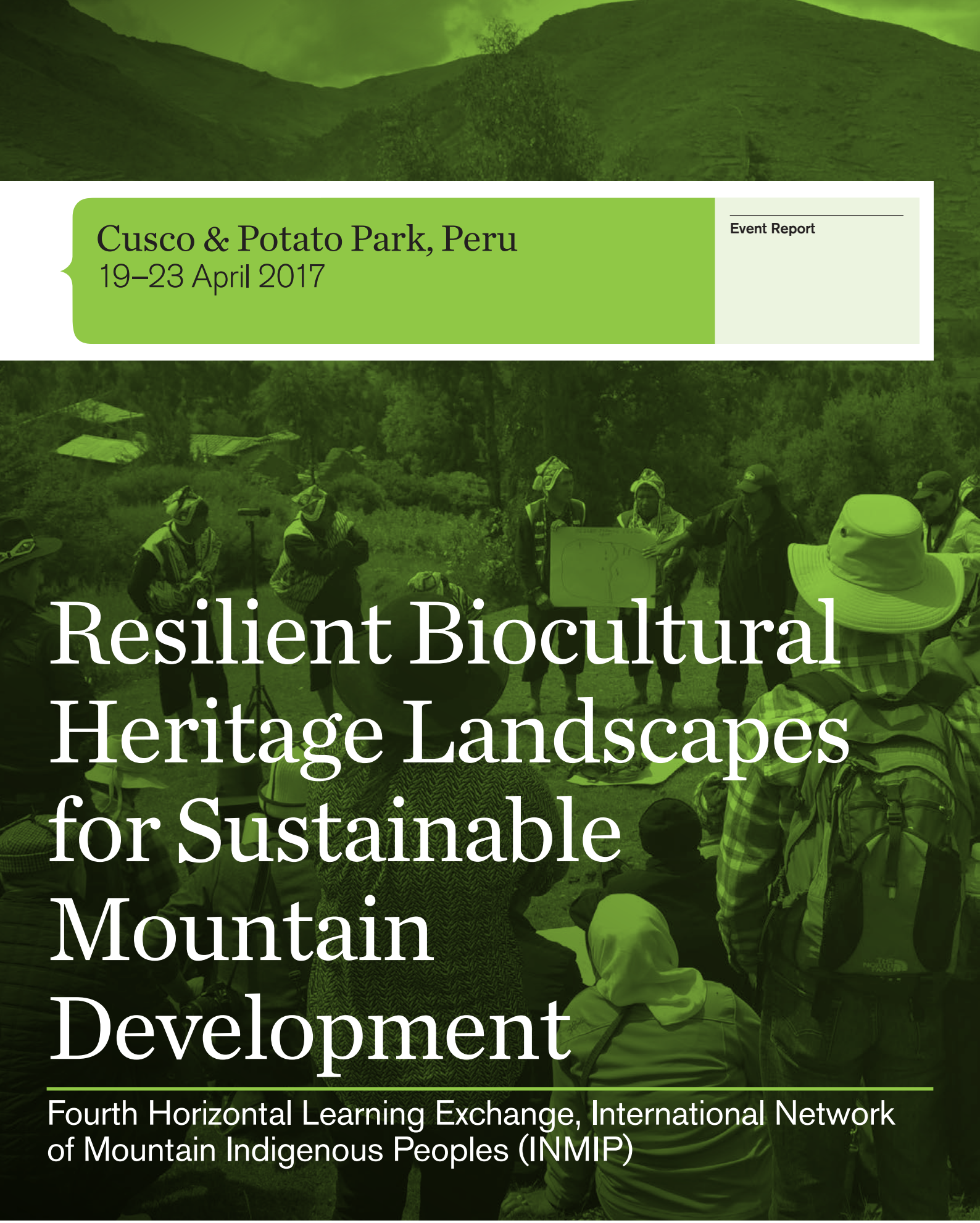
Cusco & Potato Park, Peru
19–23 April 2017

Event Report



Resilient Biocultural Heritage Landscapes for Sustainable Mountain Development

Fourth Horizontal Learning Exchange, International Network of Mountain Indigenous Peoples (INMIP)

INMIP

Asociación ANDES

iied

Author information

This report was prepared by Krystyna Swiderska on behalf of INMIP.

About the event

Fourth Horizontal Learning Exchange of the International Network of Mountain Indigenous Peoples, Cusco and Potato Park, Peru, 19-23 April 2017.

Organised by INMIP, in association with Asociación ANDES (Peru) and IIED.

INMIP is an international network of indigenous mountain communities in 11 countries. It was established in Bhutan in 2014, and aims to promote biocultural heritage for climate adaptation and sustainable mountain development.

ANDES is a small international indigenous-led organisation that works to support indigenous peoples' struggles for biocultural rights and self-determination, land rights and territorial development, and community-controlled and biodiversity-based food systems. ANDES is currently hosting the Secretariat for INMIP.

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Published by IIED, October 2017

http://pubs.iied.org/14670IIED

ISBN: 978-1-78431-538-2

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Acronyms

BCHT	biocultural heritage territory
CIP	International Potato Centre
CWR	crop wild relatives
EbA	ecosystem-based adaptation
GDP	gross domestic product
GIS	geographic information system
ICCA	Indigenous and Local Community Conserved Area
ICRAF	World Agroforestry Centre
INMIP	International Network of Mountain Indigenous Peoples
KEFRI	Kenya Forestry Research Institute
masl	metres above sea level
MSDSP	Mountain Societies Development Support Programme
SERNANP	National Service for Natural Areas Protected by the State
NGO	non-governmental organisation
NTFP	non-timber forest products
PNG	Papua New Guinea
PPB	participatory plant breeding
PVS	participatory variety selection
REDD	Reducing Emissions from Deforestation and Forest Degradation
SDG	Sustainable Development Goal
SWOT	strengths, weaknesses, opportunities and threats
TCF	The Christensen Fund
UNDP	United Nations Development Programme
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change

Summary

Mountains provide critical ecosystem goods and services. As well as 60–80 per cent of the world's fresh water, they provide energy, biodiversity, minerals, forest and agricultural products, and sustain high levels of genetic diversity for food, agriculture and adaptation to climate change. However, mountains are undergoing rapid change and environmental degradation. Indigenous mountain peoples are among the poorest, most marginalised and most vulnerable to climate change, with one in two rural mountain people facing food insecurity. Temperatures are rising faster at higher altitudes. Cultural diversity is also eroding in mountain areas, with the consequent loss of indigenous knowledge for climate adaptation and biodiversity conservation.

To help address these challenges, the International Network of Mountain Indigenous Peoples (INMIP) organised its Fourth International Horizontal Learning Exchange on Resilient Biocultural Heritage Landscapes in the Potato Park near Cusco, Peru, from 19 to 23 April 2017. The four-day 'walking workshop' brought together representatives of 39 mountain communities from 11 countries – Bhutan, China, India, Kenya, Kyrgyzstan, Papua New Guinea, Peru, the Philippines, Taiwan, Tajikistan and Thailand – to learn about methods, tools and processes for establishing biocultural heritage landscapes. Indigenous farmers from the Potato Park designed the training and delivered almost all of it, using the landscape as the PowerPoint.

The Potato Park biocultural heritage territory is recognised as a successful and mature model of landscape conservation, climate adaptation and sustainable use of biodiversity. Since 2002, native potato diversity and incomes have doubled, and potato productivity has increased despite severe climate change impacts. This shows that biocultural heritage territories like the Potato Park can deliver multiple policy objectives, including the UN Sustainable Development Goals (SDGs), the Biodiversity Convention's Aichi Targets, the International Treaty on Plant Genetic Resources for Food and Agriculture and the UNFCCC Paris Agreement.

Using indigenous and modern knowledge for mountain sustainable development

As part of this learning exchange, INMIP organised a one-day public forum in Cusco on 19 April 2017, called 'Indigenous and modern knowledge systems: challenges and opportunities for the wellbeing of mountain communities towards 2050'. The forum brought together Peruvian government authorities, universities and research institutes, international researchers and INMIP representatives, to advance knowledge of sustainable mountain development, and enable different mountain stakeholders and knowledge-holders to share insights. It highlighted the importance of Peru's mountain ecosystems for providing water, hydropower, carbon sequestration in highland wetlands and peatlands, which absorb more carbon than most forests, and crop diversity for adaptation. Mountains provide 80 per cent of the food consumed in Peru from smallholder farming, and provided 15 per cent of its GDP in 2013. However, due to climate change, 30 per cent of Peru's glaciers have been lost since 1980, and agricultural productivity has declined due to frosts, drought, floods, pests and diseases.

Peru's Vice Minister for Natural Resources stressed the importance of traditional knowledge for climate adaptation, and ecosystem-based adaptation (EbA), the cheapest approach to adaptation. He underscored the need to develop a multi-sectoral national policy for mountains, ensuring co-ordination between institutions. He invited Asociación ANDES to establish the Potato Park as the first recognised Agrobiodiversity Zone in Peru. Other government representatives also stressed the importance of traditional knowledge for agroecology and EbA, and the need to support the 'Life Plans' of indigenous communities. INMIP community representatives stressed the importance of basing adaptation responses on both traditional knowledge and science. They presented work on women's participatory plant breeding (PPB) in China, biocultural landscapes in Papua New Guinea and Tajikistan, and customary water management in the Eastern Himalayas, India. A roundtable comprising INMIP and government representatives discussed the idea of establishing a community monitoring and database system for indigenous mountain communities, linked to government policy and planning, to monitor progress towards the SDGs and Aichi Targets.

The Potato Park biocultural territory for conservation and adaptation

The walking workshop in the Potato Park was structured around four modules, each representing a key stage in establishing and implementing biocultural heritage landscapes or territories:

1. Community planning
2. Assessing the biocultural landscape proposal, research and organisation of resources
3. Implementing biocultural landscapes, transfer of knowledge and adoption
4. Assessing progress and impacts.

Quechua farmer-researchers ('technicians') introduced the Potato Park, which comprises six Quechua communities with a total population of about 6,500 people. Their biocultural heritage territory of 9,600 hectares seeks to conserve everything within its boundaries, including potatoes, other Andean crops, customs, sacred mountains and wildlife. It is governed by a general council comprising the head of each community, which oversees local technicians and supports six micro-enterprises, with technical support from the NGO ANDES. The communities conserve 1,367 varieties of potato (according to traditional classification) for local and global food security.

The Potato Park is guided by the Andean *ayllu* concept, where wellbeing depends on balance between three *ayllus* or 'communities': the humans and domesticated species/resources; the wild (plants and animals); and the sacred (eg mountain gods). Visiting communities shared their equivalent concepts of the three *ayllus*, revealing many similarities. In China, the Naxi also have three realms – one for holy gods, one for nature, and one for humans – and their relationship is very important. These worldviews face strong external threats. The Potato Park has identified the main threats as transgenic crops, biopiracy and climate change. Participants mapped the biocultural resources of their communities in each of the three *ayllus*, and used the maps to identify a range of biocultural products and services that could be developed into micro-enterprises.

Potato Park technicians explained how they created a detailed baseline through participatory mapping of the park, which allows them to monitor changes in species and crops, and plan responses. After mapping medicinal plants, they developed biodiversity registers to understand their uses and protect their knowledge from misappropriation. The women's medicinal plants collective was trained to produce herbal shampoos, soaps, teas and creams, and formed a micro-enterprise.

The Potato Park communities have developed an inter-community agreement to establish the rules on how the communities interact, based on customary laws. This enables them to rank the participation of each community in the Potato Park activities, and distribute the benefits from the community fund accordingly. The fund is made up of 10 per cent of the revenues from the park's micro-enterprises, which use the Potato Park's collective trademark. This informal trademark helps to unite the communities and has become part of their collective governance.

Participants visited greenhouses where seedlings are grown using a sandponic method – ie sand rather than soil – to avoid disease. The technicians are multiplying seeds from 24 varieties of coloured potato with high anti-oxidant and iron content, which is good for combatting childhood malnutrition. They also produce disease-free *in vitro* seeds and plan to establish a seed micro-enterprise to generate income for their conservation work. Exchanges were also held with the gastronomy collective, handicraft collective, and the community seed bank, which provides cold storage without using electricity.

The Potato Park uses a rotational farming system where potatoes are moved to a different valley every seven years – this is possible thanks to communal land tenure. The lower planting line for potatoes has moved up by 200 metres in the last 30 years due to increased pests and diseases caused by soil warming, and some varieties are at risk of extinction as they have reached the mountain top. In response, the communities are carrying out participatory plant breeding with scientists, and have sent their potato collection to the Svalbard Seed Vault in Norway. They are monitoring climatic conditions (such as temperature, rainfall, humidity) and the effects of climate change on potatoes, using transects and pest traps, working with the International Potato Centre (CIP) in Peru. To work with scientists, communities should first prepare a database of their traditional knowledge in order to start from a strong

basis. They also need a protocol; the inter-community agreement ensures that research is conducted with respect and supports their needs.

The Potato Park is establishing a genetic reserve to conserve wild and domesticated genetic diversity, including three potato crop wild relatives (CWRs). The farmers plant potatoes in animal corrals where wild relatives grow to strengthen the resilience of domesticated varieties. Participants used hand-held geographic information systems (GIS) to collect co-ordinates of CWRs, and learnt how to establish a baseline for creating a genetic reserve. They also learnt how biocultural heritage territories can be legally recognised, and scaled up and out. The head of Peru's protected areas authority explained that the Potato Park already has an effective conservation system that the state can formally recognise.

The workshop synthesis entailed presentations from community participants on what they had learnt and found most important about each module. The results will be used as the basis for the participatory development of a manual on biocultural heritage territories by INMIP. At the margins of the workshop, interviews were conducted with INMIP members to further explore the development of a community monitoring system for the SDGs and Aichi Targets.

Recommendations for agriculture, climate and mountain policy makers

The learning exchange culminated in the Potato Park Declaration, which calls on governments and others to recognise the importance of mountain indigenous peoples' spiritual values and holistic worldviews for mountain ecosystems, livelihoods and climate adaptation. It calls on them to:

1. Recognise and support the vital role of mountain indigenous peoples and indigenous knowledge in conserving genetic diversity and developing appropriate solutions for climate adaptation.
2. Provide policy and financial support for establishing community-led biocultural heritage territories as critical tools for *in situ* conservation, climate adaptation, mountain sustainable development and achieving the SDGs.
3. Ensure the participation of mountain indigenous peoples, including women, in policy and technical forums on mountain sustainable development, food security and climate adaptation, at all levels.

INMIP participants visit Pisaq Archeological Complex at dawn for opening ceremony. Credit: Lucia Florez

Introduction

Challenges facing mountain communities

Mountains cover 22 per cent of the world's land surface and are home to 915 million people, or 13 per cent of the global population, of which 90 per cent live in developing countries.[1] They provide critical ecosystem goods and services, such as 60–80 per cent of the world's fresh water, energy, biological diversity, minerals, forest and agricultural products, and recreational services. However, mountains around the world are under threat from climate change, land degradation, over-exploitation and natural disasters, which, combined with political, economic and social marginalisation, increase the vulnerability of mountain peoples to food insecurity and extreme poverty.[2] Mountain environments also harbour high levels of crop and livestock diversity, which act as an insurance against various threats,[3] but these gene pools are quickly diminishing. Cultural diversity in these areas is also eroding, affecting the strong interdependence between biological and cultural diversity.

Climate change will disproportionately affect indigenous peoples and local communities that live in and rely on fragile ecosystems, threatening their homes, livelihoods and cultural survival.[4] Mountains are already experiencing extreme events related to warming and glacier recession (eg lake outburst floods, mudflows and rock falls), water related challenges and shifts in flora and fauna.[5] There is evidence that temperatures are rising faster at higher altitudes in tropical regions.[6] These mountain-specific pressures add to the vulnerabilities often associated with indigenous peoples, due to their reliance on resource-based livelihoods. Food insecurity in mountain areas in developing countries increased by 30 per cent between 2000 and 2012, and one in two rural mountain people (329 million people) are vulnerable to food insecurity.[1]

Indigenous peoples' territories play an important role in carbon storage in both tropical forests and high-altitude pastures, and sustain much of the world's remaining biodiversity.[7] For indigenous peoples, resilience to climate change is rooted in traditional knowledge – an in-depth understanding of the ecosystems they live in.[4] According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, "indigenous, local and traditional knowledge systems and practices, including indigenous peoples' holistic view of community and environment, are a major resource for adapting to climate change". The Paris Agreement recognises the role that indigenous peoples and local communities play in building a world that is resilient in the face of climate impacts. The 2015 Paris Climate Conference (COP 21) recognised the need to strengthen the knowledge, technologies, practices and efforts of local communities and indigenous peoples related to responding to climate change.[8]

Biocultural heritage territories address multiple challenges

Biocultural heritage landscapes or territories offer an important tool for climate adaptation and mitigation, and for addressing the multiple challenges facing mountain indigenous peoples, including biodiversity loss, food insecurity, poverty, acculturation and out-migration. They respond to the Paris

1 Romeo, R, Vita, A, Testolin, R and Hofer, T (2015) Mapping the vulnerability of mountain peoples to food insecurity. FAO. www.fao.org/3/a-i5175e.pdf
2 FAO (2017) International Mountain Day. www.fao.org/international-mountain-day/2017-theme/en
3 FAO Mountain Partnership (undated) Why mountains matter for forests and biodiversity: a call for action on the Sustainable Development Goals (SDGs). www.fao.org/mountain-partnership/publications/publication-detail/en/c/218390/
4 UNFCCC Secretariat (2017) Local communities and indigenous peoples platform: proposals on operationalization based on the open multi-stakeholder dialogue and submissions. FCCC/SBSTA/2017/6.
5 IPCC (2014) Fifth Assessment Report, Working Group II "Impacts, Adaptation and Vulnerability". Intergovernmental Panel on Climate Change.
6 Kohler, T, Wehrli, A and Jurek, M (eds) (2014) Mountains and climate change: a global concern. Sustainable Mountain Development Series. CDE, SDC and Geographica Bernensia.
7 Maffi, L and Woodley, E (2010) Biocultural diversity conservation: a global sourcebook. Earthscan.
8 UNFCCC Conference of Parties Decision 1/CP.21, paragraph 135.

Agreement's emphasis on basing adaptation actions on traditional knowledge as well as science (Article 7). They recognise that the knowledge and practices of indigenous peoples and local communities contribute to effective nature-based solutions that mitigate against climate change and address its impacts.[4] They also serve as a dynamic tool for realising the Biodiversity Convention's Aichi Targets, the UN Sustainable Development Goals, and the Food and Agriculture Organization's Treaty on Plant Genetic Resources for Food and Agriculture.

Biocultural heritage territories have been defined as: "land use mosaics encompassing indigenous and traditional land tenure, production and exchange systems, cultural identity and community organisation, and simultaneous goals of endogenous development and biodiversity conservation".[9] The Potato Park biocultural heritage territory near Cusco, Peru, has been globally recognised as a successful and mature model of landscape conservation, climate change adaptation, and sustainable use of biodiversity. It is a centre of origin for the potato, where Andean genetic diversity has been maintained for centuries through the practice of the Andean cosmovision or *ayllu*, which promotes an integrated, holistic model of co-habitation between physical, biological and cultural elements. Since 2002, it has doubled native potato diversity (reaching close to 1,400 varieties according to traditional classification), conserved other Andean crops, nearly doubled incomes, increased potato productivity despite severe climate change impacts, and revitalised indigenous knowledge and biocultural heritage.[10]

Capacity building and multi-sector support are needed to develop such landscape-based adaptation approaches, along with investment in participatory research approaches that link traditional knowledge with modern science and technology. Greater co-ordination and linkages between different sectors and actors, both public and private, are also required to better support biocultural territories and address the pressing challenges facing mountain indigenous peoples.

Objectives of INMIP's Fourth International Horizontal Learning Exchange

To help address these challenges, the International Network for Mountain Indigenous Peoples (INMIP) organised its Fourth International Horizontal Learning Exchange on Resilient Biocultural Heritage Landscapes in the Potato Park from 20 to 23 April 2017. The four-day 'walking workshop' brought together mountain community representatives from Bhutan, China, India, Kenya, Kyrgyzstan, Papua New Guinea, Peru, the Philippines, Taiwan, Tajikistan and Thailand, to learn about methods, tools and processes for establishing biocultural heritage landscapes. Indigenous experts from the Potato Park trained visiting communities on how to implement 'agrobiodiversity zones', using the landscape as the PowerPoint.

Potato Park community technicians designed the methodology for the exchange and delivered almost all of the training, in different parts of the Potato Park landscape. This walking workshop methodology is designed to encourage the sharing of traditional and local knowledge and experiences by indigenous farmers, and enables practical demonstration and exercises, while also empowering the host communities through the process. Representatives from 39 indigenous mountain communities participated in the Potato Park exchange, together with representatives from civil society, research, government and donor organisations (see the participant list, Annex IV). Many of the communities were from high-altitude zones (above 2,000 metres), some were from mid-altitude zones (above 1,000 metres) and a few were from low-altitude tropical rainforests (above 800 metres).

As part of this learning exchange, INMIP also organised a one-day public forum in Cusco on 19 April 2017, called 'Indigenous and modern knowledge systems: challenges and opportunities for the wellbeing of mountain communities towards 2050'. The forum involved presentations from Peruvian government authorities, universities and research institutes, international researchers and INMIP representatives. Its objectives were to advance knowledge of sustainable mountain development, promote community and ecosystem-based adaptation and alternative livelihood opportunities, and enable different mountain stakeholders and knowledge-holders to share insights, research and activities.

9 Argumedo, A and Swiderska, K (2014). Biocultural heritage territories. IIED. http://pubs.iied.org/pdfs/G03843.pdf
10 Asociacion ANDES (2016). Resilient farming systems in times of uncertainty: biocultural innovations in the Potato Park, Peru. IIED. http://pubs.iied.org/14663IIED

The exchange in the Potato Park was structured around four modules, each representing a key stage in establishing and implementing biocultural heritage landscapes, and involving visits to different Potato Park communities. The workshop also developed a five-year strategic plan for INMIP (Annex I). It culminated in the Potato Park Declaration (Annex II). It also explored the development of a community monitoring and database system for monitoring progress towards the Biodiversity Convention's Aichi Targets and the 2030 Sustainable Development Goals – see the Roundtable at the Public Forum, and interviews with communities from different countries in Annex III.

INMIP participants visit Pisaq archeological site near Potato Park. Credit: Lucia Florez

As part of the exchange, a biocultural festival was held in the Potato Park, where each community shared traditional dances, songs, dishes and drinks, to celebrate the importance of their biocultural heritage and reaffirm their relationships as a network. The aim was also to give something back to the Potato Park communities, with whom the food was shared first. On the last day, participants were given the choice of visiting the ancient Inca agricultural experimentation centre at Moray, or taking a historical tour around Cusco, the capital of the Inca empire.

INMIP: A brief history

INMIP was established in May 2014 in Bhutan by 25 participating indigenous communities from ten countries: Bhutan, China, India, Kyrgyzstan, Papua New Guinea, Peru, the Philippines, Taiwan, Tajikistan, and Thailand. The network aims to improve understanding of mountain indigenous peoples' issues and promote capacity building for biocultural climate change adaptation and sustainable mountain development (see Annex I). It is an important platform for supporting the implementation of local, national and international climate change programmes and policies, and strengthening sustainable management practices in mountain territories. It aims to build capacity for establishing biocultural heritage territories for *in situ* conservation. The network's three previous international learning exchanges were held in Bhutan in 2014, Tajikistan in 2015, and China in 2016.[11]

The INMIP annual learning exchange provides a space for the sharing of traditional knowledge and practices for climate adaptation, sustainable mountain development and local food sovereignty. Each learning exchange has used a 'walking workshop' methodology,[12] and has produced a declaration calling on governments, research organisations and the international community to recognise the importance of mountain peoples' traditional knowledge and biocultural heritage for food security, climate adaptation and natural resource management. Each exchange has also provided a rich source of evidence on climate change impacts and other challenges facing mountain communities, as well as appropriate solutions to these challenges that build on both traditional knowledge and science. The network is co-ordinated by Alejandro Argumedo, Asociacion ANDES (Peru). For more information see: www.inmip.net

11 See Bhutan report: http://pubs.iied.org/G03798; Tajikistan: http://pubs.iied.org/14635IIED; China: http://pubs.iied.org/14669IIED/

12 See http://pubs.iied.org/14669IIED/

PUBLIC FORUM

INMIP's Fourth Horizontal Learning Exchange began with a one-day public forum in Cusco on 19 April 2017, called 'Indigenous and modern knowledge systems: challenges and opportunities for the wellbeing of mountain communities towards 2050.' The forum brought together Peruvian government authorities, universities and research institutes, international researchers and INMIP mountain community representatives. It aimed to advance knowledge of sustainable mountain development, and enable different mountain stakeholders and knowledge-holders to share insights, research and activities.

Keynote speakers

Dr Carlos Amat y Leon (ANDES Board of Directors)

Dr Amat y Leon opened the forum. He highlighted the importance of Peru's tropical mountains for precipitation, which turns the desert on the Pacific coast into the moist tropical forest in the east, and generates mega-diversity in their valleys. Climate change is one of the biggest challenges facing the world – Peru has lost 30 per cent of its glaciers since the 1980s. Biodiversity is expressed in the markets of all the villages from the coast to the Amazon. The rural population dropped from 41 per cent to 24 per cent between 1972 and 2007 due to rapid urbanisation. About 70 per cent of the working population are in informal work and do not have stable employment; high unemployment in Peru leads to social instability. So the challenge is how to produce an inclusive productive system in the mountains that gives mountain peoples fulfilling employment. We need to measure gross domestic product (GDP) based on quality of life.

Urbanisation is the basis of the Peruvian economy – along with mining, which provides finance and fuel for the economy. We have built towns in the coastal region, taking possession of the lands of the people – a large part of the population are builders constructing towns that displace agriculture. Most people are left as informal street vendors with no stable job. That is not quality of life. This economic model has resulted in huge traffic jams in Lima, highly contaminated mining villages, and brutal deforestation. It needs to be substantially modified, and taken back to the mountains, where we can be connected via the Internet and conversing with our cultures.

A new agriculture is needed to create development with quality of life. We have forgotten about caring for pastures and forests to live in balance with nature. Watersheds are the basis for our 'home' – we need to take care of them for our long-term wellbeing. Peru has the highest population living above 3,000 metres, in high pastures that provide a great hydrological sponge and support livestock productivity. They also capture a lot of carbon from the atmosphere. Good pasture management means conserving species. Management of mountain wetlands/peatlands and lakes as networks and reforestation are also key for confronting climate change. We have forgotten highlands are an important production resource for the economy. Farmers are not powerful enough to negotiate in markets – they need to form associations. Value chains need more organised producers and governance.

People in Arequipa, Ayacucho and so on have responded to mountain challenges with creativity – such as terraces on slopes facing the sun and settlements above. Mountain areas need improved education, health and so on. In Ayacucho, there are pre-Inca terraces with over 700 potato varieties. Farmers tested different potato varieties in different areas of the terraces, with varying conditions such as sun strength/hours and soil. The Potato Park in Pisaq shows an alternative way to live in our territory, with spiritual expression, rather than agglomerated in towns. We need to capitalise on the productive systems of the Andes to improve quality of life within towns. We now use drip irrigation rather than irrigation by flooding, reducing the water we use by two-thirds, and have switched from peach to pecan farming to adapt. In coastal areas, we need export agriculture with drip irrigation, high biodiversity value, and organised producers integrated into global markets. In Casamarca, planted pine trees capture water/precipitation at 4,100 metres – they have constructed an ecosystem with high rural quality of life.

A priest from the Q'eros community

The Q'eros community consists of five villages above 5,000 metres. The priest performed a Quechua ritual from our ancestors, based on *Pachamama* (Mother Earth). He asked five people to come and blow on coca leaves and pray that indigenous peoples do not move to towns but live in harmony in rural areas. He blessed the coca leaves and gave them to government officials, including Peru's Vice Minister for Natural Resources and Cusco and Apurimac regional governors, saying that the leaves are sacred – to be eaten like sacred 'ostia' (communion bread).

Priest from Q'eros community performs opening ritual. Credit: Lucia Florez

Dr William Fernando Leon Morales, Vice Minister for Strategic Development of Natural Resources

Dr Leon Morales welcomed the mountain peoples from different countries and noted the importance of this event to discuss the big challenges facing mountain communities. Mountains are very important for development; for instance Machu Picchu is a cultural marvel and important for tourism. Mountains provide vital ecosystem goods and services for sustainable development. In 2013, mountain ecosystems contributed 15 per cent of Peru's GDP. Mountains are also an important part of the response to climate change because they sequester carbon and capture and store water; highland wetlands and peatlands absorb more carbon per hectare than most forest areas (380 metric tons of carbon per hectare) so they contribute to mitigation. Mountains are 'factories of water' where the water cycle is initiated (lakes, springs) for hydropower, agriculture, drinking and so on. Peru has 71 per cent of all tropical glaciers in the world, giving rise to 8,355 lakes. They also signify energy – the hydroelectric power that gives energy to Cusco. Mountains are an important source of food – there is great biological richness in mountains, providing medicines and food for local and national populations. There are some 1,400 varieties of potato in the Potato Park. 1.4 million people make a living from agriculture in the Andes, making up 64 per cent of all producers in Peru, and 80 per cent of food consumed in Peru comes from family farming in the Andes. Mountains also sustain ancestral knowledge, traditional technologies and 'living cultures' that survive today despite modernisation, where women play an important role in environmental management.

Keynote address from Peru's Vice Minister for Natural Resources. Credit: Lucia Florez

But climate change is impacting on mountain ecosystems, and has reduced agricultural productivity in Peru through frosts, drought and floods, while changes in temperature and rainfall have led to more pests and disease. In turn, higher pesticide use is increasing production costs. Climate change is also making glaciers retreat, giving the false impression that water is plentiful; but in the longer term there will be water shortages, and without water there is no development. So we need to establish adaptation measures. Communities have strategies for adaptation – for instance, traditional knowledge allows better water capture, enabling two harvests per year. When we establish EbA measures based on traditional knowledge, we can create more resilient communities (for instance by restoring degraded land).

Less water impacts on the economy. This is especially true of agriculture, which accounts for 70 per cent of the economically active population, of which 40 per cent live in mountains – so climate change affects people, not just ecosystems. EbA is the cheapest way to achieve adaptation; ecosystems that capture water and ensure fertile soil provide a set of free services. It has reduced producers' vulnerability through better resource management. Investing in ecosystem goods and services generates not only social and environmental but also economic benefits.

Mountains represent resources and pride for Peru. National policies relating to mountains include national strategies on climate change adaptation, water resources, governance, ecosystem management, protecting and using traditional knowledge for sustainable management of mountain ecosystems, and green growth in mountains, such as value addition for traditional products. In the context of climate change, we need to develop a multi-sectoral national policy for mountains, which allows the economy and society to adapt and ensures inter-institutional co-ordination. Key challenges for the future include:

- Institutions and governance: how do we strengthen linkages between rural communities and government, and organise rural communities better so they are more prepared to deal with climate change and other challenges?
- Information and research: how do we make the most of all available water now, and rescue traditional knowledge?
- Investment: we have included natural infrastructure as part of public investments. Public investment also needs institutions at local level and links to higher levels. We have a legal basis to create Agrobiodiversity Zones in Peru – zones where rich traditional knowledge and agrobiodiversity are maintained - with the highest legal backing. I invite ANDES to establish the Potato Park as the first recognised Agrobiodiversity Zone in Peru.
- Capacity: we need to strengthen the capacity of the population, and form a large network for capacity building. We need to work with universities to help build capacity in villages to make the most of what communities have and improve wellbeing. Millions of youth wanted to help in recent emergencies in the north – so there is huge potential for trained youth to also do capacity building in communities.
- We need a co-ordinated and multi-sectoral approach: we are trying to get Andean grains and Amazonian fruits (ie biodiversity) into free school meals – such as a fruit from the Amazon with 50 per cent more Vitamin C than lemons or oranges. We have superfoods in the mountains and the Amazon; we need to link them to markets, so we are working on value chains for Amazonian fruit and Andean grains. We have payments for ecosystem services; consumers of water pay for conservation upstream. We have projects for EbA in mountains.

Wilber Venegas, Regional Governor of Apurimac

Apurimac is 90 per cent mountains and 80 per cent of its land is communally owned by communities; only 20 per cent is privately owned. The region has four structural problems or challenges:

- Cultural conflict linked to identity and confronting modernisation, eg due to migration
- Technological change puts a lot of pressure on production and increases competition for resources
- Demographic pressure and migration
- Socio-economic marginalisation.

Why do we need integrated programmes for natural resources? Because of low agricultural diversification, changes in land use, excessive rains and so on; and also to take advantage of opportunities. Communities can promote diversified land use (such as agroforestry); reforestation (which is needed to prevent problems caused by excessive rain due to climate change); and absorption of greenhouse gases by pastures. We need integrated programmes at regional level so that ecosystem management can be adapted to our local conditions, which are special and unique, and which reflect the diversity of Peru. We have huge capacity for agroecology, as the *campesinos* have been doing this type of agriculture for centuries – they have traditional knowledge of agroecology. We cannot do large-scale agriculture as there are different ecological zones; so we have to use this traditional knowledge of agroecology.

For example, reforestation in the Apurimac regional programme, Sacha Tarpuy: a massive reforestation programme of more than 33 million trees on mountain slopes in seven provinces. We use traditional knowledge and local seeds, since reforestation is an ancestral practice. Communities have to contribute 33 per cent of the labour, and they identify which areas should be reforested, which used for agriculture and which for pasture. We count on finance from the central government at the moment, but we also invest more than 20 per cent of our budget in this project as we believe it will create opportunities to improve the wellbeing of mountain communities. We employ some 17,000 people in reforestation, of whom 33 per cent are women, to improve equity. The area is on a copper ridge.

Agriculture zones and zones suitable for livestock must be maintained, and reforestation is vital – as a mountain zone we are very vulnerable to climate change. Communities say we should not continue to plant eucalyptus, but native varieties that will help maintain ecosystems. We are training communities to add value to forest products, and are impressed by the Potato Park making soap and potato shampoo – we may have to copy that. In 20 years we estimate the wood will bring 12 million dollars a year, and mushrooms grown on trees will also bring several million. Planting needs to be done in the rainy season and when rains fail communities need to water plantations communally. We are also supporting communal agrobiodiversity management and hope to propose three Agrobiodiversity Zones in next few months.

Jim Farfan Vargas, Management of Natural Resources and Environment, Regional Government of Cusco

Peru is a mega-diverse country and Cusco is one of its most biodiverse regions. Biodiversity includes the diversity of genes, species and ecosystems, according to the Convention on Biological Diversity. It also includes the diversity of culture, which has an intrinsic value for development and social cohesion. This is part of biodiversity, because human groups are repositories of knowledge, technologies and genetic resources as part of their culture, adapted to their environment. Measuring biodiversity is useful for decision-making, conservation and adaptation to climate change. In the Cusco region it serves to promote conservation areas, including for glaciers, forests, wetlands and native crop varieties. Tourism provides an important source of income for conservation, particularly ecotourism within and outside of protected areas (there are state, regional and private protected areas in the Cusco region); agrotourism, to learn about Andean cultivation systems and associated customs (eight Agrobiodiversity Zones are proposed); and educational tourism.

Thematic presentations

The Regional Government of Apurimac reforestation plan: Mr Francisco Medina, Director of Environment, Regional Government of Apurimac

The reforestation programme of Apurimac uses ancestral knowledge that communities have learnt through trial and error, and traditional species that have multiple functions for communities. Their reforestation approach is sustainable in terms of the environment and enabling people's participation. Watershed management regulates the microclimate, vital due to daily temperatures extremes, and generates benefits for soil regeneration. The programme has also increased the sense of communities' ownership of the project; it has produced social benefits, since the community no longer feels isolated, but is linked to the regional economy. The programme aims to help to diversify the territory, and is

helping to improve land use. It provides economic benefits through increased income, and economic diversification, increasing resilience to economic shocks. Greenhouse gas mitigation is also a huge opportunity.

The community forms the forest management group – our role is not to tell them what to do, but to co-ordinate and organise. The trees are for the communities and will stay in the community. Whole community participation is ensured by rotating the labour every 15 days. We have used low-cost technologies, as communities will not be able to maintain high-cost technologies in the long term. We have established community networks to look after the plantations. Communities move cattle up and down along particular routes, so the programme has ensured that can continue. In terms of organising community resources, men normally want to do the work and say women cannot – but women are employed too, as they do certain things more efficiently, and are paid the same as men. The communities use drip irrigation for plantations, and develop monitoring plans for forest activities. The law has established that rural communities should create management committees and so on; we are following these requirements. The community management committees are a recognised part of forestry committees, so the programme is linked to the national context and laws, and is adapting them to the regional context.

Proposal for UNESCO Biosphere Reserve for Machu Picchu: Elias Julio Carreño, National Service for Natural Areas Protected by the State (SERNANP)

UNESCO defines Biosphere Reserves as areas of terrestrial or coastal/marine ecosystems recognised at international level by UNESCO's Man and Biosphere Reserve programme. UNESCO Biosphere Reserves are not natural protected areas – they seek to integrate conservation with sustainable development, including cultural, social and economic components. They are nominated by national governments and form part of an international network. There are five Biosphere Reserves in Peru, and a further three have been proposed. They have three main functions: biodiversity conservation, development (social and cultural), and research and monitoring. The Ministries of Culture and Environment have developed a proposal to establish a UNESCO Biosphere Reserve in Machu Picchu. The proposed Biosphere Reserve will cover a number of provinces or areas (including Pisac, Lares). So we need to define how to engage communities, hold workshops with municipalities, universities and so on, carry out a participatory process, and develop a management plan.

INMIP Public Forum in Cusco, 19 April 2017. Credit: Lucia Florez

Life plans – Mechanisms for linking with indigenous communities: Mr Adolfo Gomez, Ministry of Inter-Culturality

Different actors – such as masters students and indigenous farmers – have different needs and different knowledge. Life plans are strategic and collective community planning instruments. They can link government planning with communities' visions. They include cross-cutting priorities for education, economy, ancestral knowledge and biocultural heritage. The Ministry of Culture has produced a guide for collective planning; examples include the community of Mayuriaga. Life plans are important to ensure policies and programmes address local peoples' needs. They have guidelines for intercultural planning by regional and local governments with respect to indigenous peoples, linked to budgets. There are 17 life plans under development in a region, but the regional government is not currently considering them. They will conduct consultations and capacity building so that life plans are integrated into the plans of regional governments.

Ecosystem-based adaptation experiences in the Peruvian Andes: Mr Marco Arenas, National Service of Protected Areas

Natural protected areas are legally protected by the State for the conservation of biodiversity and associated values of cultural, landscape or scientific interest and for their contribution to sustainable development. Parks that only exist on paper or that cannot be touched do not work. Machu Picchu is intangible in principle, but is used for development. Effectiveness is measured based on conserving diversity, and benefits to people. Natural protected areas are increasingly vulnerable to climate change – this has already been analysed, and master plans developed for mitigation and adaptation. Our conceptual model of climate risks and EbA responses indicates which elements are to be conserved, species and problems that affect them, and proposes solutions. Examples of ecosystem management for adaptation include maintaining and enhancing ecosystem coverage to promote water resources; promoting sustainable economic activities such as livestock, management of *vicuňas* (camelids) and using irrigation to increase their pastures; biodiversity management; and using green infrastructure. The mountain EbA project involves landscape management-recovery and valuing traditional knowledge (eg for recovery of ancestral water infrastructure), which allow landscapes to be managed without having to use technologies from outside and by modifying some activities (such as keeping livestock above water sources).

Cusco Digital: Mr Javier A. Lastarria Rivera, Regional Government of Cusco

There has been significant technological change in the last few decades: computers, the internet, and now fibre optic broadband, which is much faster and will bring benefits to more areas and people. We have a project to bring broadband internet access to public and private institutions and different areas of the Cusco region, providing more than 2,000 kilometres of fibre optic cable. This will be useful for 'tele-education' in remote areas to improve education; and for 'tele-medicine' to improve health through interactive communication between doctors and patients. It will also be useful for tourism – for online booking and record keeping, for instance – and for risk and disaster management.

Climate change and early alert systems in the Cusco Region: Dr Paul Franco, National University of San Antonio Abad of Cusco

We are developing a real time early warning monitoring system for climate change related natural disasters and extreme events, and have already completed a pilot project. The system monitors and communicates conditions and risks. Using wireless technology, sensors measure vibrations at monitoring points (including under a lagoon) and are connected to sirens at the local authority, police, fire brigade and health centres. The system also connects with rural communities through sirens in schools or NGOs. This is all done using free software, working with the municipality, university and private companies. We also have cameras for monitoring, and a climate centre. This tool aims to avoid loss of life, but of course it does not prevent disasters.

Knowledge platforms and networking – exploring ways to strengthen links between farmers and consumers in Cusco: Dr Trent Blare, World Agroforestry Centre

The mission of the World Agroforestry Centre (ICRAF) is to enhance the contribution of trees to the fight against malnutrition, climate change and poverty. It is based in Nairobi, Kenya, and has five regional offices (including in Peru). We conduct action research in Peru on the consumption of nutritious and healthy products, especially from trees; tree domestication; and climate change adaptation and mitigation. We are conducting research on Cusco's urban food system with support from the McKnight Foundation. Why focus on Cusco? Cusco is special because of its high tourism levels, but it also has similar characteristics to many other regional towns. It has high demand for quality food; an annual population growth of 0.5 per cent; and 11 per cent growth in per capita income in the last five years. Some producers benefit from the export or local sale of iconic Peruvian products, such as quinoa and native potatoes. Agricultural producers make up 59 per cent of the population, largely small scale.

There are problems such as obesity; low fruit and vegetable consumption; dependence on informal markets, where sanitary standards are not prioritised; limited options for producers to capture more value; and scarcity of quality local products for companies and consumers. Focusing on value chains is not that useful – better to focus on systems to understand where to intervene. Our research interviewed 300 consumers in 2015 and found that they prefer local products and are prepared to pay more for them, but find it difficult to find quality local products. We also interviewed 50 restaurants, which found strong interest in buying local products, but less interest in buying directly from producers. There are a few experiences of direct purchase from farmers (for native potatoes, trout and Andean grains), but not many, and in small quantities. These face logistical and tax-related challenges. Restaurants have limited incentives and capacity to establish lasting links for purchasing local products, other than traditional products. We explored three case studies on creating direct linkages between producers and restaurants (eg for potatoes, lettuce), involving a producer association, producer networks, and a private company. While these can start well, problems may arise:

- Logistical challenges for producers with limited accessibility (in terms of transport and communication); the need to aggregate small quantities from many producers; limited trust amongst producers and between producers and buyers.
- Difficult market requirements: product standards (size, colour); obtaining organic certification is difficult and expensive; obtaining receipts; cleanliness of the product.

Next steps: developing a conceptual framework to analyse food systems in Cusco; engaging in dialogue with the key actors in Cusco to find ways of working together and take initial projects to scale; developing proposals for funding to improve producers' capacity for direct sales; and promoting consumption of local products.

Participatory genetic improvement in the context of climate change – the case of the potato: Ladislao Palomino, National Institute of Agrarian Innovation, Cusco

The Andes in Southern Peru is increasingly affected by drought and frost. Native potatoes tend to be more nutritious than improved potatoes. They provide genetic resources that are resistant to diseases and insect plagues (*rancha*), tolerant to drought and frost (some varieties are tolerant to both), and have nutritional quality such as micro-nutrients, including iron and zinc, and anti-oxidants. Participation in crop improvement/breeding is important, especially for women. Currently 145 families (populations) of potato tolerant to drought and frost are undergoing a process of participatory field evaluation by farmers. Traditional knowledge is an important basis for scientific work and conservation. This great potato diversity is good for the economy as well as nutrition. Anti-oxidants (eg carotenoids, anthocyannins) provide protection from cell damage due to abiotic stress (eg drought, frost, heat). Coloured potatoes (purple and red) have significant levels of anthocyannins at 73–84 per cent – whereas grapes only have 8 per cent. These have anti-cancer, anti-inflammatory, anti-mutagenic, anti-hyper-glycaemic and anti-cholesterol properties.

INMIP community presentations

Biocultural landscapes for mountain communities in Papua New Guinea – creating pathways to sustainable livelihoods: Gure Afao Tumae and Anne-Marie Wanamp

Papua New Guinea (PNG) has about 2 million mountain communities – its highest peak is 4,500 metres above sea level. As one of the first agricultural civilisations, they have been practicing agriculture for about 7,000 years. Mountain communities face major challenges: languages and biocultural diversity are rapidly eroding. There are 800 indigenous tribes in PNG. 90 per cent of land is owned by local people and less than 10 per cent is owned by the government. However, the government comes up with policies to clear the land of indigenous peoples for development, like Special Agricultural Business Leases. The population is growing at an alarming rate, and forests are increasingly cleared for gardening. Environmental damage is widespread and local people are grossly marginalised.

With climate change, flora and fauna in PNG are at risk of extinction – mainly due to poor management, such as bush fires. Climate change has caused drought and frosts. Dry periods happen much earlier than in the past. Potatoes have been devastated by frost and drought, leading to crop failure and the loss of seeds. Food security is endangered, as natural hunting/gathering grounds cannot support growing populations. Rural mountain people are at greater risk of food insecurity. They have also had severe floods with devastating consequences – damaging houses and washing away roads.

How are we responding to the challenges? Traditional sustainable agricultural practices help mitigate climate change effects; for instance, 'enga mounds' to enable crops to survive long dry periods; terracing on steep slopes; shifting cultivation (but this is becoming limited); selective logging for family use; and seeds kept in families and passed on. We also take on modern knowledge and improved technologies to help mitigate the impacts of climate change, such as high-input commercial farming, and potato late blight tolerant clones from the International Potato Centre (CIP), Peru. The government has policies on forest conservation, the UNFCCC, the Paris Agreement, REDD; ecotourism and rural development (such as alternative income from sustainable natural resource management, community-led protected areas); and the PNG education policy includes a curriculum on sustainability and climate-smart production systems.

Agriculture in PNG is rainfed, and irrigation has never been done. We have water sources, but how to harvest them? We need to develop well-designed irrigation systems for sustained agricultural production by mountain peoples, working with key government and international development partners. Agroforestry should be supported as a strategy for sustainable agriculture and climate change mitigation. Seed conservation has also become a challenge for us – we need *in vitro*, *in situ* and *ex situ* preservation of germplasm to help ensure food security for our people.

Naxi women and seeds – community-based biodiversity conservation and adaptation: Xiuyun Zhang, INMIP representative, China

Two Naxi women presented a short film of their life in the Stone village in Yunnan, China, including Naxi singing, farming and landscapes. They are experimenters working with experimental varieties for adaptation. They exchanged seeds with Peruvian farmers and brought back purple and white maize and they do mass selection with their local varieties. They did experiments in two different areas, including one at sea level, which did not work. They are now carrying out experiments for the third time and sharing their achievements, experiences and lessons. They are 'farmer–breeders' and have a great diversity of maize. They are conducting Participatory Variety Selection (PVS) and Participatory Plant Breeding jointly with scientists using a red maize variety introduced from a university. The Guangxi Maize Research Institute, a provincial public research institute, has provided training for research and PPB. The scientists work with women farmers in the field on landrace conservation and improvement and local adaptation of external varieties. Finding varieties that work well in the environment requires repeated attempts. They are also working with black sesame, peanuts and black maize. They established a community seed bank last year, with 26 crops and 160 varieties including maize, wheat, legumes, and some medicinal plants. They also have annual community seed fairs for seed and traditional knowledge exchange in the harvest season. A women's culture dance group gives cultural performances during the harvest season. These women farmers also have community seed gardens linked to the community seed bank for in-field seed exchange and PVS.

Water and social capital, Eastern Himalayas, India: Nayan Pradhan

There are major water resources in mountains – spring water provides 100 per cent of drinking water for mountain communities in this area and 70 per cent of irrigation water, especially for paddy fields; the river and rainwater each provide another 15 per cent of irrigation water. Some springs are seasonal, becoming active for five to six months after the monsoon, and others are perennial (about 40 per cent of springs).

According to indigenous knowledge, water sources are sacred places – irrespective of religious faith, every individual respects the sacred places of the village, which builds mutual trust and support among the community. There are several traditional rituals relating to water conservation, such as worshipping trees, banning entry to water source areas, planting trees, customary rules prohibiting tree cutting and keeping the area clean, ceremonies related to death, worshipping of deities and so on. These activities build reciprocity between humans and nature. During the rainy season irrigation channels are collectively repaired and regulated to ensure that rain water is used equitably for irrigating paddy fields; and occasionally communities do collective maintenance work for drinking water resources. These activities build co-operation and enhance co-ordinated activities in the community.

The modern knowledge system focuses on building water tanks, but there is little sense of local ownership or responsibility for their maintenance, as they are considered government property. The government has a programme to promote rainwater harvesting but is not fully implementing it. The government has initiated water recharge trenches in Sikkim, but this is still in the initial stages. Irrigation channels have been built in some villages but a lack of regular maintenance is causing serious landslide problems. The government has scattered programmes for drinking water distribution systems, but they lack proper planning and implementation.

Water resource management for the wellbeing of mountain communities – the key challenges:

1. Traditional knowledge-based systems of water resource management losing significance, due to modern technological interventions
2. Water resources drying out due to deforestation
3. Carrying capacity of water resources is not enough for a growing population
4. Decline of social capital in the community due to modern lifestyles
5. Lack of participation in planning, implementing and maintaining water resources
6. Commercialisation of water resources.

Opportunities for water resource management towards 2050:

- Empower consumers/users in water resource management and utilisation mechanisms
- Promote customary laws for water resource management
- Promote rainwater harvesting and groundwater recharge mechanisms
- Afforestation using water conservation-friendly trees
- Promote common water distribution outlets at community level
- Educate people about safe and judicious water management.

Tajikistan – Apple Park: Yodgor Qonunov

Our work is based on the philosophy of Mirzosho Akobirov, an agronomist, poet and philosopher: “Life is surrounded by mountains which inspires man to the knowledge of God. If you have learned to know God, you will know who created the beauties of nature. Using natural resources and not adding to its beauty is a sin. Can man as God be the creator of beauty in nature?”

Mirzosho created a botanical and cultural garden, Kuhsori Ajam. He found a wetland and started to plant trees. Local varieties of fruit in the area were in danger of disappearing but modern fruit trees were not well-adapted to local conditions. So Mirzosho has collected 52 apple, 34 pear and 32 apricot

varieties from local farmers. He provides incentives for youth to engage in the work, in order to inform them and include them in the revival of beauty in nature. In 2010, Mirzosho visited the Potato Park in Peru. He concluded that if Peru is the country of the potato, then Tajikistan is the country of the apple – so he implemented the idea in Tajikistan and created an Apple Park in the Jafr community, Rasht Valley. He planted native varieties used by ancestors – the park includes fruit trees, shrubs and medicinal plants used in food. It also includes an old sacred pear tree called aurora, which is over 300 years old. People still use seedlings from this tree. He has also established a local museum, and there will be a museum in the botanical and cultural park. The agro-biocultural model involving a park, textiles and products has been shared with about 20 villages, and they will continue to share and spread the model.

Biocultural heritage of Kyrgyzstan – perspectives and current situation: Akylbek Kasimov, BioMuras Foundation

Kyrgyzstan has a rich biocultural heritage but it also has problems. It is a centre of origin of some fruit trees, but only 10 per cent of seeds are local varieties – the rest are modern, hybrid varieties imported from elsewhere. Kyrgyzstan has a unique wild walnut forest, which is a source of income for communities near the forest. In Southern Kyrgyzstan, after INMIP began, they implemented programmes to conserve local seeds. They learnt from INMIP meetings in Bhutan and from the experience of the Stone Village in China about establishing a community seed bank. They have developed a sustainable development strategy for local communities – a network for biodiversity and training, involving 200 people (youth, elders, men and women). They promote organic production.

The walnut fruit forests provide a source of food, wood, forest products and ecotourism. They involve the youth in protecting and preserving biocultural heritage, and involve local people in forest management. Problems include a lack of knowledge of agroforestry, cutting trees for firewood, and raising animals in forests. Local people are trained and then participate in forest management, with support from the Christensen Fund. They have established an association of forest users with local communities. Community management of forest resources provides a source of income, along with ecotourism.

INMIP participants from Kyrgyzstan and Thailand at the Public Forum in Cusco. Credit: Lucia Florez

Roundtable on indigenous and modern knowledge: challenges and opportunities for the wellbeing of mountain communities towards 2050

The roundtable invited three representatives from indigenous mountain communities and a representative from the regional government of Cusco to address two questions:

1. Is there a need for a community monitoring system for mountains, linked to governments?
2. If so, how could it work?

A community monitoring and database system could enable indigenous mountain peoples to monitor key indicators for sustainable development, based on traditional knowledge. It could address priorities identified by communities, such as climate change threats, threats to territories, traditional knowledge loss, poverty, and inform community planning; and could also inform government policy and planning and provide data for monitoring progress towards achieving the Biodiversity Convention's Aichi Targets (2020) and the Sustainable Development Goals (2030). For example:

- Target 18: Indigenous knowledge, innovations and practices are respected (this is not on track).
- Target 11: 17 per cent of terrestrial and inland water is conserved through protected areas or "other effective area-based conservation measures" (eg Indigenous and Local Community Conserved Areas - ICCAs).
- Target 14: Ecosystems that provide essential services relating to water, health, livelihoods and wellbeing are restored and safeguarded, taking into account the needs of indigenous peoples and local communities.
- Target 13: Genetic diversity of cultivated plants and wild relatives, including other culturally valuable species, is maintained.
- SDG 1: End poverty and build resilience of poor and vulnerable people to climate-related extreme events (and enhance land and natural resource tenure).
- SDG 2: End hunger – double agricultural productivity and income of small-scale producers and ensure sustainable and resilient agricultural systems by 2030; and maintain genetic diversity of seeds and wild relatives by 2020.
- SDG 15: Ensure conservation of mountain ecosystems and biodiversity by 2030.

Yapit Tali, Taiwan: Indigenous mountain people in Taiwan understand how ecosystems work and know how to avoid disasters. But the government does not trust indigenous knowledge, and may force indigenous peoples to leave their own territories to avoid disasters. Despite the distrust by the government, communities are trying to document/record local traditional knowledge on how to respond to climate disasters. They have worked with scholars to try to persuade the government of the importance of indigenous knowledge; they are still learning to trust each other. The government and indigenous people have different opinions about land and disaster risk reduction. Since 2001, there has been a law to protect the rights of indigenous peoples – this provides a starting point for dialogue to strengthen the relationship between indigenous peoples and the government. The government needs to recognise the value of indigenous knowledge before a community monitoring system linked to the government can work.

Indigenous women from Taiwan, Roundtable, Public Forum.
Credit: Lucia Florez

Benny Cumatang, the Philippines: The Indigenous Peoples' Rights Act has been in place in the Philippines since the 1970s. There are 110 tribes, each with their own customary system. The government awarded some rights to land managed by their ancestors – an Ancestral Domain title, which has also been recognised as an ICCA. The communities have developed a sustainable development plan and identified forest sanctuaries. They are very dependent on forest resources. Recognition of forest sanctuaries also protects biodiversity, wildlife, breeding grounds and birds and maintains the forest. They engage young people in annual activities to conserve the forest. The role of indigenous peoples in management of forests is recognised by the government.

Cusco Regional Government: Peru takes part in international conventions such as the Kyoto Protocol, Nagoya Protocol and the Global Strategy for Biodiversity. It is committed to their implementation. There is a national biodiversity strategy that prioritises the participation of indigenous peoples and should be linked to the strategies of the 25 regions in Peru. But there are no links between national, regional and local governments.

Alibek Otambekov, Tajikistan: After the collapse of the Soviet Union, collective farms were destroyed. Community organisations' monitoring system are important for addressing village problems, and all the information goes to government level, because government is part of the process and takes these priorities into account in national planning. Community development planning happens every three years – they prioritise problems, and identify who will address them. Now these community organisations are recognised officially. Many elements are impacting on local food systems. The relation between local leaders/authorities and structures and the government is important – they are often able to solve problems by working together. Local plans are taken into consideration in national planning.

Traditional knowledge and local varieties are important. Crops are imported from outside markets and may push local indigenous varieties out. Some now understand the importance of local varieties for resilience and sustainability. These varieties are getting more popular, even with the government. Solar calendars are used by farmers and adapted to local conditions, acting as a useful monitoring system.

Discussion:

- The Potato Park communities monitor the weather – eg temperature, precipitation – through their weather station. They have five test plots testing 16 native varieties for resilience to pests, diseases, frost and so on, and they monitor the maintenance of potato diversity.
- Kyrgyzstan – forests belong to the government, and in order to use them, locals must sign agreements and meet certain conditions. One project established a community forest management organisation in consultation with district and regional levels, and this led to better government recognition of the importance of traditional knowledge.
- India (Nayan): It is also important to monitor customary laws. They ensure the continuation of traditional knowledge and sustainable natural resource management, and that government respects the rights of communities in regard to traditional knowledge.

Conclusion: A community monitoring system linked to government first requires government recognition of the value of indigenous knowledge, otherwise it is unlikely to work. Intermediaries such as universities can help build government recognition; this is an ongoing process in Taiwan. Community forest management can also enhance recognition of traditional knowledge (as in Kyrgyzstan). It may be possible to introduce such a system in countries where the government already takes into account local knowledge through village planning (as in Tajikistan), or recognises the role of communities in natural resource management / ICCAs (as in the Philippines).

POTATO PARK EXCHANGE

The learning exchange was held in the Potato Park on 20–23 April 2017. It consisted of a walking workshop structured around four modules, each representing a key stage in establishing and implementing biocultural heritage landscapes or territories:

1. **Community planning**: mapping biocultural heritage assets and identifying biocultural products and services
2. **Assessment of biocultural landscape proposal, research and organisation of resources**: including governance structures and micro-enterprises
3. **Implementation of biocultural heritage territories/landscapes, transfer of knowledge and adoption**: eg repatriation, agroecology, micro-enterprises, community protocols, collective trademarks and collaboration with scientists
4. **Assessing progress and impacts**, and scaling up and out.

On the way to the Potato Park, participants stopped to see the terraces in Pisac. Alejandro Argumedo, INMIP Coordinator, explained that the ancient terraces have irrigation channels which make very wise use of water, the limiting factor for agriculture in this land. Traditionally, water was used in a sacred way. Crops were brought here to be adapted to different altitudes. On the other side a bird called *pisaca* is carved into the mountain; this bird was very dear to people. So agriculture and the sacred are very inter-connected – for the community, agriculture is a ritualistic practice. When corn came here we did not use it much for food but for rituals (corn beer or *chicha* is used for rituals, and there is a similar drink in the Eastern Himalayas called *chi*). This is rainfed agriculture; it rains only four months of the year. From May to November is the dry season, and planting starts in October (taking place in April, this event was at the end of the rainy season). The area used to be forested with Andean oak but was deforested by colonial loggers and miners. Archeologists have divided the area into different functions – production, ritual, and so on – but it was probably much more integrated.

Potato Park technicians introducing the Potato Park. Credit: Lucia Florez

This workshop started in the Amaru community with a ceremony called *Quintu*, which involves asking permission from the mountain gods and other elements so participants can be blessed for the day and so that Mother Earth (*Pachamama*) "can teach us well". This has to be done every day before the Potato Park farmers can start work. The Potato Park technicians[13] explained that they have developed a methodology for this learning exchange, and that the first topic is an interpretation of what we call the 'biocultural heritage' of the Potato Park.

13 The Potato Park technicians or *tecnicos* are indigenous farmers elected by each community to co-ordinate the Potato Park activities, with support from ANDES.

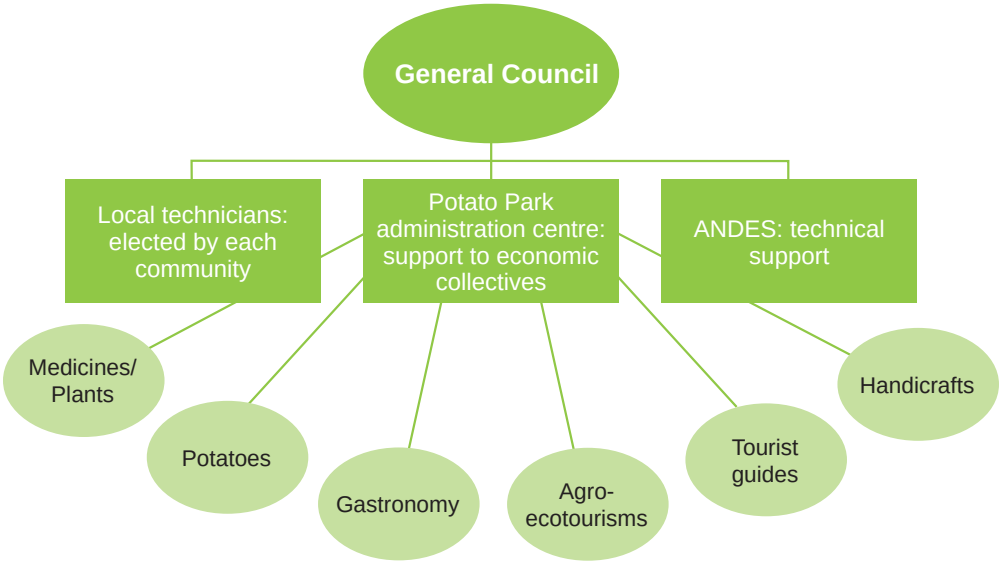
Module 1: Community planning

Biocultural heritage of the Potato Park: governance and ayllus

Aniseta from Sacaca community explained that the objective of this introductory session is to understand the space we are in, and how through it we can start to exchange knowledge and experiences. The Potato Park consists of six communities: Amaru, Paru Paru, Pampallanca, Chahuaytire, Cuyo Grande[14] and Sacaca. The total area of the Potato Park is 9,600 hectares, and its population is about 6,500 people. He said that it is not just about potatoes, it is all you can see – including our customs, because they are our memory, and all the sacred mountains and wildlife and types of food we prepare, and us – everything it contains is what we call the biocultural heritage of the Potato Park.

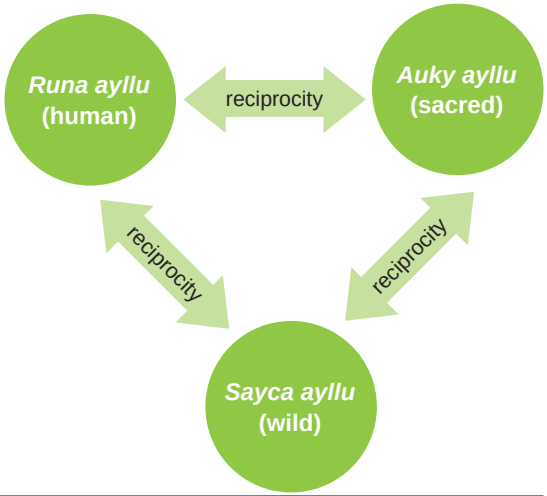
How are we organised? The first level of organisation is how communities govern themselves. Then comes the Potato Park General Council which brings together the six communities. Each community head or president is a member of the council. The association and council have an administration centre. The Park is managed in an autonomous way.

Figure 1. The Potato Park governance structure



This is not a new way of organising. It follows an old type of spatial management called the *ayllu*. In the Potato Park we have three big communities or *ayllus*: the people and everything that lives with humans, including domesticated crops, animals and water (*runa ayllu*); the community of the sacred (*auky ayllu*); and the community of the wild (*sayca ayllu*), which includes wild animals, plants and medicinal plants. The *auky ayllu* includes the sacred mountains – one mountain has been elected as 'mayor' (ie head of the whole land) then there is a female *apu* or mountain god that looks like a woman. When crops change colour this mountain looks like woven fabric, so people plant crops there for weaving.

Figure 2. The three ayllus: Andean worldview



14 Cuyo Grande is the most developed and is currently 'resting', ie not taking part in the Potato Park Association.

To manage ourselves as a community of humans we have an inter-community agreement to ensure equitable benefit-sharing. The other *apus* (mountains) are councillors of water, medicinal plants and so on, and they live like an *ayllu* – it is their laws we have to follow because they are older than humans, and because our customary laws are based on how these 'big heads' think. Our inter-community agreement simply follows those laws. The two biggest *apus* are male and female; they are married. Family is important, and families have to have long-term relationships in the community. If the three *ayllu* communities lived separately, it would not work. There is one element that glues the three communities together, called *ayni*, which means reciprocity. For the three communities to live together in harmony, we have to have sacred reciprocity as a principle.

Our brother asked the *apus* for a good day – that is the way we reciprocate with the mountains, and when you do agriculture, you have to give offerings so that the land can reward your work in a plentiful way. We have a responsibility to take care of the wildlife and wild trees and other wild species because if we deplete these resources this reciprocity would not work, and we would not have agriculture, food or water. The wild species provide us with indicators, like flowers, or the howl of the wolf (the sign that the frost is coming) so we depend on them deeply for our agriculture – not only forecasting for the next week, but even for the next year. We also use the sky for this. Good living only happens if there is harmony between the three *ayllus*. When there is a good relationship between them we get *sumaq causay*, which means 'holistic living' (ie wellbeing). The most sacred element of all of this is the *Pachamama*, and we have all the stellar elements from the sun to the moon and the stars that we call *hanan pacha* (the upper world), *kay pacha* (this world), and *uku pacha* (the under world). This is the way we see our world and how we want to keep it. We know that outside there are strong forces that try to erode our way of thinking – it is humans that are destroying it, with wars, climate change and other elements that are attacking it. There are three main challenges to our worldview: transgenic crops, bio piracy and climate change.

This way of organising the three *ayllus* is very old, handed down from our great-great-grandfathers. It is very much alive in many communities, but they do not use it to organise their space as we are doing here. We are not doing this just for today, but for past and future generations also. We think this is the way to get organised for the future. Our hope is that other communities in Peru and other countries can also join in a movement so we can manage our landscapes in a sustainable and holistic way. In Lares, other communities are organising their territory in this way.

This is the framework for our learning exchange. We would now like to ask each country or community how they organise their space – what are their three *ayllus*? This is the first step in planning to establish a biocultural heritage territory. We want to use the three *ayllus* to frame our discussion. Each group will walk slowly down the hill and do a resource mapping exercise while walking – the idea is to be inspired by the Potato Park landscape but to draw the three *ayllus* of your own community, the sacred, wild and human elements. Each group will draw the type of resources they have in each *ayllu* and will then present their map.

The biocultural heritage of the visiting communities

Philippines: We believe that God has spirits designed to manage the land for people: a spirit assigned to manage agriculture, a spirit of water, a spirit of land, a spirit of honey bees, a spirit of the forest, and a very high spirit which looks at people's situation and inspires the tribal leaders to manage their communities well. These spirits guide our relationship with the environment.

Higaonon tribe biocultural heritage map, the Philippines. Credit: Lucia Florez

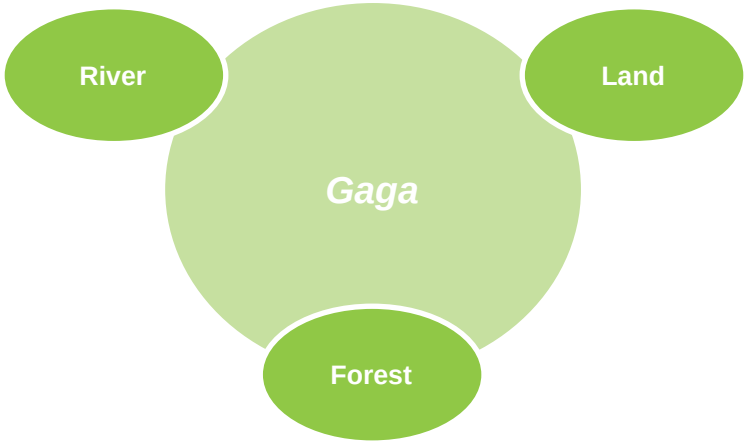
Kenya: Taita community (1,600–2,000 metres above sea level): We are well-connected to the natural forest and the environment – these are all part of our culture. We face farming problems with climate change – a borer pest is affecting the maize and going up and up in altitude. We have a cultural centre to promote culture and environment, and our community is also a catchment for seven rivers. Elders are farmers in the Taita mountains – there are 68 hills with a rich diversity of crops, animals and wild plants, and they have a water source for irrigation and domestic use. The challenge is degradation of the ecosystem and now the community has difficulties getting water. So we are working with the county government to conserve the landscape, and through the cultural village we have several initiatives for conservation and agriculture. We have our own dialect, prepare traditional foods and have traditional dances; we grow cassava, millet, cowpeas, yams and sweet potatoes.

Kyrgyzstan: Our grandparents lived in harmony with nature. They respected the landscape, resources, animals and so on. In these modern times we have problems because society has become more modernised, and because of globalisation. But even now in rural areas, villages have respect for the mother land and pray for it and to birds and animals, and pray that the harvest will cover their needs. We are a mountain country, and mountain ecosystems play an important role in the sustainable use of pasture, forest resources and the sustainable development of communities.

Bhutan: Like the Potato Park, we have a similar practice of respecting mountains, trees, lakes and rivers in our communities. Communities and provinces have their own deities. Such tradition contributes to the conservation and sustainable use of our natural resources. Plans and development programmes at every level are guided by our development philosophy of 'gross national happiness'. This is supported by four pillars that include the **preservation and promotion of our culture** and **conservation of the environment**, which is in harmony with the idea of biocultural heritage landscapes. But we do not have communities linking together – that is one lesson we will take from this exchange. Similar support from the organisers and donors would further strengthen our conservation efforts and help us in establishing resilient biocultural heritage landscapes.

Taiwan: The customary law of the Tayal community is called *gaga* – it defines and decides how we should use land, rivers and forests. *Gaga* is carried out at the level of the extended family. Tayal people believe that if you follow *gaga*, you will be able to cross over a rainbow bridge after you die and join the virtuous Tayal ancestors in the other world. The Kanakanavu community is only 500 people. Our river is very important, especially for female gods – if you see the river you know where your ancestors passed. The river was protected and managed by the whole extended family. Once you see changes in the river, you know something has happened, and the family has a responsibility to find out what happened. Through the river you see the balance or imbalance between humans and ecosystems.

Figure 3. Gaga: customary law of the Tayal community in Taiwan



India, Eastern Himalayas: We are from the Lepcha community. Binumit Lepcha: we believe in mountain gods and worship Mount Kanchenjunga – she is mother god. We have rituals and deities and worship mountains, caves, rivers, plants, animals and forests. We believe the Lepcha come from the mountain god, that their forefathers are the mountains and that their mother is Kanchenjunga. So

she gives all the water, climate, rivers and food to the Lepcha community, and everything they need. So our survival is only thanks to the mountain. Water comes from the sacred Mount Kanchenjunga and to the villages so we worship the rivers. Once a year we have a ceremony to worship the rivers. When we plant a seed, we worship the seed and after harvesting we worship. There are many caves and we believe the cave gods protect the community.

Lepcha Community biocultural heritage map, Eastern Himalayas, India. Credit: Lucia Florez

Thailand – Karen. We want to talk about how we live with nature. We also believe that mountains, water and everything has a spirit. There is a poem passed down through generations: if we live with water, we need to take care of water, and if we live with the forest we need to take care of the forest. We pass on this knowledge through a poem. There is a poem that if a monkey dies in the forest, there will be silence for seven forests, and if one big horn bird dies, the seven bayan trees will be sad. Another saying our elders said before they died is that we have to protect taro seeds, yam seeds and at least 30 varieties of seeds, so that even if famine comes, we will not die.

China: Our traditional Naxi dress represents the moon and the stars. It shows the virtue of Naxi women – at the back you can see seven stars – because normally Naxi women go to the field to work while the stars are still out and go home when they are out again. Another element is their hat, which represents the moon – so they carry the moon and the stars. Naxi people share a very similar cultural philosophy to the Potato Park. We also have three realms: one for the holy gods; one for nature; and one for humans. We do not put the three together like the Potato Park, but as a triangle, and the relationship between them is very important.

Papua New Guinea: The Potato Park is an eye-opener for us. Back home it is similar to what has been said so far. Humans have a close connection with their culture, the spiritual world and with nature. We have many different cultures that identify themselves with plants, mountains, crops and so on. But now they believe more in God. We are still in touch with nature through our interaction with wildlife. Farmers see special kinds of birds so they can prepare for farming – for example, so they know that the long dry season is coming. Sometimes they go and see where the sun rises, and when it rises at a certain angle they know the rain is coming, because they can see the tilting of the earth. Some of our cultures are dying because people want to embrace modern development. As mountain peoples, we want to learn how to keep our culture and our links with nature.

Tajikistan: We are from three communities living in high mountains: Wakhon, Shughnon and Rasht. High in the mountains, indigenous peoples usually live in harmony with nature as in ancient times. The Arian, Zoorastrian and Sufi all keep conversing with nature. We call this region the culture of pluralism, as many communities live in harmony. A key element from very ancient times is the popular solar calendar which shows the harmony between the people, nature and culture. When we sow in spring, we

do it with music and dancing. Before breaking the land, we make an offering and put oil on the horns of bulls, and this symbolises the harmony between people, animals and culture.

Apurimac region, Peru: Introduction by Alejandro Argumedo**:** Six hundred years ago, this area was part of the pre-Inca Wari people. They disintegrated because of a big El Niño event, but after El Niño, the Incas flourished. But then the Chanca came from Apurimac and there was a war with the Incas, and the Incas won and then expanded. As that happened at a time of El Niño we call it *Pachacuti*. So we Quechua people from Cusco and Apurimac are all brothers; we visit each other and the history of our people is very connected.

Apurimac community representative: We are very worried about the population in our area, so we have identified our mountain gods and native medicinal plants in the mountains, and that is what takes care of us. '*Apurimac'* means 'the god that speaks loudly'. In the mid-altitude zone we also have beans, potatoes and the same plants as here. To start sowing we wait until the full moon – you cannot sow under any other moon. If the moon is a bit inclined, it means there will be more rain, if it is straight, the rain will pass. When a rainbow is a bit dark, it means the rains will continue; when it is bright, the rains will pass. If thunder is very strong, the rains will pass; but if it is faint, the rain will continue. We have fruit trees in the low-altitude areas. Thanks to our regional government we have a reforestation project for carbon capture, which we hope will help many countries through climate change mitigation. What we are lacking is a way to organise ourselves as has been done in this community. We have sacred sites and archeological sites, but young people do not respect them. We have condors and many *vicuña*. Cutting trees is prohibited, especially native trees, which are medicinal. By law there is a fine of 40,000 soles (about USD12,500). We all represent different Quechua communities, but have similar customs, as we are also descendants of the Incas. We thank our brothers from other countries and welcome you to Apurimac – we hope we can visit your lands one day.

Presenting the community maps

Taita community, Kenya: The main features of our community are two national parks, a number of forested hills which serve as water catchments for that community, two rivers coming from two hills that serve the community, and one river from Tanzania. The area includes three or four towns and the Indian ocean. There is one sacred forest and sacred caves.

Megabo farming village, Papua New Guinea: The community has untouched virgin forest and a river with settlements along its banks.

Thailand: We grow coffee for income and have a community forest and two main rivers. We have a sacred site called 'Dei paw thu' (umbilical cord trees) forest. When a baby is born in the community, the umbilical cord is cut and put in bamboo and wrapped around a tree. That tree cannot be cut because our spirit is in the tree.

Taiwan: We have fish. We have *gaga* (customary law) and the most important part of that is *Utux*, which is the spirit of the whole world.

Tajikistan, Jafr: We have an apple park with fruit trees, medicinal plants and a sacred tree, and a separate area where we cultivate potatoes and so on.

India: We have the Kanchenjunga mountain, and the Neoran Valley, which is the second biodiversity hotspot in that area.

Philippines: We have spirits of weaving, blacksmith, agriculture, soil, forests and so on.

Apurimac: We have fruit trees.

Bhutan, Chamkharr community: We have a community forest and mountains. We pray to a big tree for the wellbeing of the community and for a good crop harvest.

Kyrgyzstan: We have high mountains and one sacred mountain, and villagers pray to it and carry out ritual traditions before they start farming. There are also sacred lakes – one is called Kulpun Ata Lake. People who want to name a child go and pray there.

Potato Park: This is how we relate to the land – we divide the mountain into the upper part, middle part and lower part. We also use an old Inca diagram (*Santa Cruz Pachacuti*) which reflects our worldview – it has the female side on the left, the male side on the right, the stars, sun and moon.

Potato Park community biocultural heritage map. Credit: Lucia Florez

The gastronomy collective, Chahuaytire community

Members of the women's gastronomy collective, community of Chahuaytire, Potato Park. Credit: Lucia Florez

After a highly diverse and delicious lunch at the Papamanca traditional restaurant, the women's gastronomy collective explained that they have formed their co-operative with members from each community of the Potato Park. They said that all the food consumed today was produced in these communities – nothing comes from outside. They have learnt from their sisters who work on medicinal plants, so they try to provide food that is healthy, including 'health foods'. Their cooking is not only for the stomach but also for the spirit, because in their tradition crops are 'hot' or 'cold', and they try to balance the two. The money they make here is based on the inter-community agreement, so they have to give ten per cent to the Potato Park fund. The money they make is for their family, but also gives them freedom to have some money they can use how they want. They have members from four communities and their own management body.

Module 2: Assessing biocultural landscape proposal

The module focused on **assessing the biocultural heritage proposal, research and organisation of resources**, including governance and micro-enterprises. It took place in the Sacaca community, the smallest, most central community where the park's administration centre is located – known as the heart of the Potato Park. As in all the communities, it has a lower altitude zone where grains are grown, a middle zone where quinoa, machua and oca are grown, and an upper zone for potatoes.

Baseline research and micro-enterprises

Walter Quispe, Potato Park technician: We create a baseline through participatory community mapping to identify the resources we have in each *ayllu*, as we did this morning. By identifying those resources by altitudinal range, we can see if crops are moving up. With global warming many crops are moving higher – mapping helps us see if crops are moving up each year. We went through a detailed mapping process in the Potato Park. Mapping also allows us to understand if there are more people or less, if the land is becoming smaller or if there is land that is unused. For example, in the *auky ayllu* (sacred), we have mapped what kind of plants we have for offerings – that is very important for us. But in doing this map, we also see if there is any depletion of resources (ie loss of medicinal plants) in the mountains. So we have mapped for trends over the last 30 years and asked our elders to look at them to see if our generation is doing okay. These maps allow us to monitor trends, gather information to see if we are losing species and crops and use it for planning responses.

Session on baseline research and micro-enterprises, Sacaca Community. Credit: Lucia Florez

How do we organise the information after completing the baseline to establish community enterprises? For medicinal plants, after mapping we first brought all the medicinal plants here. We also brought together the elders, female and male experts in medicinal plants, to see if the younger generation are still using the plants. Then we developed a register of those medicinal plants. To do the biodiversity registers, we worked with Dalit women from India because they have experience of community registers and it is easier to work among women. We developed a large matrix and analysed the medicinal plants and their uses – stems, roots, leaves. This biodiversity register was used not only to understand the value of our medicinal plants but also to protect our knowledge about their uses from misappropriation by outsiders.

Women's medicinal plant collective: We then did more capacity building on how to use the medicinal plants, working with ANDES. Based on the information, we decided we could process the medicinal plants and use them differently. After training, we are now producing shampoos, soaps (eg honey and herb soap), herbal teas and creams, and we formed a **micro-enterprise**. The members are women from each Potato Park community. The profits are divided up in three ways. We contribute ten per cent to the Potato Park fund, and those funds are divided equally among the communities at the end of the year (according to the principles set out in the inter-community agreement). The remaining 90 per cent is used for buying materials to produce all the products, and the rest is divided among the women who work in the collective. We have already got sanitary registration for different types of teas so we can sell them outside the park. We have some requests from hotels so we sell directly to them, and we do marketing through fairs. We also sell a large part through the ecotourism that comes to the Potato Park. We are now passing on our experience to other communities, such as the Maize Park in Lares, where we are working with women to help set up micro-enterprises.

The medicinal plants can either be used directly, or if processed we can rub them on using creams, and mix them with other medicinal plants to make them more effective – eg one plant can be used for treating infections, and for animals if they fracture their feet. In ANDES there are people from different parts of Peru who can help us sell our products in different markets. But our main objective at the moment is not to export – we prefer to sell high-value products rather than exporting in large quantities, as producing teas, crafts and so on is only one of our occupations, alongside farming.

Women's Medicinal Plants Collective, Potato Park. Credit: Lucia Florez

The Potato Park's inter-community agreement and collective trademark

Mariano Sutta, Potato Park technician: You cannot do anything if you are not organised. The Potato Park communities started to negotiate among themselves in 1998. So it has been a long journey and a slow one because we had to get together from the heart, rather than because of immediate needs. Before then, each community was on its own and did not care about collaborating with other communities. Since 1998, the communities decided to come together. They now have their own way of documenting the Inter-Community Assembly that governs the park. The President of the Association of Potato Park communities changes every two years. We had to develop an inter-community agreement which establishes all the rules on how the communities interact, based on customary laws. There is a way of ranking the participation of communities in the Potato Park – if a community does not follow

Mariano Sutta explains the importance of the Potato Park's informal trademark. Credit: Lucia Florez

the agreements of the Potato Park, they receive fewer points and fewer benefits when the Potato Park community funds are shared at the end of each year (this fund is made up of ten per cent of the income from the parks' micro-enterprises). We have done much more work together in the last 15 years and every time we are getting stronger. The Potato Park community technicians/researchers are chosen by all members of the community because of their knowledge. For any activity we do, we have to go back to our communities and inform them about what has happened at a monthly meeting.

We have developed a collective Potato Park trademark for all Potato Park products. All the park's micro-enterprises use this collective trademark and contribute to the Potato Park's trust fund. To develop new products, we have to develop biocultural innovations to link old ways of doing things with new ways. This collective trademark also serves to unite the communities, and has become part of our collective governance. We also analyse government policies and laws so we can be aware of what's happening.

To organise ourselves to set up micro-enterprises, we first had to understand better how the different members in the community and outside their community interact – what their customary laws are. We did research on customary laws in the Potato Park communities with ANDES. Once you know how people interact, you know how they use medicinal plants, and depending on how they use medicinal plants, you will know how they make decisions. This resulted in our Inter-Community Agreement which regulates how the communities interact and how they share benefits.

The Philippine's NTFP Exchange Programme

Genevieve Labadan: Our organisation is called the NTFP Exchange Programme. NTFPs – or Non-Timber Forest Products - are biological materials extracted from forests for human use. We do this to help communities preserve forests so they do not engage in palm oil plantations and mining. We do product scanning with the communities, especially with those who know about the resources in their territory. Then we list all the resources and decide which ones to use to develop products based on certain criteria, eg: distance from the community, regeneration rate, cultural significance (for instance, it may be taboo to use or develop a resource), and ecological significance. We then identify the top five products. Before developing them into full-scale products we carry out market research. We have developed natural fibres, dyes, essential oils, handicrafts and resins. We develop products from the Almasiga tree, and forest honey (we are the first honey network in the Philippines).

Module 3: Implementing biocultural landscapes

Seed multiplication and traditional knowledge in the Potato Park

Module 3 focused on **implementation of biocultural landscapes, transfer of knowledge and adoption**. It started in the community of Paru Paru, with a visit to greenhouses with potato seedlings. There are 1,367 different varieties of potato in the Potato Park – the highest level of *in situ* potato diversity in the world. Why do we keep this high diversity? It is for our children and future generations for adaptation to climate change. We are multiplying seeds from 24 varieties of coloured potato that have high anti-oxidant properties. These potatoes have high iron content which is good for children and combatting malnutrition. Our seed micro-enterprise will work on the principle of *ayni* (reciprocity) – so we are multiplying seeds for distribution. The technology we use in the greenhouses is sandponic, where seeds are grown in sand rather than earth, to avoid disease. The sand has been cleaned, so we avoid the diseases and pests that are in the soil now. With climate change all pests and diseases are moving to higher altitudes, so there are not many places where you can find clean soil. These greenhouses allow us to avoid contamination to provide clean seeds.

We try not to use chemical fertilisers so we can multiply the potatoes in an organic way. We are trying to link traditional knowledge with science, working more closely with scientists. We are building a traditional knowledge centre especially to encourage the youth to be involved in traditional knowledge transmission – it is still under construction but we hope it will host future exchanges.

Taiwan: We use fire or coal to kill bacteria in the soil.

Developing baskets of biocultural products and services

By a high-altitude lake, each community presented the biocultural products that they would like to develop, or have developed, based on the biocultural resource maps they prepared on Day 1.

Taiwan – two communities: The first community (Tayal) identified two products:

1. Traditional medicinal plants, which they could use to stuff chickens – tourists would have to stay to eat the chicken as they cannot take it home;
2. Mushrooms, collected from the forest from natural growth, and using parts of cut trees to grow mushrooms.

The second community is Kanakanavu in the south of Taiwan. Several years ago we recovered women's fields and lost practices. These women's fields are called *Usuru,* where traditional plants are grown. We developed micro-enterprises using these fields to grow plants to make medicinal bread. We are going to work with the other community group to establish a micro-enterprise for bread made with medicinal plants. The effects would be:

1. Maintaining the elders' traditional knowledge;
2. Generating revenue; and
3. Attracting visitors.

Tajikistan: The first product we can use to develop enterprises is the local apple, because it is very high quality and demand in the market is increasing – we can support this process. The second is medicinal plants. These are also very important and we can process them for the market. The third are agricultural products like vegetables. We also have livestock that could be used.

China, Stone Village: We have come up with five products:

1. Walnut oil, because there are quite a few wild walnut trees that we have used to produce oil for cooking for centuries.
2. We produce very high quality traditional ham which was recognised by Slow Food.
3. We grow geraniums for making essential oils.
4. We have learnt how to mix geranium oil with bees wax to make lip balm.
5. We grow traditional and PPB waxy maize to make flour.

Naxi women from China present their biocultural resource map, Paru Paru Community, Potato Park. Credit: Lucia Florez

India, Eastern Himalayas: We are establishing community tourism as we are next to a national park. The community is switching to cardamom as a cash crop. We are growing traditional crops like millet and buckwheat to make bread. We conserve 35 varieties of bean and four wild relatives of bean. We are establishing a community seed bank. We are setting up a Bean Park and a micro-enterprise for women so we are very grateful to learn from the Potato Park.

The Philippines: Our territory is 80 per cent forest. The one abundant resource we have chosen is abaca cloth. Abaca is a shade-loving tree related to the banana, traditionally used for weaving. It is very important for the Higaonon tribe – they use it for weddings, gifts, and rituals. If a person has done wrong, they can redeem themselves by providing abaca-woven cloth to the person or family that has been wronged. Abaca's scientific name is *Musa textiles*.

Bhutan: Our community representative is from Bumthang, central Bhutan. The staple food crop of the community is buckwheat, which was almost replaced by potatoes a few years ago. Our centre has intervened to revive and promote buckwheat again through community group mobilisation. The group has revived buckwheat cultivation in our fields and collected and conserved it in the community seed bank. The farmer group develops various products out of buckwheat such as buckwheat flour, cakes, cookies and so on. The group has also initiated producing wild strawberry jam. Such group initiatives help to generate cash to sustain the group. The group is looking forward to producing local green tea from one of the herbs identified in the locality. The farmers have been inspired by the Potato Park to create a trademark/logo for their products.

Papua New Guinea: PNG is an island in the South Pacific**.** It is biologically and culturally diverse, from the coast to the mountains. We have many micro-enterprises. These products are typical of the highland areas, which are still intact with forests. From the forest we have a wide variety of mushrooms, and the best honey in the world. We farm trout in the mountain waterfalls. We are starting to develop medicinal plant-based products and ecotourism.

Kyrgyzstan: We have rich biodiversity in our wild walnut forest. These forests are important as they produce water for our country and other countries like Tajikistan and Kazakhstan. Our wild walnut forest generates income from walnut wood, and walnut products that we export. We are establishing micro-enterprises to process walnut and apple products. We also have medicinal plants.

Kenya, Taita: We have hilly forests with a rich diversity of medicinal plants – therefore medicinal plants are one of the products that the community is going to develop and add value to for the market. The community also cultivates a lot of cassava – we can use it to make flour, bread, cakes and chapatis. Within the forest, we have climbers and tree species that are used for weaving (baskets and mats).

The hills have good clay soil to make cooking pots. We also have some wood species which are good for carving to make serving spoons, masks, hats and carpets. The group is also engaged in cultural tourism as it has a cultural village.

Apurimac (Peru): As we are Andean, we also divide our land into high, middle and low altitude zones. We have a river system that comes from glaciers in the mountains, and have extensive wildlife. We are 266 communities, so we plan to reforest the whole area with 260 million trees. We are harvesting mushrooms and we want to introduce a dairy industry as the land is suitable for that. We want to have a micro-enterprise for making pencils as one of the forest by-products.

Thailand: The products we have are from community forests and rotational farming:

1. Wild bees from community forests – they make soap with honey to sell to customers and restaurants
2. A spice mixed with chilli
3. Local tea (or Assam tea) leaves from the community forests
4. Shaded coffee beans from the forest around the village
5. A local medicinal herbal tea

- We also hold training workshops for students in the forest, or 'educational exposure trips', on rotational farming.

Potato Park: We have three new ideas:

1. We are establishing a community seed enterprise.
2. We have potatoes with high levels of anti-oxidants – we would like to use these to make bread to help with child nutrition problems. Making bread and flour are new ideas we are learning from others here.
3. We have highly coloured potatoes from which you can extract dyes, so we are hoping we can use them to make beauty products like make-up.

Agroecology and Potato Park's work with scientists for climate adaptation

At another high-altitude lake (about 4,200–4,300 metres above sea level), **Walter Quispe** from the Potato Park explained that the potatoes are moving up in the landscape. They are now growing at 4,500masl – the highest in the world, because of climate change. This site is called Pacu Plain (*pacu* are the tiny needles on the ground). All the potatoes in this area are those from the Park's collection that are planted every year. We have a rotational farming system – we move all the potatoes that we have every seven years from site to site (this site is one valley), because the land gets poor. We have to let the land recover so that when we come back in seven years we will have a good harvest.

Walter Quispe, Potato Park Technician.
Credit: Lucia Florez

Another reason we move the potatoes is because potato cultivation is moving up to higher elevations with climate change causing an increase of pests and diseases in the soil, so we use the traditional practice of rotation for that too. If we talk to the elders they say that 30 years ago, potatoes would grow at 3,200 metres above sea level; but now those varieties do not grow below 3,400masl, while others now grow as high as 4200masl. Climate change makes us sad because the higher you go the more rocky it gets; and you cannot go any higher. These potato

varieties are unique, providing genes for other potatoes – but as they are growing at higher and higher altitudes, we will lose them. We are working with scientists to keep these potatoes here or bring them down to lower altitudes.

Pedro Condori Quispe explained that the rectangular area covered with a plastic tunnel is a monitoring station. There are five of these stations in the park, at different elevations with different plots. This is the third one, at 4,300 metres above sea level – we have two more higher up. This research is based on establishing a transect every 100 metres, and we do it collaboratively with CIP, ANDES and the local researchers (*tecnicos*) in the Park. We have just had the first results, identifying the best varieties at different altitudes. There are 18 varieties with high tolerance to frost and drought. We are testing for frost resistance and other variables that farmers in the Potato Park are interested in, and we will then multiply the seeds of the best ones. In this trial plot, there are five rows of different varieties, and for each one they are monitoring how they react to the addition of calcium carbonate to the soil. The trial plots also have traps for pests (eg flies) which are counted every week so they can learn about their population dynamics and see how high insects can go. One of the pests we have is the Andean weevil, so we have special traps for them to see how many there are. We also have devices that measure temperature, rainfall, relative humidity and ultra-violet radiation.

We are using plastic as integrated pest management to try to stop the Andean weevil from going into the fields. We also use pheromones to attract the males into the traps and analyse the results with CIP to develop this organic pest control method. Our work shows the importance of collaborating with scientists, because what we do here would be impossible without that – we have to work together with respect so we can develop responses for the future. In order not to lose varieties we are doing participatory plant breeding with scientists. To work with scientists you first have to prepare a database or collection of what traditional knowledge you have so you can start from a strong basis. But any collaboration with scientists has to have a protocol. So we have an inter-community agreement that regulates how to research respectfully, to ensure that the research supports our work and benefits the farmers. If some rotation sites are at lower altitudes, we may lose seeds/varieties, so we sent the whole Potato Park collection to the Svalbard Seed Vault in Norway last year – 700 varieties, according to scientific classification.

Pedro Condori, Potato Park technician, explains potato trials to INMIP participants. Credit: Lucia Florez

Questions and answers

Q. If CIP and ANDES leave, would you be able to continue this work alone?
A. Yes, we feel confident and well-trained and we can work alone. We have been trained for more than 18 years so we are capable – we feel like professionals.

Q. What measures are you taking to avoid soil erosion on steep slopes?
A. As you can see, we plant in vertical and horizontal rows, so that avoids erosion, and we are building slow-forming terraces. We do not plant trees because they do not grow at this altitude and we do not want to take land away from potatoes. We would rather plant trees around lakes to conserve water.

Q. Why is it called 'Potato Park' and why are you keeping such a large variety of potatoes?
A. **Lino Mamani** explained: we not only have the highest diversity of potato, we also have potato wild relatives. To be a park it also has to be a gene reserve – it should have a large diversity of crops and wild relatives. When we started the work in the Potato Park, we first did a local collection of potatoes and counted 678 varieties (using traditional classification). To increase the diversity of potatoes we formed an association of Potato Park communities and went to CIP and asked for the repatriation of potatoes that used to grow here. So we have increased the diversity little by little with potatoes from CIP and other donations. We have brought more than 450 potato varieties from CIP. We have signed two agreements with CIP, the first in 2004. We got the potatoes back as *in vitro* seedlings and learnt how to multiply them and produce clean seeds. We are not interested in producing large volumes and selling large volumes, but in the quality of the product and the diversity of potatoes. When we produce communally, all the produce is shared. The potatoes are being distributed to other communities as we do not feel we are their owners, so that is one big benefit of the Park. If the potatoes are good and resistant, they are shared with other communities in the Cusco area and in another park in Lares. We do not only keep tubers – we have learnt to commercialise the botanical seeds, so this can help us to set up a community seed enterprise. This is not to make a 'quick buck' but also for the future. Our first objective is to have food sovereignty – ie the right to choose what we plant, what we eat, and what we sell.

INMIP participants learn about different types of potato.
Credit: Lucia Florez

Q. Do potatoes at the top of the mountain have the same productivity as the lower ones?
A. No, there is a wide diversity of soils in the Potato Park – black, red and yellow. We know that black soils are very good, so we plant certain varieties in those soils, and we use natural fertilisers in soils that are not that fertile. If we keep coloured potatoes at lower altitudes they lose their colour.

Q. Are there wild animals that damage crops?
A. There are high-altitude deer that like only one type of potato so we plant that variety for the deer to eat.

Q. In Taiwan it is hard to imagine doing this rotation as we have private land in the way.
A. In the Potato Park, we have communally owned land with a land title. We have a national law that gives us rights over communal land, so there is no private property in this land. As potatoes move up, other crops do too, like oxalis, ollucos (tubers), wheat, barley and corn.

Q. What elevation has the weevil reached?
A. The highest elevation from the analysis of transect data is 4,100 metres above sea level. Above 4,150masl it is clean and we can safely plant our potatoes. Because of climate change, phytoptera and other pests and diseases are also moving up.

Potato wild relatives: establishing a genetic reserve

Eve Allen trains INMIP participants to collect baseline data on crop wild relatives. Credit: Lucia Florez

Eve Allen, a Fulbright-funded researcher working with ANDES, explained that the Potato Park is considered to be a secondary centre of origin of domesticated potatoes, where several wild species grow naturally among cultivated landrace varieties. The local farmers are aware that the presence of wild potatoes improves the resilience of their cultivated varieties. Crop wild relatives (CWR) are widely distributed throughout the Potato Park. Where we are now in Paru Paru community, overlooking Azul Cocha Lake, is one of the Potato Park's 'hotspots' containing high levels of intraspecific and interspecific cultivated and wild potato diversity. Eve is helping the Potato Park collect the necessary baseline data to establish a gene reserve. CWRs are vital – they are used for fuel, medicine, food and fodder and as a source of climate-adaptive traits, since they generally have higher levels of genetic diversity than domesticated populations. If healthy populations are maintained, it is probable that they can respond to climate change much faster than cultivated varieties. Thus, conserving CWRs within agroecosystems also maintains evolutionary processes that can generate novel genetic diversity for climate change mitigation and adaption. Two of the wild potato species known to occur in the Park are very closely related to domesticated species. They can be crossed with domesticated potatoes to produce offspring that have improved resistance to pests and frost, and tolerance to high temperatures and drought.

A genetic reserve is a landscape approach to managing the genetic diversity of wild populations. The Potato Park genetic reserve covers the whole landscape, especially the areas of higher elevation. The main objective is to maintain the level of genetic diversity in wild populations so they can keep evolving. Establishing a genetic reserve here is important as a centre of origin and diversity, where wild potatoes grow in proximity to cultivated potatoes and can transfer genes to domesticated varieties – this causes an ongoing evolution of the crop to create new varieties. Genetic diversity is conserved and new genetic diversity is created. This can be linked to a Participatory Evolutionary Plant Breeding programme so that farmers can facilitate a faster transfer of genes. This enables us to adapt to climate change; adaptation happens in the wild population and then the genes are passed on to cultivated populations.

To create our genetic reserve, we are starting by mapping using geographic information systems (GIS) – farmers collect information on the range and population density of crop wild relative populations, and the frequency with which cultivated potatoes are planted near wild potato populations. We are also doing laboratory analysis, for instance on germination potential, which helps get information about pollination and whether the populations of CWRs are viable sizes. We are also collecting information on the ancestral knowledge of farmers about CWRs. We find that farmers tolerate wild relatives growing near their cultivated fields because there is an awareness that CWR populations promote increased yield and resilience. CWRs are also used for rituals and for food in times of famine. Using ancestral knowledge and science, we are developing management plans for the genetic reserve. Populations of one wild potato species, *Solanum aucale*, are found in high densities where livestock graze. We thought this was because of manure. Shepherds have said that they see the wild potato seeds in animal droppings – so the animals are moving the CWRs, which is important. We are working with all five communities at high altitude to map hotspots of genetic diversity. Although the farmers' plots are only planted with potatoes, it is not mono-cropping, as they plant many different varieties of potato in each plot. We also have wild populations of oca, tarwai (lupins), mashua and passion fruit. The next step would be DNA analysis to find out more and use genetic markers.

Three wild potato species in the Potato Park – *Solanum bukasovii*, *Solanum acaule* and *Solanum raphanifolium* – grow naturally in a variety of environments. Wild relatives are used to make freeze-dried potatoes. Their leaves, flowers, size and so on are different to domesticated potatoes – wild potatoes are much smaller. The flowering time of CWR and domesticated potatoes overlap, but CWRs flower earlier. The farmers have planted potatoes in an animal corral (ie outdoor livestock pen) where CWRs also grow from seeds in the animals' dung. The CWRs spring up alongside the cultivated potatoes, and when there is a high number or frequency of wild potatoes, there is a high probability of crossing. Using handheld GISs, farmers collect the wild potatoes' co-ordinates.

Participants were shown wild relatives growing alongside domesticated potatoes in an animal corral at 4,161 metres above sea level. They were given a hand-held GIS and record sheet to collect the co-ordinates of wild potato plants in the corral as part of the training. They first had to record the date, community, location, climate conditions and what cultivated plants there are, and then collected spatial data on the number and frequency of wild potatoes at about ten points around the boundaries and at every 3–4 metres.

Seed management by the Potato Guardians collective (*Papa Arariwas*), Paru Paru

Representative of the Potato Guardians collective: We are in the Potato Park's Participatory Plant Breeding Centre in the Paru Paru community. This is a transfer area, where new potato varieties arrive and are treated before they go into the greenhouse. The parent materials are stored here so the whole Potato Park collection is here. We also have a small lab where *in vitro* seedlings arrive and are prepared before going to be multiplied. The greenhouse is divided into three areas: at the back we store the parent varieties, in the second area we multiply them, and then the seedlings go to a net-house and to the communities. Each community asks for the variety they like and then we distribute it. So the diversity is spread to all communities, not just kept in one place. This shows we are organised and are following a systematic process, but when potatoes go to the field, they are managed by the farmers. Each community has their own potato collection which they keep in tunnels.

Handicrafts collective – textiles, Pampallanca

Representative of the handicrafts collective: The handicrafts collective are mostly women and one man from different communities of the Potato Park. This is where we do our weaving and keep our shop, in the Pampallanca community. First we spin the alpaca wool. Then we make stronger strands to make yarn (ie wool), and dye the wool. We use plants to make different coloured dye. We use *cochinilla* (an insect) to make fuchsia and purple from bacteria and a cactus – this makes 7–10 colours in combination with different plants. Then we start weaving using a traditional weaving loom. The designs/symbols and icons on the woven products represent our environment, such as a frog, which is very friendly to the potato. One scarf takes two weeks to make. The group includes young girls and elders of almost 70 who teach the group. Children can learn to weave from 10–12 years.

Handicrafts Collective, Pampallanca community, Potato Park. Credit: Lucia Florez

The Potato Park's community seed bank, Pampallanca

Representative of Potato Guardians collective: The seeds we store here are not just for the Potato Park, but we also distribute them to other communities. We think a community seed enterprise will be our next micro-enterprise, to support our seed conservation work. We conserve both tubers and botanical seed. The seed bank building has water on the floor and low windows on two opposite sides, so the air flow keeps it cold at all times, without using electricity. Humidity is good for potato seeds – the building was designed with CIP. We have a potato "that makes the bride cry" because it is so knobbly and hard to peel – if a bride wants to marry she has to peel the potato without damaging it. Moraya is a dried potato that can be stored for 20 years – just add water when you want to eat it. Bucasori wild relative is the grandfather of *chuño* freeze-dried potatoes, the old way of preserving potatoes. The seed enterprise will focus on botanical seed. We have been trying to learn how to produce botanical seeds for three years. We can keep them for 50 years with the community seed bank. Yiching Song from China has offered to provide a freezer where we can keep them for 200 years.

How to make *chuño*? In June we get very cold weather, so after cooking we spread the potato on flat land where the frozen ground dries it. We do this once we see a certain bird and know the frost is coming. Then we stamp on the potato so the bitter part comes out, put it in the sun, and repeat this many times. Studies show that the Incas used to do this. The heart of some potatoes is dark, which indicates they have more strength (ie high in antioxidants), so we use them more as 'nutri-ceuticals'. This shows that keeping diversity also gives more options for micro-enterprises. We have put a rope around our potatoes on display here because it symbolises tying up the spirit of the potato – we have to keep the spirit inside so that the potatoes are better and stronger.

We have sent botanical seeds from our whole potato collection to the Svalbard Seed Vault. The Potato Park is an *in situ* conservation area which allows potatoes to evolve. The seeds sent to Svalbard have both scientific and Quechua names listed – it is a black box which can only be opened with the consent of the communities. The Potato Park Association has entered into two agreements directly: 1) with CIP for potato repatriation, and 2) with the Svalbard Seed Vault in Norway. Svalbard forms part of the Food and Agricultural Organization's multilateral system, so the Potato Park communities have put their seeds into this system for seed exchange.

Community Seed Bank, Pampallanca community, Potato Park. Credit: Lucia Florez

Module 4: Assessing progress and impacts

As methods for conducting research and collecting data had already been covered in previous modules, this module focused more on how to get government support for biocultural landscapes to promote scaling up through policy and scaling out to other areas. ANDES and the Potato Park are working with SERNANP, Peru's national protected areas authority, to see how biocultural heritage territories (BCHTs) could be implemented. Protected areas usually focus on wildlife, but biocultural territories include wild crops and wildlife, as well as domesticated varieties. Marcos Arenas talked about getting legal recognition at national level.

National recognition of biocultural heritage territories

Marco Arenas, Head of SERNANP

I am going to talk about how BCHTs can be applied and made practical in various ways. Traditionally, protected areas have been managed by the state; what we want to look at here is a different approach based on community participation. We want to see how community-level conservation can be linked to government conservation. So first we need to understand what community participation means, who the actors are and how they can be involved in decision making. Government protected areas are usually managed by one entity – the government – so community participation is difficult for governments and public authorities to understand. In the past, public policy worked through a top-down approach, but now the government vision is to collaborate with communities. How should that work? We have been discussing this with ANDES and the Potato Park to see how we can collaborate more closely so that the Potato Park can be managed by communities.

How can a BCHT be managed? We already use this model with Amazon communities:

1. Define a common objective: this is to conserve the potato in the landscape, and conserve the BCHT with the potato as the central theme.
2. Establish a plan of action and communication.
3. Define the geographical scope of the BCHT.

Then we need to define the key objectives of the territory or conservation area; and of the community. If the two objectives are the same, it is easy; if they do not completely overlap it is more difficult. We have identified a key objective of conserving genetic diversity, but that needs legal recognition. The BCHT also needs to generate benefits, such as through ecotourism, to achieve conservation. In this case, the community's objective is conservation through creating a genetic reserve, improving livelihoods and quality of life, and maintaining the cultural identity of local communities.

The model should also promote development in the district, province or region within the 'space' (ie biocultural landscape) with government involvement at every level and collaboration between the different actors. Three previous models for protected areas have not worked. First there were strictly protected islands with park guards (eg Yellowstone, 1870s); then protected areas with buffer zones around them (1950s and 60s); and then protected areas with 'best neighbours', eg no mining nearby (1990s). So now the vision is of 'regional development with spaces' – in other words, the protected area is integrated with the region's development.

Based on the idea of community conservation areas and the Potato Park, I propose the following approach for establishing BCHTs:

1. Establish the area/ territory and what you want to conserve (ie the physical basis for the model) – it is important to define the territory, as a community can only make decisions for its own territory; for the wider space, it needs to collaborate with others.
2. Establish a collective community organisation that can make decisions, like the Association of Potato Park communities.

3. You also need a wider network of allies so there are spaces for discussion and providing advice to the Potato Park, eg through the ANDES Board, students conducting research and CIP.
4. All this should be rooted in a management plan and instrument, eg minutes of community meetings or a 'life plan' that sets the rules for management.

The park can be labelled or managed in different ways to promote legal recognition – a gene reserve, BCHT, agrobiodiversity zone, or a co-managed protected area. Each one offers a legal framework. The Potato Park Association is fortunate to have the technical support of ANDES. The Association has:

- A space for decision making by consensus
- A governance structure
- Social legitimacy
- Legal security (ie it is legally registered)
- Co-management and co-responsibility.

Each community in the park is contributing to the Biodiversity Convention's Aichi Targets, which are national goals, especially Target 17. Usually governments only count national protected areas, but each community's conservation areas are contributing to their country's national goals and these community BCHTs may be much more effective than protected areas. Effective management requires planning to achieve the desired objectives. The Potato Park started negotiations between communities in 1998, with the actual park starting in 2000.

In the public sector we set a vision for 20 years ahead. For the Potato Park, the goal may be to get legal recognition as a BCHT, and the community would decide what they want from their BCHT; such as identifying resources to develop into products. Or they could identify a climate change-related problem and then come up with a plan and activity to address it. For instance, if there is not enough water, they could establish irrigation channels, small dams and micro-enterprises. Another example from the Potato Park is the increase in weevils due to climate warming – how to protect crops? One possible response is the work that Eve Allen is doing to establish a genetic reserve and conserve CWRs, which could enable us to find a weevil-resistant variety. Working with trust, we can do a lot – perhaps the Potato Park should trust the public sector a bit more.

Co-management defines the roles of state and community. In the Potato Park, the community has organised itself, showing the state how it manages biodiversity and what kind of support it needs. The state is open to consensual decision making. Under the statutes of the Potato Park, rules are established – so the Potato Park is starting to play a state role. The community has the capacity to impose sanctions – so the state works with the community to sanction. The state needs to take the model that works and give it legal recognition and protection.

The Potato Park is also an example of EbA, since its potato varieties have genetic diversity that could help if there is a threat to food security, such as potato blight – the Park may have genes that are resistant to the disease. Similarly, if forests had been conserved or reforested, impacts of El Niño in Peru like flooding and landslides would have been much less severe.

Alejandro Argumedo, ANDES

There is no co-management of the Potato Park; it is at discussion stage only, because the community is concerned about mining. At the moment, we are simply exploring different models of co-management and getting legal recognition. Currently, the responsibility for managing the Potato Park rests with the Potato Park Association (with technical support from ANDES) – but the Ministry of Environment is talking to the Ministry of Culture and the Ministry of Agriculture to try and give it legal security. The challenge is to get BCHTs recognised by governments so that their holistic approach to managing landscapes – the wild, sacred and human spheres – can be protected as a whole, rather than separately, which means getting recognition under different laws.

Questions and answers

Q. Over-development of tourism is influencing cultures – are you concerned? How will you limit tourism?
A. Alejandro explained that the objectives of the area need to remain clear, otherwise they could turn into 'Disneyland', as has happened in a few cases. It is very important to ensure that there is not a high level of tourism that can affect cultural identity – this needs to be ensured through the development of a life plan or management plan by the communities. In this case, the objective for using the space is biocultural heritage, so we will keep a holistic view and balance.

Q. Almost 76 per cent of the Apurimac region is under mining concessions. How can we organise ourselves if the mining companies have already taken control of our biodiversity?
A. This is a problem across the Andes. The Potato Park model ensures that communities are organised, but when communities are not well-organised it is easier to create a fracture, when one community engages in mining. This problem is not only in BCHTs but also in or around many protected areas, because we did not have an integrated sustainable development vision for the region. That breaks up the vital connectivity in the landscape. In a lot of cases in Peru, the old Inca routes that connected people, seeds and animals have been disrupted by mining. As the public sector, there are two responses:

1. All mining projects must have an environmental impact assessment to find out whether they are viable.
2. Companies need to ensure they have social license to operate – this means consultation and the prior consent of communities within the framework of International Labor Organization Convention 169, since Peru has a law on prior informed consent. However, communities must be legally recognised for this law to apply. If the community has a life plan they can sit down with the government and say, "This is our vision and it does not include mining". When communities do not have a unified vision or plan, it is easier for mining companies to enter.

Participants' syntheses of the workshop

Rather than a facilitator providing a summary of the workshop, community participants were asked to provide a synthesis of what they had learned and what was important for them for each of the four modules or steps for establishing BCHTs:

1. Community planning
2. Assessment of biocultural landscape proposal, research and organisation of resources
3. Implementation of BCHTs/ landscapes, transfer of knowledge and adoption
4. Assessing progress and impacts

As a key objective of the exchange was to learn about methods and tools for BCHTs, the INMIP Coordinator, Alejandro Argumedo, suggested that the results of the synthesis could provide the basis for building a contents list for a practical handbook or manual on BCHTs. The INMIP website will have a communication portal for network members – an annotated contents list could be posted on the portal and developed further at the next INMIP meeting. In this way all INMIP members would be authors of the manual and have ownership of it. Participants welcomed the idea. Each country or community was asked to stick 'post-its' on flipcharts on the four steps, using pictures, single words or short phrases to highlight key points. They then explained these to the group.

Apurimac

1. Community planning: We want to gain consensual agreements first, which must be achievable, then define the geographic space for BCHTs.
2. Assessment, research and organisation: We have identified useful resources, eg from pine forest plantations. We want to focus on what benefits we can get, like ecosystem services – water, oxygen – and wood to produce crafts, musical instruments and so on.

3. Implementation: Once we have identified the resources, we can start capacity building and establish a school on community forest resource management. We will also be involved in workshops, exchanges and public forums.

Kenya

1. Community planning: First we want to map the resources that we have so we can plan how to manage them, and establish the boundaries – our area of jurisdiction. We could then carry out a strengths, weaknesses, opportunities and threats (SWOT) analysis of our ecosystem and communities; and establish a cultural village to be the centre for co-ordinating all the activities in the landscape.
2. Assessment and participatory research: We plan to empower communities and build capacity so they can participate in the research and work closely with scientists to collect data about the landscape. We need strong communication, and value addition to increase incomes. We need to develop a constitution to guide operations within the community and landscape, a five-year community implementation plan and shorter one-year action plans.
3. Implementation: We will use various platforms to disseminate our information and transfer knowledge, like field-based innovation fairs and cultural events.
4. Assessing progress and impacts: We will assess the plan's implementation to see what was not implemented and why. To measure the impact of the BCHT, we will need to collect some baseline data at the start, and conduct surveys every five years to document impacts. We will collect data on environmental variables and yields of traditional varieties to try and identify varieties that are drought-tolerant and pest-resistant.

China, Stone Village

The two main products from our community are food and clothing. We want to transfer these skills to the next generation but the youth do not want to stay in the community due to the long distance from cities. The sour plum soup and five-grain rice wine we shared last night are our advantage – we can sell it to tourists who visit our community, rather than producing it in large quantities to sell in cities.

Kyrgyzstan

1. Community planning: We were impressed by the resource mapping and development planning exercise, and by using the three ayllus for community planning. This is important because it respects history, tradition and knowledge. We found that the management at community level is very organised – that is useful for us. We also recognise that gender has been taken into account, so that both women and men are involved in resource management.
2. Assessment, research and organisation: We noted that researchers respect farmers' traditional knowledge, and farmers also accept the results of scientific research, using the results in their farming.
3. Implementation and knowledge transfer: The community should act in harmony with the environment. When they use natural resources, they also give back to nature to conserve wildlife and forests so that all ecosystems are conserved. It is very important to rotate crops; we have problems with this because there is private property on land in some areas, so it can be difficult to organise crop rotation. Using laboratories and different types of conservation, such as *in vitro* and *in situ*, is a good approach to conserving biocultural diversity. In future, we should improve our biocultural research.

Philippines

1. Community planning: This should be informed planning based on indigenous knowledge. The community should be informed about challenges such as climate change facing the community, and there should be strong technical support to translate the plan into something agreed on by everyone.
2. Assessment and research: There should be good documentation of traditional, despite the challenge of putting oral tradition into writing. We should be grounded in traditional knowledge (TK) so that can form the basis for scientific research. We should raise awareness of TK and promote sharing it.
3. Implementation and knowledge transfer: Once we have a plan, we would like to lobby the government for support, and continue to strengthen the traditional transfer of knowledge; for instance each year young people go to the forest to learn ethnobotany.
4. Assessing progress and impacts: There must be a participatory impact assessment, so the community knows what to measure.

Papua New Guinea

1. Community planning: We should mobilise our biocultural heritage by going to the communities to gauge what kind of development they want, and what BCH they have and want to preserve. We have two constraints: 1) fragmented communities and 2) land ownership issues. One of the first things we want to do is a community development plan. The community will need to decide its objectives in the short, medium and long term. We want to form a committee of tribal leaders from the different clans in the community to make it easier for them to work together, with representatives disseminating information to their own clans.
2. Assessment and research: We should then carry out participatory mapping of the resources.
3. Implementation and transfer of knowledge: The community should participate in everything, including decision making, and each community should take responsibility for something in the community plan.

Gure Afao Tumae from PNG presents his group's synthesis. Credit: Lucia Florez

4. Assessing progress and impacts: Regular committee meetings should be held where the communities can provide an update on progress. That way we can ensure that things are done in a transparent manner.

Taiwan, Tayal community

1. Community planning: We live in mountains so we will pay attention to the different altitudes, and the river is very important to us – it provides food and water for the whole of Taipei. People in the city should love Tayal people more, as they are protecting the water source for them.
2. Assessment and organisation: The Tayal have a *galan* (an area where water runs through). Their *galan* has eight tribes, each with collaborative micro-enterprises. Two of these communities or tribes have virgin forests and vegetable and fruit co-operatives. Besides the organisation within the community, they also communicate with outside organisations like universities and other, far-flung communities.
3. Implementation and knowledge transfer: They are focusing on the conservation of a traditional millet crop. For a long time they have been eating food imported from outside, so they are now in the process of reintroducing millets using traditional plants for organic pest control, and sharing this traditional knowledge with other communities.

4. Assessing progress and impacts: We will see how many varieties of traditional crops are growing successfully. We are organising young people from all eight communities to share information on problems and how to deal with them on the internet or through forums.

Kanakanavu community: We are working on an *usuru* (woman's field). We have *to'onnatamu*, a place where the elderly gather to transfer traditional knowledge to young people, and we try to regain our knowledge about our traditional ways of living. We try to connect our knowledge with outside resources like Taipei Medical University or a famous bakery, which we can teach how to make bread using traditional methods, and we can learn from the Tayal how to make traditional food to combine our knowledge and develop new products. We also have a bakery in the mountains and we sell bread to outside communities through it, through Taipei Medical University and ecotourism. By doing *usuru*, the women's group has recovered traditional knowledge. The impact will be a biocultural ecosystem and fresh food, and we will establish new supporting networks through our people. By connecting the spirits to our people we will enhance our traditional knowledge and develop enterprises so that we can cope with challenges like climate change.

Tajikistan

1. Community planning: This should be a great opportunity to use existing natural resources that should be preserved as biocultural heritage. We already have some experience of this. The Pamir region is at a high altitude and has seen significant impacts of climate change and natural disasters. Therefore, some communities have identified the need to keep traditional knowledge, and identified people who are traditional knowledge keepers.
2. Implementation: We have established a village technology group to bring together farmers with an interest in certain crops and agricultural research institutes for participatory technology development. In the Pamir, young people tend to leave their village. We need to establish micro-enterprises so they will stay in the village and preserve our biocultural heritage.
3. Assessing progress and impacts: This should be participatory monitoring with scientists and policy makers, and should spread village technology groups (scale out) to the rest of Tajikistan.

Bhutan

1. Community planning: We need to identify the biocultural heritage site.
2. Participatory research and organisation of resources: We will conduct a baseline survey and identify resources – natural resources, water resources, crops and traditions; and identify what resources to develop into products.
3. Implementation and transfer of knowledge: Communities need support – technical, financial and human resources. This also requires co-operation between people within the community, and between communities if more than one community are involved.
4. Assessing progress: We will identify a focal agency that can review and monitor whether the biocultural landscape has had an impact – this is different to regular monitoring by communities.

India

1. Community planning: First we have to dream, and then discover what we have in our resource mapping. We should design a micro-level village development plan, and identify what aspects we are going to deliver in the plan.
2. Participatory research and organisation of resources: First we would hold focus group discussions with the religious head, elders, traditional knowledge holders and retired farmers, who have a lifetime of agricultural experience. Then we would hold discussions with the younger generation to see what they think. To organise resources, we use self-help groups that consist of 10–20 people.
3. Implementation and transfer of knowledge: This can be from elders to youth; we will also create a community-based indigenous knowledge bank using social media and the latest technology. We will conduct a SWOT analysis to assess different options.

4. Assessing progress and impacts: We will assess what the group has achieved, including impacts on social capital, economic aspects and livelihoods, and on the ecological security of the community.

Thailand

1. Community planning: There needs to be a clear understanding of the project objectives among the whole community, and the whole community should participate in planning. This will need the co-operation of village members and a clear allocation of duties and separate roles.
2. Participatory research and organisation of resources: We need to create respect, so that non-indigenous peoples and scientists respect local knowledge. A community research group should be created to collect data with scientists.
3. Implementation and transfer of knowledge: We want to create networks for different areas or topics, for instance for cooks, to successfully transfer traditional knowledge. We need a community space or 'youth camp' where elders can pass knowledge to the younger generation, and workshops to transfer knowledge to outsiders.
4. Assessing progress: The most important thing is to measure cross-community happiness with what we are doing – in other words, the BCHT. We should also measure the number of young people who want to come back from working in the city and live in a traditional way. It will be a success if we can make our own decisions with respect to our biocultural heritage, if the government understands the plans, and if we gain the legal right to follow our heritage and indigenous way of living.

Potato Park

What we have done:

1. Community planning: We conducted a baseline study and mapped everything in our communities and the three *ayllus*.
2. Participatory research: An example is the transects, where we plant potatoes at different altitudes to study adaptation to climate change. This will help food security both in the Park and the wider world.
3. Implementation and transfer of knowledge: We have developed biocultural innovations like medicinal plants and the gastronomy collective. We have exchanged traditional knowledge with farmers in other communities in Peru and around the world. Our general council meets every five years to assess progress (since our plans last for five years). There are also meetings of the Potato Park Association every two months to review progress.

Wrap up: Alejandro Argumedo, Asociacion ANDES and INMIP Co-ordinator

Some fantastic ideas have been shared. I am very pleased about how we are coming to a common understanding of how we would like to see our territories in the future. We are in a complex and fast-changing world. In thirty years' time, about 70 percent of the world's population will be living in cities – how are we going to connect to this world that is emerging in big cities? Who will manage rural landscapes, produce food and conserve ecosystems? The whole economy of the world is changing – the five biggest companies are internet-based (such as Google), rather than mining and oil companies. AirBnB manages more than USD30 billion a year, but does not own a single bed – this example shows that the old practices of reciprocity or sharing are still important. We have tools in our communities that can be inserted into this new economy.

Regarding climate change, now that the United States is withdrawing from the Paris Agreement, we are going downhill fast. That is a big concern for our landscapes. This network that we are creating, INMIP, could be a platform to show the world that we can actually make some changes, if we collaborate with scientists and policymakers, but on the basis of our strengths – our traditional knowledge. Producing a manual on BCHTs could not only help our communities but also influence other communities. If we start networking more as a landscape-based network, there are revolutionary things we can do. Seed companies work as big networks, like the International Seed Federation. If we work together, we could form a community seed federation. Regarding product branding, we could also have a general brand or

individual brands connected through, for instance, a BCH indication. The main product of this exchange could be cooperation on a manual for BCHTs that we could develop. We could launch this publication at our next meeting, as a manual or a tool box, as different communities have different tools.

Workshop evaluation and feedback

Some participants provided verbal feedback at a roundtable near the end of the workshop, although there was not enough time for all participants to speak. They were also asked to fill in a written evaluation form to provide feedback on the organisation, logistics and so on.

Thailand: Thank you for such a warm welcome. It has been an eye-opener for me, because I can see this is so much more than a Potato Park. You have a strong community, you are proud of who you are and that is a good example for indigenous peoples. Everyone has been kind to us and tried to be the best hosts.

Kyrgyzstan: When I saw the agenda for this workshop I was very interested because all the exercises are much needed these days. Without combining traditional knowledge and science, we cannot get results. I have read a lot about ecosystem management but I could not imagine how it could work – and here I have seen it working in practice. I have had a unique experience, especially on the link between nature, humans and spirituality. I think this experience should be disseminated throughout the world. We should develop some training modules for that as many people need this experience. On behalf of our team, I would like to express our gratitude to the organisers.

The Philippines: Please accept our deep appreciation; thanks for letting us experience the beauty of your place. It is very peaceful and harmonious. When we go home we will be proud to share what we have seen and experienced here.

India: We have had a great, wonderful experience through this walking workshop and learning exchange. We have seen so much; we are so grateful. I think the Potato Park will be a guide to the world on conservation and production in the face of climate change. We have seen agrobiodiversity, flora and fauna, and livestock diversity. A BCHT should be declared here, and the Potato Park should serve as a model for developing BCHTs. The Potato Park should be converted into an institution for learning, so that farmers and others can come here to learn about BCHTs.

Bhutan: We extend our deep gratitude to the organisers and donors for your collective efforts in successfully organising this programme. This was our first time at such an event. The idea of using the Potato Park as a PowerPoint and learning ground was a wonderful learning experience. We have learnt a lot and will share the impact in future workshops.

Potato Park response: This forum has been a success and it should not be the last – as local leaders, we are committed to continuing this work. We too have learnt a lot while using the landscape as the PowerPoint, and we deeply appreciate your visit and what we have learnt from you. We can develop more innovations, based on what we have learnt. We have heard that some of you have wild apples. We are going to cross wild and cultivated potatoes to increase their resilience to climate change.

During the interviews conducted just after the workshop on the proposed community monitoring and database system, many of the communities stated that they plan to establish a BCHT, and will share the valuable knowledge gained with their communities (see Annex III). Their additional feedback includes:

China: The China team really liked the Potato Park's idea of using participatory plant breeding to develop a highly nutritious variety to help feed children – they are impressed with the idea (Xiuyun Zhang is passionate about PPB).

Tajikistan (Jumabek): What I have seen here, I will try to do at home. What I have learnt is new for me and my community so I will share this knowledge and information. I will present all the materials and show the videos – I *have* to do this. I have collected some seeds here; I will do a pilot plot and if the results are good, I will share them in my community.

Developing a community monitoring and database system

Interviews were held with INMIP participants from China, Kenya, Papua New Guinea, Taiwan, Tajikistan and Thailand to obtain feedback on the idea of establishing a community monitoring and database system for monitoring progress towards the Biodiversity Convention's Aichi Targets and the 2030 Sustainable Development Goals. The system, which is being explored by the United Nations Development Programme (UNDP), would be linked to government policy and planning processes. It would provide data to help governments monitor progress towards these goals in indigenous mountain communities, based on indicators identified by or with communities, that are useful for addressing their own needs. This would require governments to recognise the value of traditional knowledge, and acknowledge communities' contribution to the data and progress reported. For communities, it could be a way of enhancing government understanding of their situation and needs, and increasing government support.

Semi-structured interviews were conducted with INMIP community representatives and facilitators, focusing on the following questions:

1. Do you think such a community monitoring system would be useful for your community, and what should it monitor – for instance income, food security (SDGs) or BCHTS, conservation (Aichi targets)?
2. Would you be happy to share your data with the government?
3. How could the system work in practice?

Most of the respondents felt that the proposed monitoring system would be useful, to support their communities' needs, inform the government about what they are doing and get more government support. They said it would be useful to monitor agriculture, food security, natural resources and livelihoods, and the monitoring could be done as part of establishing BCHTs. It could help communities improve their environmental management and show governments that their farming and livelihood systems are sustainable. Most of them also said they would be happy to share data with the government, even if the government claimed credit for their work (it was suggested that UNDP could act as a watchdog to ensure this does not happen), as it could lead to better government support.

Many respondents highlighted the need for a trusted facilitator or intermediary between communities and government, and to "build the capacity of both sides to work together". They emphasised the need to identify national policy targets that the monitoring system would inform; identify the right government departments and officials who are "open to traditional knowledge"; and encourage the government to "listen to information from communities". In Taiwan's case, there is currently insufficient trust and understanding between the communities and the government – a longer-term process is needed to build trust before such a system could work. Others noted that the government would probably be interested in their data since they do not have the capacity to collect it themselves (Kenya). In Tajikistan, the government already collects data from communities, but it is not always accurate. Some respondents also highlighted the need for a research partner or university to work with communities to generate good data, and for funding for community monitoring. For further details, see Annex III.

Annex I – INMIP strategic plan for 2017–2022

Vision

A world rich in biocultural heritage that maintains the reciprocal and harmonious relationship among the spiritual, human and natural realms for resilient indigenous mountain communities.

Mission

Provide a global platform for exchange of knowledge and experiences and cooperative discovery for the recognition, protection, and promotion of mountain indigenous biocultural heritage.

Values

- Reciprocity – between network members and in relation to Mother Earth and the sacred
- Diversity – biological and cultural diversity are critical to the future of mountain peoples and the planet in these times of global change
- Cultural identity – focus on indigenous mountain communities
- Empowerment – of indigenous peoples to influence policy, support local implementation of policies and practices for food sovereignty, rights to resources and knowledge
- Communication – for effective networking, sharing knowledge, experience, best practices, and to influence policies relevant to indigenous peoples, mountain ecosystems, smallholder farmers, environment and climate change.

Objectives

1. To **establish networks** of biocultural heritage territories and community seed banks and support international seed exchanges and collaborative activities
2. To **strengthen the capacity** of indigenous mountain peoples for resilience in the face of global change by revitalising their biocultural heritage, particularly spirituality, indigenous knowledge, practices and customary laws
3. To **exchange knowledge**, **information, strategies and innovations** for adaptation to global change and promote the intergenerational transmission of indigenous knowledge
4. To **advocate for policies** at the local, national and international levels that recognise and protect
   a) the integrity of communities, biocultural heritage and the environment
   b) the rights of mountain indigenous peoples, particularly of the role of women, youth, children and elders, based on a range of traditional resource rights, such as those included in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and International Labour Organization Convention 169.

Priorities for the next five years

Year 1 (May 2017 – April 2018)

1. Networking and communication
   - Launch INMIP webpage – featuring announcements, news, archives, link to members' web pages, portal on BCHT, communication platform
   - Share recipes for publication of INMIP cookbook

2. Capacity building
    - Prepare training manual on BCHT
    - Develop case studies on BCHT – 3 or 4 (eg Thailand, Philippines)
3. Knowledge exchanges
    - Planning and fundraising for INMIP annual exchanges in Kyrgyzstan, July 2018, Taiwan, March 2019 and a regional thematic workshop in Thailand, October 2018.
    - Call for proposals for collaborative activities among INMIP members
4. Policy influence
    - Prepare a policy brief to be presented at various policy forums
    - Organise a side event at the UNFCCC COP23 in November 2017
5. Fundraising
    - Develop joint proposals for funding by potential donors.

Years 2 – 5 (May 2018 – April 2022)

1. Networking and communication
    - Maintain INMIP website
    - Maintain regular communication with INMIP members on upcoming events, relevant news
2. Capacity building
    - Develop and carry out collaborative projects among members
    - Develop and share training manuals, guides
3. Knowledge exchanges
    - Hold INMIP annual exchange in Kyrgyzstan, July 2018
    - Hold regional thematic workshop in Thailand, Oct 2018
    - Hold INMIP annual exchange in Taiwan, March 2019
4. Policy influence
    - Develop one policy paper annually for submission to international policy forums
    - Develop and share declaration from each knowledge exchange
    - Pilot biocultural indication (design framework, mechanisms, labels, select sites for pilot)
5. Fundraising
    - Raise funds for Secretariat and annual knowledge exchanges
    - Develop funding mechanism for collaborative projects among INMIP members.

Management plan

The INMIP Secretariat (Director and staff) will review the strategic plan on a quarterly basis to ensure progress is being made in relation to identified priorities. The Secretariat will update the action plan each quarter. The INMIP membership will review and update the strategic plan annually at the annual knowledge exchange.

Action plan

INMIP's Action Plan from May 2017 to April 2018 can be found in its full Strategic Plan, see www.inmip.net.

Annex II – The Potato Park Declaration

International Network of Mountain Indigenous Peoples, 23 April 2017

We, over 100 indigenous peoples, representing 39 mountain communities from Bhutan, China, India, Kenya, Kyrgyz Republic, Papua New Guinea, Peru, The Philippines, Taiwan, Tajikistan and Thailand, together with 26 representatives from civil society, research, government and donor organisations, gathered in the Potato Park, Cusco, Peru, from 19 to 23 April 2017, for the fourth community to community Learning Exchange of the International Network of Mountain Indigenous Peoples (INMIP). The exchange began with a policy dialogue in Cusco which brought together representatives of indigenous mountain communities, government officials and experts to discuss the role of indigenous and modern knowledge systems in improving the wellbeing of mountain communities in the face of climate change.

Our mountain homelands are hotspots of biological and cultural diversity, that play a critical role as water towers, centres of crop domestication and diversification, repositories of resilient genetic resources for adaptation to climate change, and places of high spiritual value. Our rich biocultural heritage is rooted in our distinct cultural identities, ancestral knowledge and customary laws that ensure the sustainable management of mountain ecosystems.

Even though we play a vital role in conservation and sustainable use of biodiversity and ecosystem services for rural and urban populations, indigenous mountain peoples are amongst the poorest, most marginalised and most vulnerable to global climatic changes. These changes are adding to existing problems of insecure land ownership, out-migration, cultural disintegration, extractive industries, inappropriate mountain policy regimes and biopiracy.

We met in the Potato Park, a biocultural heritage territory in a centre of origin of the potato, where 6 Quechua communities conserve about 1,367 native varieties of potato, 3 species of wild potato, and many other Andean crops and wildlife. The INMIP horizontal learning exchange provided training on methods and tools for establishing biocultural heritage landscapes, based on the successful Potato Park model. It used an empowering walking workshop methodology, where indigenous farmers shared their expertise directly with other farmers, using the landscape as the classroom. It also sought to strengthen and expand this emerging indigenous peoples' network.

As the world moves towards a highly urbanised population, with an estimated 66 per cent of people living in cities by the year 2050, our concern is that there will be too few people living in mountain areas to produce sufficient food, conserve agrobiodiversity and protect fragile mountain ecosystems. One response to this is to create biocultural heritage landscapes which sustain vibrant and inclusive green economies, using old traditions and wisdom, in harmony with modern science and technologies.

The International Network of Mountain Indigenous Peoples, concerned for the future of mountain ecosystems and the livelihoods of our communities in the face of global and climatic change, calls upon governments, religious and spiritual leaders, research organisations, civil society organisations and the international community to:

1. Recognise and respect indigenous peoples' spiritual values and expressions, particularly the sacred nature of their food and landscapes, and the messages they provide for peace and harmony among all peoples of the world.
2. Recognise the critical importance of biocultural heritage, including indigenous peoples' holistic worldview, where the human, spiritual and natural realms are inter-connected and inter-dependent.
3. Recognise the important contribution of indigenous mountain peoples' knowledge to the conservation and sustainable use of biodiversity, provision of ecosystem services, including water, soil, food crops, crop wild relatives and wildlife, and implementation of community-based disaster risk management strategies.

4. Support participatory action-research with indigenous mountain communities that fully respects their traditional knowledge, local institutions, and collective rights to knowledge and innovations, to enable communities to address the urgent threats posed by environmental and socio-economic changes, particularly climate change.
5. Support and facilitate the repatriation of native crop varieties from gene banks to indigenous mountain communities, the creation of landscape based gene reserves and community seed banks, and horizontal seed exchanges; and protect and promote local seed systems for food and nutrition security in the face of climate change.
6. Support the establishment and legal protection of indigenous peoples' biocultural heritage landscapes and Community Conserved Areas to promote the conservation and sustainable use of biodiversity and foster local green economies, pro-poor inclusive growth and nutrition-sensitive climate change adaptation and mitigation.
7. Recognise the particular role of indigenous women in food security and the conservation, development and sustainable use of genetic resources for food and agriculture, strengthen the voice of indigenous women and ensure opportunities for their participation in decision-making processes at all levels.
8. Strengthen traditional natural resource management systems, and the traditional policies and institutions that govern them; and prevent the rapid loss of indigenous knowledge and languages through inter-generational transmission.
9. Recognise the important role of indigenous peoples' agroecological farming practices in climate adaptation and mitigation, and the significant contribution of indigenous highland pasture management to carbon sequestration.
10. Provide support for participatory development of biocultural products and services, creating market linkages, branding of indigenous products and protecting indigenous names, to support sustainable livelihoods and the conservation of biocultural heritage.
11. Ensure that government policies and programmes do not exacerbate the impacts of climate change on indigenous mountain peoples, and support traditional knowledge-based strategies for climate adaptation and disaster risk reduction, alongside science.
12. Recognise the important contribution of indigenous mountain peoples to achieving the Aichi Targets and Sustainable Development Goals and establish collaboration with them to monitor the achievement of these global goals at local level.
13. Recognise and strengthen the International Network of Mountain Indigenous Peoples as an important mechanism for knowledge exchange and innovation for enhancing the biocultural heritage and adaptive capacity of mountain indigenous peoples.

We call on indigenous peoples and traditional farmers to work for the preservation of their biocultural heritage landscapes and traditional resource management systems; and we call upon national governments to implement policies that support indigenous knowledge systems.

Finally, we want to reaffirm our commitment to working together and in our own communities towards our common vision: a world rich in biocultural heritage that maintains the harmonious relationship among the spiritual, human and natural realms for resilient indigenous mountain communities.

Annex III – Interviews on developing a community monitoring system

China, Stone Village

Ruizhen Li and Xiuyun Zhang: Of course we are going to tell the government what we have done and what we have achieved, and of course we would be willing to share our data with the government. We would really like to provide information to the government on a regular basis, eg on the Aichi targets or income levels. But we have to find the right government department to share the information with and discuss with them to see what kind of information to collect and share – so there is a need for facilitation between the local community group and government agency. Normally in China, the system is top down so we do need facilitation to do this kind of bottom up monitoring and to find the national policy targets to align the information with. But because of Ruizhen's position as the peoples' representative for the whole Bashoan Village, she knows what is going on at government level, so she and Mr Mu (the Stone Village party representative) could help to find the corresponding agency. Irene Song (facilitator) asked: where would the funds for monitoring come from?

The government will claim credit for the progress made but at the same time they will also see the hard work of the community. China is improving its recognition of indigenous peoples' rights so this could be a positive reinforcement as the government would appreciate the community's work. The national government may want to support the work, and the local government would be happy because they would have some achievements to report. When the community renovated one building in the Stone Village with support from The Christensen Fund (TCF), the government came and liked it, so they gave the community more funds to renovate the rest of the school.

Taiwan

We are not sure if such a system would be useful because we feel that we are monitored by the government, eg they tell us not to cut trees, or use water. We live in an area with water and the government restricts our land use for agriculture so we have been using chemicals and growing commercial crops to make a living, but now we are realising that is not the way to go. We got scientists to show that we are doing forest management in a scientific way. We have a forest management group, but that is not enough to convince the government that we are managing the forest in an efficient way. We have ecotourism, so some youth are coming back, and we have to learn to monitor in a scientific way. We have tried to do co-management with the government but the government has a very different approach to the Tayal – they think people should be kept out and use forest guards and are very bureaucratic. It is very hard for us to imagine how to co-operate with the government.

For disaster risk reduction (eg in the face of typhoons), our community knows where to go and when, but the government tells us to go to a different place and we think it is not safe. Typhoons are getting worse with climate change. In 2008, the government forced people to move away from their community in the mountains and this resulted in elders committing suicide because they lost their roots and culture, and the government built houses for them in the lowlands, not in their ancestral mountain home – the community did not participate at all in the planning.

So they do not have a close and trusting enough relationship to work with the government – they would need a facilitator to help build this first. In the Tayal community, they also do planting on slopes like the Potato Park, with vertical rows to catch the soil and prevent erosion. But the government fines them USD2,000 for planting on slopes – one woman could not pay and so committed suicide. When the government thinks of development, they only think of companies and cities. The community's use of land is very restricted by the government to provide water for downstream populations – they get USD250 in compensation per person, but that is not enough to compensate for lost livelihoods, and they have to submit a lot of paperwork to get the USD250.

Tajikistan

Alibek Otambekov (TCF): Communities would need the support of a trusted organisation to work with the government – an organisation that is trusted by communities and by the government, such as the Aga Khan Foundation's Mountain Societies Development Support Programme (MSDSP). Otherwise the government

would not listen to the information from communities, and they would get jealous if local organisations/ farmers are getting foreign funds and would try to get some of the funds. We would need to find someone in government who is interested in getting the data – it has to meet a national development purpose/goal and the government person needs to value traditional knowledge or be open to it – an intermediary can help find that person in government. The government says it is committed to the Aichi Targets and the SDGs, but in reality they are not that important, so the information collected needs to help address national development goals too. MSDSP could facilitate the process for Mirzosho in the Rasht valley, and for other communities it works with and other communities too. The ideal thing would be to connect the community and government directly, but first you need an intermediary to build the capacity of both sides to work with each other. Other potential intermediaries include Oxfam Novib, Caritas (Germany and Switzerland), and Flora and Fauna International – they already have good collaboration with the government (on forest and climate change issues).

Male farmer (Rasht Valley): We have a landscape like the Potato Park and if someone is interested in using and owning it, the government will give them a certificate. As part of a TCF project, Mirzosho created an experimental plot – an orchard in a dry zone, and the government supported it and gave a certificate. After this visit to the Potato Park, we are thinking of expanding the area to higher levels and cultivating around a highland lake and setting up a BCHT. We already have a 1-hectare BCHT established after a previous visit by Mirzosho to the Potato Park. I am in a different village to Mirzosho and he also wants to establish a BCHT based on what they have learnt in the Potato Park. He is thinking of terracing as in Peru and cultivating potatoes, and would like to create an experimental area with terracing like Moray and use potatoes from Peru. The Rasht Valley is the main potato growing area of Tajikistan. I am quite sure it will be new to Tajikistan – we can do it in four days as he has 19 children. At first, when people saw we were doing a BCHT in a sloped area, they said he is stupid. Later Mizorsho used traditional knowledge integrated with modern knowledge – he used plastic to cover tree seedlings and the trees have grown. When Mizorsho first started making the orchard BCHT in the hills, he said he wanted to do an experiment. When they had a harvest he explained what species he wanted to conserve for climate change adaptation and the government said fine, but did not provide any support like tools etc.

In our community we do not have a monitoring and database system at the moment – a pioneer should first set this up and the community should see how it works and then we can involve the community in data collection. At the moment there is a government monitoring system – they tell the community how much of a crop (eg potatoes) they need to produce and then come and measure how much has been produced, but the community tries to cover up if it has not produced enough. If we want to create something new, the government may not accept it, because it already has a Ministry of Forestry and land cadastre – they collect information but that information is false. It would be nice if we could do monitoring ourselves, but I don't know which organisation in the community could do it.

Jumabek Abdulloev (Khoit village, Rasht District): Kordosho is working with MSDSP – he knows all the areas where MSDSP is working and has a village organisation – they can do monitoring. They also have a supra-village organisation which should facilitate the process and bottom up links for project implementation. Every village has a Village Development Programme and based on that they can do monitoring and collect information and give it to a government organisation. Monitoring at village level is important to identify potential natural resources, eg to create crop land. They can expand their potato area but also need to establish storage and a seed bank – he will organise this when he gets back. So agriculture is the most important area to monitor, and natural resource conservation like crop diversity.

Habiba Gurgalieva (Yamg village, Ishkashim District, Pamir): Yes we have a monitoring system – we also have a village organisation and village development plan. Based on the plan, we identify what kind of opportunities and resources we have. We monitor livestock (number of animals and of breeds), plants, agriculture and historical places. We have a museum which is very famous and many people come to the village as tourists. We monitor the conservation of wild plants because we use many of these plants for food – especially above the village (at 2,600 metres above sea level) up to 3,500masl, we collect herbs for food and medicine and collect crops. We have three varieties of potato and two of wheat, traditional varieties of wheat and barley, and one bean variety. The village organisation monitors livelihoods/income levels – every household can choose which kind of variety they will grow, and that can bring additional income. Yes I would like to share information and data with the government, and I would like to talk to the government and to suggest that we set up a BCHT. I will share information about biodiversity conservation with the local government. Community monitoring would be useful for conservation of biocultural diversity and getting the government to support a BCHT. We will explain the proposed monitoring system to our village. If they monitor what we have done, the government will give more support.

Kenya, Taita community

There are 17 villages in our group – Granton Msullah is the chair of the group and Mary Kitawa is the vice-chair. The group is supported by Chemuku Wekesa from Kenya Forestry Research Institute (KEFRI), and we make products. Yes, monitoring is important and very useful to our community, but we need some funds to start off as we are not getting any support from the county government. Chemuku/KEFRI can help us develop our monitoring framework, and KEFRI could perhaps provide some research funds – it would not be very expensive if the group collects the data in their area. We need to start and then we can use that progress to raise more funds. We are willing to share the information with the county and national government – eg the ministry in charge of environment, tourism and culture.

What would you find useful to monitor? We live in mountains and our farmland is very small – so we would like to look at the food security situation, and the environment and income, as they are all linked. At 1,700 metres above sea level (where they are) and above there is enough rain, but soil fertility has declined a lot, and below about 600masl it is very dry; there is hardly any rain but they have plenty of land for farming. Collecting information would be useful for planning as a community. The county and national governments would probably be interested in getting this information because we do not have the capacity to collect it. KEFRI would work with the community to collect the information and package the findings. They could first approach the national government – that would be easier than the county government. KEFRI management can approach the national ministry directly. We are not worried that the government would take the credit for what we are doing. We feel this would help us get better support from the government. For example, the Rabai Cultural Village set up through the Smallholder Innovation for Resilience project is now supported by the government and is self-sustaining. The Taita group aims to develop products and conserve culture. We need to strengthen the group and bring on board other members – but almost half of its members have left because of governance and funding issues. We also plan to set up a BCHT.

Papua New Guinea

Anne Marie Wanamp (University of Goroka) and Gure Afao Tumae (Fresh Produce Development Agency): UNDP offices in each country could help to ensure that governments do not take the credit for community initiatives – if they can do that, it should be okay. Having an international partner like UNDP acting as a watchdog would safeguard the communities very well, so the government can also just be a partner. Terms of reference developed by UNDP should ensure the rights of local communities and indigenous peoples are duly acknowledged – that would help. They would need to sit with community members to convince them that this would be useful, and community leaders should be involved. This could be approached the way we did the walking workshop – identifying the resources they have, starting from the top, and doing this as part of the process of establishing BCHTs. We need more clarity on what UNDP wants – we would like to work with UNDP. We could work with a national think tank that works closely with government. The initiative would also need to be linked to national development goals. UNDP is already involved in projects in some villages (eg in Anne Marie's province). This initiative will not work if it is top-down. It would contribute to establishing a BCHT. In Goroka, there are two or three places where we could work to establish a BCHT. We would need to bring on board conservation NGOs – mining and logging are the main threats. They can also engage with local and provincial governments, which would be the main counterparts; the provincial government reports to the national government (eg Environment and Conservation Department). Best to start at local government level (there are elections in July and August).

Thailand

Sirivimol Kitaphanich ('Apple') (PASD and Rai Run Rom Organic Farming Learning Centre): Communities would probably be happy to share their data with governments, even if the government takes ownership of the data. Collecting data can help communities improve their own environmental management (eg carbon footprint) and allow them to show governments that their livelihood systems (eg rotational farming) are not harming nature, and provide evidence that the community is doing something good. So both the government and the community get the credit. In the case of the Karen in northern Thailand, if communities can provide data on their rotational farming systems this would be relevant for the Aichi conservation target because it would show that they are burning less than what is assumed and are effectively conserving nature. Communities would need to establish a local monitoring team, and work with a university researcher to make sure they collect good data, and a facilitating organisation (eg local NGO) would need to facilitate the collaborative research. Jam's community (represented here) already has a good relationship with the university and has conducted similar studies. It would be helpful to have a manual to help the community do the monitoring, ideally one that is tailored to each country context.

Annex IV – List of participants, Potato Park exchange

Name	Country	Organisation/ Community	Role	Email
Xin Song	China	Center for Chinese Agricultural Policy, CCAP	Facilitator/Translator	xinsong2014@163.com
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The International Network of Mountain Indigenous Peoples (INMIP) aims to support capacity development for climate change adaptation through community-to-community exchange of knowledge and innovations. It currently includes communities from 11 countries in Asia, Africa and Latin America. It is coordinated by ANDES (Peru), with support from IIED.

INMIP organised its 4th learning exchange in Cusco and Potato Park, Peru, 19–23 April 2017, with support from ANDES and IIED. This report presents the results.

Event Materials

Food and Agriculture

Keywords:
International Network of Mountain Indigenous Peoples (INMIP), traditional knowledge, biocultural heritage, climate change adaptation

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Funded by:

Tamalpais Trust
NEW FIELD FOUNDATION
SwiftFoundation
THE CHRISTENSEN FUND

Supported by:
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
based on a decision of the German Bundestag

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SGP The GEF Small Grants Programme
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