand the reasons to change their relations and behaviours	<b>Yes.</b> Most CIP scientists in Lima recognise the value of traditional knowledge. The agreement enhanced awareness of the value of TK and collaborative research with indigenous farmers among CIP scientist through visits by Quechua communities to CIP in Lima, and CIP press releases on the agreement shared with its offices in Africa. The two CIP scientists directly associated with this agreement have gained additional practical recognition of this value.
V4	[Practice] Wider stakeholder groups relate to each other differently	<b>Yes.</b> A number of families in the Potato Park have adopted conservation plans and strategies because of the agreement (not only those directly involved), totalling 351 families in five communities.
V5	[Value] The need for alternatives and room to fail is evident in other projects/programmes	<b>Yes.</b> 49 farmers in five communities (directly involved in the research) now recognise the importance of science and collaborative research with scientists. CIP has benefitted with improved understanding of traditional practices and traditional way of observing important factors that differentiate analysis of results. This increased understanding helps CIP scientists think of better ways to analyse and observe research results within other projects with indigenous communities.
V6	[Practice] Alternatives and room to fail are built into other projects/programmes	<b>Yes.</b> Based on learning within the repatriation agreement, new techniques have been integrated into the agricultural system and other ANDES and Potato Park projects: techniques for pest control and increasing productivity; botanical seed production; systematic analysis of production (numbering varieties in the field, documenting results). The CIP scientists have learned to better appreciate the value of using an idea as a spark to build a project rather than to first develop an idea into a project and present this to the communities. The period of project development, design and scope have greatly benefitted from this in looking at a broader landscape approach and to not be blinded by conventional needs for data collection methods. To say room is built in to appreciate and learn from failures is not quite the approach but to learn from looking and analysing results from a different lens has benefited other projects.
	<b>P10</b> Capacity development activities are integrated into the project/programme	<b>Yes.</b> Capacity-development activities for farmers were an important part of the project. CIP provided training on a number of topics: dynamic conservation; pollination; integrated pest management; natural fertilisers (calcium, humus, compost); germ-free potato seed production, and seed management and storage to support participation of the farmers in all aspects of the research. ANDES provided capacity building for negotiating the agreement, and on conservation, rights and economic development of repatriated material (enhancing economic use of potatoes was important to incentivise community participation in the agreement activities). ANDES provided capacity building on the technical, legal and policy content of the agreement for local leaders, authorities, government and Papa Arariwa, to ensure clear understanding of the

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		implications of the project and collaborative research. In total, 49 Potato Park farmers were trained by ANDES and CIP (35 men, 14 women); 2 CIP scientists were trained by PP farmers; and the PP farmers trained another 187 farmers in 12 communities with whom they shared the repatriated seeds.
P11	Capacity development activities target all participants in appropriate ways (eg. governments, farmers, scientists)	<b>Partial.</b> Capacity development activities mainly targeted Potato Park farmers (see P10 above) and were facilitated by ANDES and CIP using appropriate approaches tailored to the needs of indigenous farmers. Through the collaborative research process, PP farmers taught CIP scientists about: the Andean holistic worldview and concept of wellbeing (Sumaq Kausay); working in the Andean principle of ayni (reciprocity); cultural aspects of potato cultivation (traditional practices, mythology, rituals, uses); and traditional biological and environmental indicators (including of climatic events). In return, CIP scientists taught PP farmers a deeper understanding of how and why, from a physiological and anatomical view, potato plants adapt, grow and respond to varying environments. ANDES' agronomists also participated in capacity development, especially in relation to transferring seed technologies from CIP to the Potato Park. Government officials were also targeted for capacity development through awareness-raising workshops on repatriation and seed policies within the context of national legislation.
P12	Capacity needs are determined collectively in a bottom-up manner	<b>Yes.</b> Collaborative workshops, with participation of the Potato Park, ANDES and CIP, are organised yearly to collectively identify capacity development needs, and an action plan is developed.
P13	Capacity development needs are systematically integrated into all project components	<b>Yes.</b> Capacity development activities related to the agreement have addressed agriculture and seed policy issues, dynamic conservation, in-situ and ex-situ conservation strategies, integrated pest management, and climate change. In this context ANDES and PP built a better appreciation for understanding the concept of 'ownership' of the traditional varieties, practices and knowledge.
L7	[Cognitive] Similar level of understanding of the problem by all stakeholders	<b>Partial.</b> The farmers and CIP scientists have different types of knowledge and understanding relating to the problem, but through the collaborative research process, a more shared understanding of the problem has been achieved. This is an area that continues to grow and evolve as a give and take between the parties.
L8	[Relational] Increased understanding between different participant groups of different needs and perspectives, and how to better work together	<b>Partial.</b> While there is increased understanding between scientists and farmers of their different needs and perspectives, there are still some challenges in facilitating co-learning processes, sharing information, and joint decision making. Regular communication through monthly meetings, and working together supports increased understanding, although CIP's time in the field is quite limited. Frequent meetings and communication facilitate sharing of information, but a more systematic process for documenting, storing and sharing information and results of collaborative research is needed.



L9	<i>[Normative]</i> Increase in collective understanding of the best methods for building capacity for particular stakeholders	<b>Yes.</b> This is evolving and based on continued learning. The partnership has created opportunities for the Potato Park, CIP and ANDES to combine skills, expertise, and resources more effectively and develop the capacity to create evidence by cross fertilising traditional knowledge and science.
V7	<i>[Value]</i> More informed stakeholders	<b>Yes.</b> Potato Park farmers are more informed about dynamic conservation, scientific aspects of potato cultivation and techniques relating to seeds, and about their rights and economic development of potatoes. 61 repatriated potato varieties are being used to develop 11 new 'biocultural' products: chocopapa (chocolate potatoes), starch, papa sour, prepared food and drinks, natural products (e.g. potato shampoo). CIP scientists are more informed about Andean culture and traditional knowledge (see P11).
V8	<i>[Practice]</i> m. Capacity development leads to different groups working together better n. Capacity development leads to changes in practice that reflect a better understanding of the problem and solutions	<p>c. <b>Yes.</b> Capacity development on scientific aspects by CIP has enabled farmers and scientists to work together better; as has capacity development of scientists by farmers to build understanding and respect for indigenous worldview, culture and traditional knowledge. ANDES has also strengthened the capacity of farmers to engage directly in equitable collaborative research partnerships with scientists through capacity building for farmer-led research and empowering research methodologies, both during the agreement period and before.</p> <p>d. <b>Yes.</b> 400 families received repatriated varieties, and 252 families continue to cultivate them for increased food security and climate resilience. CIP reports a 21 per cent increase in yield due to repatriated varieties, while farmers estimate as much as 50 per cent increase.</p>
P14	Key individuals/institutions who will support/champion change are identified	<p><b>Yes.</b> A number of key individuals were involved in implementing the agreement: 23 community leaders from the PP; directors, agronomists, educators, administrators from ANDES; and the head of gene bank, and curator of cultivated potato from CIP. Key individuals in the PP are involved in capacity development in their communities and policy processes outside their communities, attempting to promote change in social and environmental policies and practices. Although only a couple from CIP are involved in the implementation of this agreement, the director and curator of the gene bank at CIP are involved in raising awareness of the importance of TK and practices, and in-situ conservation as it relates to their aim of conserving agrobiodiversity.</p> <p>The agreement has led to increased cooperation and partnerships between the PP, ANDES and Regional Government Cusco, Municipality of Písaq, Federation of Potato Growers, national ministries, and IIED on related issues. A Memorandum of Understanding has been established between the Potato Park, Lares and Vilcanota communities and others for distribution of repatriated potato varieties.</p> <p>The agreement has influenced Peruvian government agencies as officials to recognise the value of indigenous knowledge and management systems. INIA now supports the work of ANDES and</p>

		the Potato Park to establish similar community-managed agrobiodiversity conservation areas respecting local livelihoods and cultural activities.
P15	A change strategy is developed, including mapping of existing norms and endogenous processes	<p><b>Partial.</b> A change strategy has been developed by ANDES centred on gaining the support of key government agencies and other communities (see P14 above), but a strategy for promoting institutional change within CIP has not yet been developed.</p> <p>The collaboration has, however, enhanced CIP's awareness of the values of repatriating potatoes back to the Andean communities and in the ten years that CIP has been working with ANDES and PP, the number of communities that have requested and participated in CIP's repatriation program continues to grow. This is at least in partial response to the agreement and the success with repatriation in the PP.</p>
P16	<i>Existing norms and endogenous processes are mapped</i>	Refer to P15 above.
P17	Key institutions are challenged to make changes that facilitate social learning Indicator used: Increased level of institutional support at CIP for repatriation and collaborative research with farmers	<p><b>Partially.</b> Increased support for repatriation and research with farmers from CIP genebank; and increased support from CIP grants and contracts for developing repatriation agreements. CIP sponsored PP members to come to CIP to exchange potatoes, so there is institutional recognition of this agreement. As mentioned in P15, the repatriation programme at CIP continues to grow as the benefits and knowledge of repatriation grows within the communities and NGOs who are working directly with the communities. Institutionally, the agreement has raised awareness on a corporate level of the benefits that can be derived from working with communities. CIP directors and gene bank staff are eager to sign a new repatriation agreement with the PP, demonstrating support for the process within CIP. But there has been no institutional funding for implementing this agreement.</p>
L10	[Cognitive] Identification of obstacles and opportunities for institutional change	<p><b>Yes.</b> Farmers can identify both obstacles and opportunities for institutional change and propose solutions to involved diverse stakeholders. Obstacles for institutional change within CIP include limited funding for PP conservation efforts, and lack of relation between CIP and community authorities. Opportunities for institutional change in the PdP include support from ANDES, CIP, IIED, Gore and the international reputation of the PP; and in CIP include potential collaboration with CCAFS, PIM and RTB.</p>
L11	<i>[Relational] Key institutional and project actors share a common understanding of the problem and approach to solving it (social learning)</i>	

L12 [Normative] Institutions understand that a shift in values or practice is needed to foster social learning	<p><b>Partial.</b> The agreement has started to generate awareness of the importance of social learning among the two CIP scientists directly involved. It has helped to increase awareness more widely in CIP of the value of traditional knowledge and collaborative research with farmers (but not of social learning specifically):</p> <ul style="list-style-type: none"> <li>• CIP reports a high level of recognition of traditional knowledge among its staff, particularly in Lima.</li> <li>• Farmers coming to CIP in traditional dress has had visual impact, and raised awareness of the importance of TK.</li> <li>• A half-day workshop to develop technical skills for pollination and management of in-vitro plants was held for PP members at CIP. This opportunity arose because of the agreement, and there is interest in doing more of this in the field with youth. The direct outcome of this workshop was the involvement and recognition of the PP communities in the global stage of conservation of genetic resources through the deposit of the PP's seed collection in the Svalbard Global Seed vault. This is a very tangible outcome of the agreement.</li> <li>• Dissemination of the agreement by CIP-Lima through CIP press releases has enhanced recognition of the value of working with TK and indigenous communities amongst CIP offices in other countries, such as in Africa.</li> </ul> <p>The Potato Park–CIP agreement has also helped to shift the values and practices of other institutions not directly involved, opening spaces for ANDES and PP to work with governments and international processes (for example, the FAO Treaty) providing additional learning opportunities for Potato Park communities through cooperation with scientists from other institutions and universities on common goals, such as conservation and sustainable use of agricultural diversity.</p>
V9 [Value/Practice] Reduced number and severity of barriers; increased number and potential impact of opportunities	<p><b>Yes.</b> As previously mentioned, the agreement has played a part in the increased repatriation of native potato varieties more broadly back to the Andean communities in Peru.</p>
V10 Challenges lead to changes in institutional openness towards SL-orientated approaches (evidenced in eg attitudes, conflicts)	<p><b>Yes.</b> Challenges created by the evolution and implementation of international policy treaties on access and benefit sharing, traditional knowledge and seeds, including the CBD and the FAO International Treaty, lead to the search for collaborative responses; CIP responded within this framework and signed the Repatriation Agreement with the Potato Park and ANDES. The agreement has led to increased institutional openness and creation of trust between CIP and communities.</p>

P18	Use of traditional frameworks for research	<b>Yes.</b> Quechua TK and spiritual practices were integrated into many of the dynamic conservation strategies applied by partners of the agreement. TK was used as the basis for action to restore and protect the mountain environment, to communicate the status of the territory, and monitor biodiversity and the quality of crops, soil, and availability of water. ANDES and the PP used traditional knowledge indicators such as observation of plants, weather and animal behavior, to provide early warning of potential climate impacts such as droughts, extreme events and outbreaks of pest and diseases. They developed community maps and traditional agricultural calendars, in ways that are compatible with Quechua knowledge, to capture and communicate indigenous knowledge useful for developing local solutions to social and environmental problems. Community mapping is also used to identify the cultural, spiritual as well as the economic values of their landscapes, and to identify potential problems in their production system, particularly those related to climate change. The application of TK and practices also served to preserve this body of knowledge and pass it on to younger generations.
L13	[Normative] Revitalisation /strengthening of cultural practices, rituals, ceremonies	<b>Yes.</b> Following the return of native potatoes through the agreement, the Potato Park succeeded in having the National Day of the Potato declared by the government of Peru, working with various actors, including ANDES, CIP and national government bodies. This day is now used as an opportunity to organise diverse activities to celebrate native potatoes, and associated rituals and uses, as well as other cultural practices including agriculture, food, art, music, poetry and dance.
V12	[Cognitive] Changes in the number of Quechua speakers	<b>No evidence.</b> However, participants believe that maintenance of language is supported by using Quechua for field work and research, including in the agreement activities.
V13	[Practice] Changes in the status and trends in number of people who practice traditional agriculture	<b>Yes.</b> The agreement has brought back traditional potato varieties which the communities had lost, and this has led to a revival of the traditional knowledge, beliefs and practices associated with the repatriated native potatoes, through the memory of the elders. It has also promoted traditional agriculture by enriching and diversifying the native varieties available. At the same time, ANDES promotes the practice of traditional agriculture, which is a proxy indicator for the preservation of traditional knowledge and practices, and is particularly closely linked to customary sustainable use of biodiversity. The use of Local Researches (Técnicos Comunales) by ANDES as leaders in the processes of learning, interacting, transmission of knowledge and practices, for all the Potato Park activities including those related to the agreement, ensures their constant renewal and re-enactment through cultural and social practices within, among and between indigenous people (inter-generationally and trans-generationally). The maintenance of the Potato Park as an agrobiodiversity conservation unit with a communal land-use and tenure system based on traditional knowledge and customary sustainable use also promotes the maintenance of traditional agriculture.

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L14 [Normative] Legal frameworks and policies better recognise customary laws, institutions and practices and protect traditional knowledge

**Partial.** As part of the collaborative research related to the agreement, ANDES has developed community databases (Biocultural Registers) for recording TK and provided training on their use to protect indigenous knowledge and practices. Communities can use databases and registries as defensive protection against 'biopiracy' (the unauthorised use or misappropriation of traditional knowledge without benefit sharing). These databases and registries may also find use by communities in land title claims and defense against extractive industries.

The agreement, along with the Potato Park's increasing economic revenues, led to the development of an inter-community agreement for benefit sharing, which uses customary laws and practices and provides incentives for conserving biodiversity and continuing indigenous practices. For example, it includes provision for investing the benefits in training and skills development for transmission of indigenous knowledge and practices and other kinds of capacity building.

The transfer of Potato Park seeds to Svalbard Seed Vault was based on community rights to participate in the FAO Treaty on PGRFA multilateral system, to control the use of their own seed varieties, and to transfer and share seeds with others. This helps to promote recognition of customary laws and understanding of the rights of communities and the nation at the level of international policy.

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