Jafr and Tuggoz communities, Tajikistan
11–18 September 2015

Event Report

Climate Change and Biocultural Adaptation in Mountain Communities

Second International Learning Exchange of the International Network of Mountain Indigenous People (INMIP)

iied

Asociación ANDES

SwedBio
A programme at Stockholm Resilience Centre

MOUNTAIN SOCIETIES DEVELOPMENT SUPPORT PROGRAMME
A project of the AGA KHAN FOUNDATION

Farmers from Bhutan and Peru pray together at a sacred tree in the Food Park, Jafr. K. Swiderska

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About the event

Second International Learning Exchange of the International Network of Mountain Indigenous People (INMIP), Tajikistan, 11–18 September 2015

Organised by Asociacion ANDES, IIED, Mountain Society Development Support Programme (MSDSP, Tajikistan) and SwedBio at Stockholm Resilience Centre

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We dedicate this publication to the memory of Adrian Argumedo-Stenner, with a poem written by his sister Hannah, which includes some of Adrian's own poetry:

Tonight we can hide in the tall grass
Let the stars swallow up the blackness
Let the moon light up the lake and let
the crickets sing us a lullaby
The sky is not enough for everything you've planned
This galaxy a pit stop on the side of a mountain road
Yet the planets have opened their arms to you
The rings of Saturn thrown to you lest you ever drown in the darkness

Rest in Peace Adrian

Acronyms and abbreviations

BCHT	Biocultural Heritage Territory
COP	Conference of the Parties
CSB	Community Seed Bank
FAO	Food and Agriculture Organization of the United Nations
INMIP	International Network of Mountain Indigenous People
IPCC	Intergovernmental Panel on Climate Change
Masl	metres above sea level
MLS	FAO Multilateral system
PNG	Papua New Guinea
TK	Traditional knowledge
UN	United Nations
USD	United States dollar

Executive Summary

Mountain ecosystems and communities are extremely vulnerable to climate change. There is evidence that temperatures are rising faster at higher altitudes. High mountains are 'highly temperature-sensitive regions', with several extreme impact events of recent decades attributed to warming, according to the Intergovernmental Panel on Climate Change (IPCC). Glacier retreat has led to lake outburst floods, debris flows, rock fall and avalanches, and reduced water availability for mountain and downstream populations.

Indigenous and traditional peoples living in mountains for generations sustain important traditional knowledge (TK) and a diversity of resilient genetic resources for adaptation. According to the IPCC, '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 United Nations Framework Convention on Climate Change Paris Agreement of December 2015 recognises that adaptation action should follow a 'participatory and fully transparent approach, taking into consideration vulnerable communities and ecosystems', and should be based on traditional, indigenous and local knowledge, as well as science (article 7). However, to date, mountain communities have received little support for adaptation and their involvement in adaptation policy and planning has been limited.

In September 2015, indigenous mountain farmers representing 21 communities in 10 countries met in Tajikistan to discuss the impacts of climate change, exchange traditional knowledge for adaptation, and develop collective responses. This was the second meeting of the International Network of Mountain Indigenous Peoples (INMIP), involving communities from Bhutan, China, India, Kyrgyzstan, Papua New Guinea, the Philippines, Peru, Taiwan, Tajikistan and Thailand. Of the communities represented, about half are high-altitude communities (above 2,000 metres above sea level), a quarter are mid-altitude (above 1,000 masl), and a quarter are from low-altitude tropical rainforests (about 800 masl). A 'walking workshop' methodology was used, allowing farmers to exchange knowledge about problems and solutions while walking through the landscape. The workshop showed the importance of biocultural heritage for adaptation – including traditional knowledge, biodiversity, ecosystem-rich landscapes, and the cultural and spiritual values that sustain them.

This report aims to share the results of the workshop amongst indigenous mountain communities, climate change policy makers, scientists and others. It shows the potential of mobilising traditional knowledge to provide place-based evidence on climate change and its impacts on ecosystems and livelihoods, and to develop effective responses that sustain biological and cultural diversity for adaptation in future. Indigenous, local and scientific knowledge systems can contribute equally valid knowledge to create a full picture in assessments, research, decision-making and reporting processes.

Climate change is adversely affecting mountain communities

The community representatives presented their assessments of the climatic changes in their respective communities over the last 30 years, focusing on: glaciers and water; temperature and rainfall; pests and diseases; soils; and seeds and biodiversity. All the communities reported significant adverse changes in climate or weather patterns, particularly in the last 10-15 years, including changes in precipitation patterns – such as more variable rain, lack of rain at times, too much rain at other times, very heavy rain or higher snowfall. Many communities also reported more extreme weather in the last 18 months alone, which in many cases has 'never been seen before'.

Communities in the Potato Park, Peru, have observed glaciers shrinking – about 60% of Ausangate glacier has been lost in the last 30 years. Likewise in Tajikistan a number of glaciers have decreased in size, although in Tuggoz a glacier was observed to be expanding due to increased snowfall. Two-thirds of the communities observed higher temperatures and temperature extremes, which is thought to have led to more pests in many cases, and to drying up of streams in some cases (eg, Thailand). Late spring frost has destroyed fruit harvests in Kyrgyzstan and Tajikistan. Yunnan, Southwest China has experienced spring drought for the last five years, while Papua New Guinea is experiencing its worst ever drought – the government has declared a state of emergency and many communities face

famine. Typhoons have become more severe and frequent in the Philippines and Taiwan, and flooding is a growing problem in some communities. Tajikistan has seen unprecedented mudflows this year, destroying dozens of houses and killing 7 people.

India and Thailand reported giant hailstones damaging houses and crops; and a number of communities have experienced very strong winds. Pests and diseases have got worse in many cases, and soils have become dryer and more eroded (eg, due to heavy rain). Seeds and wildlife have been adversely affected by drought in Papua New Guinea, while bees in Tajikistan have declined, probably due to the hot weather. Potato diversity has been affected in the Potato Park in Peru as rising temperatures and pests have forced potato cultivation up by 200 metres in the last 30 years, reducing the area in which potatoes can grow. Most of the communities believe that these changes are related to climate change, except for Tuggoz in Tajikistan, which is still unsure if their unusual weather patterns are due to climate change or are a continuation of natural disasters they have always faced.

Biocultural heritage is critical for adaptation

All the communities identified traditional knowledge and practices as critical for developing effective responses and innovations for adaptation. As temperatures rise and weather becomes more extreme and unpredictable, a key response is to improve ecosystem health in order to enhance productivity for food and income, genetic diversity and other ecosystem services (eg. water), and provide physical protection (eg. forests protect against typhoons in Taiwan and the Philippines). TK is the key to improving ecosystem health, not only because it provides tried and tested sustainable practices (eg, forest management, agroecology), but also because it enshrines ecological values and holistic worldviews in which people and nature are inter-dependent and human well-being depends on balance with nature. TK also provides understanding of farming practices that work in harsh local environments and strategies to minimise risk.

All the communities identified the importance of planting different crop varieties together to reduce risk, and of using local crop varieties because they are already adapted, e.g. to drought and pests. In Tajikistan, local fruit trees in Jafr can survive the increasingly hot and dry conditions whereas introduced varieties cannot, so farmers are planting local varieties and grafting introduced varieties onto them to produce fruit for the market. In Tuggoz, which is located in a centre of wheat diversity, the farmers have found that local wheat varieties produce higher yields than introduced modern varieties. In both communities, organic fertilisers have proved better for soil fertility and structure than costly inorganic fertilisers. Some communities have reduced pest attacks using traditional methods – eg. wild plants, mixed cropping, smoke and chilli water. A number of communities also emphasised the importance of using both traditional and scientific knowledge, for example to develop crops which are both more resilient and higher yielding through Participatory Plant Breeding, to improve local irrigation systems and farming calendars, and to enhance organic farming practices.

A key concern for all the communities is how to sustain traditional knowledge and promote its transmission when young people are migrating to cities and no longer pursuing farming livelihoods. This will mean enhancing TK-based income opportunities, involving the youth in all community activities and making these attractive to them, and integrating TK into formal education systems. Networking between communities is also important for sharing TK and effective solutions. A key conclusion of the workshop is the importance of community managed landscapes – or biocultural heritage territories – for climate adaptation. Biocultural territories are multi-functional landscapes that enable the continued evolution and co-evolution of genetic resources for adaptation, whilst sustaining traditional knowledge, ecosystem services, and cultural and spiritual values as the basis for local economies.

Developing collective biocultural responses

The workshop highlighted the importance of international learning and seed exchanges for enhancing mountain communities' adaptive capacity. Since the Bhutan workshop, a number of communities have started to use the practices they learnt, revive traditional practices, develop new tools, and test the crop varieties they obtained. In Papua New Guinea, maize from China is growing much better than local maize, while in Jafr, Tajikistan, a farmer has adapted Peruvian potatoes through selection over five years, creating new diversity. The Tajikistan workshop established two new international networks for horizontal learning on key tools for biocultural heritage-based adaptation:

i) An International Network of Biocultural Heritage Territories for in-situ conservation and adaptation in centres of crop diversity.

ii) An International Network of Community Seed Banks to conserve local crop diversity, ensure access to seeds for adaptation and recovery from climate disasters, and facilitate international seed exchanges among communities.

The workshop culminated in the Tuggoz Declaration (Annex 1), which calls on governments and climate change negotiators to urgently implement radical emissions cuts; ensure the full and effective participation of mountain indigenous peoples in climate change policy and planning processes at international, national and local levels; and give priority to vulnerable communities, including mountain indigenous peoples, in the allocation of climate finance. It calls for the protection of indigenous farming systems and landscapes through the legal recognition of Biocultural Heritage Territories. It calls on governments to fully recognise and respect their cultural and spiritual values, worldviews and languages, and to systematically integrate traditional knowledge and languages into education systems. It calls for their rights to land, natural resources and traditional knowledge to be fully respected in all mitigation and adaptation policies and programmes, and for the full and effective implementation of the UN Declaration on the Rights of Indigenous Peoples.

Workshop participants at an ancient fort, Tuggoz

Introduction

There is evidence that temperatures are rising faster at higher altitudes[1], and high mountains are 'highly temperature-sensitive regions' according to the IPCC. Several extreme impact events of recent decades can be qualitatively attributed to warming, namely glacier lake outburst floods due to glacier recession and subsequent formation of unstable lakes, debris flows from recently deglaciated areas, and rock fall and avalanches following the loss of mechanical support accompanying glacier retreat[2]. Glacier retreat is reducing water availability for mountain communities and downstream populations. These changes are already having significant impacts on mountain ecosystems and the livelihoods of the indigenous and traditional peoples who depend on them for survival. Mountain regions are home to some of the world's poorest and most marginalised people. According to the IPCC's Fifth Assessment Report, even modest changes in climate can push transient poor and marginalised people into chronic poverty – such shifts have already been observed among climate-sensitive livelihoods in high mountain environments. Yet in many countries, mountain communities rarely receive support for adaptation and are rarely involved in adaptation planning.

At the same time, indigenous and traditional mountain peoples sustain important resources for adaptation – including ancestral knowledge of mountain ecosystems and a diversity of resilient crops and livestock breeds. The IPCC's Fifth Assessment Report recognises that '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'.[3] The report also states that, to be sustainable and resilient, any policy for food security will have to systematically integrate efforts to manage crop genetic resources. However, genetic resources are disappearing at an alarming rate;[4] while up to 90% of all languages, an indicator of traditional knowledge, will be lost by the end of the century.[5] Indigenous peoples often face marginalisation; displacement from their lands, territories and resources; denial of land rights; and adverse impacts from large-scale development.[6]

In the new UNFCCC COP21 Paris Agreement, 'Parties acknowledge that adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems' (article 7). The need for Parties to respect the rights of indigenous people is recognised in the Preamble, but not in the main part of the agreement. The COP21 Decision 'Recognizes the need to strengthen knowledge, technologies, practices and efforts of local communities and indigenous peoples related to addressing and responding to climate change, and establishes a platform for the exchange of experiences and sharing of best practices on mitigation and adaptation in a holistic and integrated manner'.[7]

1 Raymond, S. *et al*. (2006). Threats to water supplies in the tropical Andes. Science 312(5781):1755–1756.
2 IPCC (2014) Fifth Assessment Report, Working Group II "Impacts, Adaptation and Vulnerability: Part A Global and Sectoral Aspects", Intergovernmental Panel on Climate Change, https://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-PartA_FINAL.pdf
3 IPCC (2014) Climate Change 2014. Synthesis Report. Summary for Decision Makers. https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf
4 Secretariat of the Convention on Biological Diversity (2014). Global Biodiversity Outlook 4. Montreal.
5 UNESCO (2003). 'Language, vitality and endangerment'. Document submitted by Ad Hoc Expert Group on Endangered Languages to International Expert Meeting on UNESCO Programme Safeguarding Endangered Languages. UNESCO, Paris, 10–12 March 2003.
6 Secretariat of the Permanent Forum on Indigenous Issues, UN DESA (2009). State of the World's Indigenous Peoples.. UN Department of Economic and Social Affairs, New York. www.un.org/esa/socdev/unpfii/documents/SOWIP/en/SOWIP_web.pdf
7 UNFCCC (2015). Adoption of the Paris Agreement. Conference of the Parties, Twenty-first session, Paris, 30 November to 11 December 2015, https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

This report provides a record of recent climatic changes experienced by 21 indigenous mountain communities in 10 countries, and of the solutions they have developed based on traditional knowledge and experimentation. It also shows the potential of mobilising traditional knowledge for enriching the evidence on climate change impacts on local livelihoods and food security, and for designing effective adaptation responses that support biological and cultural diversity. Traditional knowledge provides empirical, place-based evidence that can complement and add clarity to scientific assessments, research, decision-making and reporting processes. Such a multiple evidence-based approach[8] is already encouraged by the Convention on Biological Diversity in its monitoring of the Aichi Targets, and the Inter-governmental Platform on Biodiversity and Ecosystem Services (IPBES), the biodiversity equivalent to the IPCC, is developing procedures for working with indigenous and local knowledge. This report also aims to support the sharing of traditional knowledge for adaptation amongst communities in the International Network of Mountain Indigenous Peoples (INMIP) and beyond.

From Bhutan to Tajikistan: INMIP learning exchanges

In May 2014, representatives from 25 indigenous and traditional mountain communities from 10 countries met in Bhutan to discuss the impacts of climate change and to exchange knowledge for adaptation. More than 70 farmers took part, from Bhutan, China, India, Kyrgyzstan, Papua New Guinea, the Philippines, Peru, Taiwan, Tajikistan and Thailand. The workshop found that many mountain communities are already experiencing increased temperatures, more intense pests and diseases, reduced and more erratic rainfall, and more extreme weather events, which are putting a strain on their ability to produce food. It also highlighted the importance of biocultural heritage[9] for climate resilience: historical knowledge about local ecosystems and extreme weather events, traditional farming practices which conserve natural resources, traditional crop varieties adapted to a range of conditions, and cultural and spiritual values which promote equilibrium with nature and social equity.[10]

The workshop in Bhutan established the International Network of Mountain Indigenous Peoples (INMIP), and developed the Bhutan Declaration on Climate Change and Mountain Indigenous Peoples,[11] which provides the vision for the network. The network aims to exchange traditional knowledge and seeds for climate change adaptation and food sovereignty, and to promote the protection of biocultural heritage, local seed systems and farmers' rights. The workshop also enabled the communities to learn new techniques (eg, for seed drying) and acquire new seeds, and inspired them to revitalise their biocultural heritage and develop practical tools such as biocultural heritage territories and community seed banks.

In September 2015, a second farmer-to-farmer learning exchange was organised in Tajikistan, bringing together over 50 participants representing 21 mountain communities from the 10 countries. Participants included indigenous leaders and traditional farmers whose conservation work has been recognised internationally. The seven-day workshop sought to deepen the knowledge exchange on climate change impacts facing mountain communities and to consolidate INMIP as an innovative institution for developing effective biocultural responses. It had three main objectives:

1) To enhance the capacity of mountain indigenous peoples to address the impacts of climate change and sustain their biocultural heritage.
2) To gather evidence of the impacts of climate change on mountain communities and the role of biocultural heritage in adaptation.
3) To develop collective adaptation responses.

8 Tengö, M. et al. (2014). Connecting diverse knowledge systems for enhanced ecosystem governance: the multiple evidence base approach. *AMBIO* 43:579–591.
9 'Biocultural heritage' is the inter-linked traditional knowledge, biodiversity, landscapes, cultural and spiritual values and customary laws of indigenous and local communities. See: www.bioculturalheritage.org
10 IIED (2014). Mountain Communities Workshop on Climate Change and Biocultural Heritage. An international exchange on indigenous knowledge, values and strategies for adaptation, Bhutan, 26 May– June 2014. http://pubs.iied.org/pdfs/14635IIED.pdf
11 http://pubs.iied.org/G03798.html

Tajikistan has a very rich biocultural heritage – it is a centre of diversity of apples, pears, apricots, wheat, mulberry and cherry varieties, and a centre of origin for rye and possibly apple. It is a highly mountainous country: 90% of the land surface is covered by mountains, and the Pamir region is so mountainous it has less than 0.04% arable land. The Tajik Pamirs are home to five main ethnic groups each with their own language: the Yazgulami, Shugnana-Rushani, Ishkashimi and Wakhani, which are all Pamiri, and the Kyrgyz ethnic group. These communities still base their livelihoods on traditional knowledge and worldviews, and are continuing to conserve and further develop many crop varieties in situ. Tajikistan was part of the Soviet Union until 1991. On the Russian (ie. Tajik) side of the border with Afghanistan, monocultures were planted and farmers started to lose their traditional knowledge and resilient seeds and agricultural practises, whereas South of the river, in Afghanistan, the Pamirs' traditional farming systems were maintained. Driving through the barren landscape, it is striking to see how pockets of green vegetation coincide with human settlements.

Welcome by Jafr community at Mirzosho's orchard. Geraldine Galvaing

Methodology for the walking workshop in Tajikistan

The workshop was held in two innovative and contrasting mountain communities in Tajikistan: Jafr in the Rasht Valley (up to 1,600 masl), and Tuggoz in the Wakhan Valley in the Pamirs (2,500 masl). To enable crops to grow in these harsh conditions, and to maximise resilience and yields, farmers in both communities are combining their traditional knowledge with scientific knowledge that has proved useful in their local environment. The Jafr community is revitalising and protecting local varieties of fruit trees, which unlike many of the introduced varieties are able to grow in the increasingly dry conditions and to regenerate eroded hillsides. The Tuggoz area is rich in traditional wheat varieties. To maximise yields in poor soil and water conditions, the community grows traditional wheat and uses traditional farming calendars and irrigation systems that they improve and adapt using both local and scientific knowledge.

A 'walking workshop' methodology was used for the workshop, in which farmers share knowledge while walking through the landscape, and discussions take place in and around farmers' fields, sacred sites, water sources etc. Unlike more formal workshop settings, being out in the field enables farmers, practitioners and researchers to see innovations at first hand and exchange very practical knowledge, and encourages indigenous farmers to actively share their knowledge. The host community decides where to walk, so they can explore problems and look for solutions together in the landscape. The 'walking workshop' is an indigenous methodology, also used by the Greek philosophers, which has guided a number of learning exchanges facilitated by ANDES in the Potato Park over the last decade. Knowledge sharing strengthens local institutions and community knowledge. The opportunity to connect across knowledge systems, whether indigenous, traditional or scientific, stimulates innovation and experimentation based on others' experiences.

Mirzosho explains his potato related innovations in the Food Park, Jafr. Krystyna Swiderska

In Jafr the walking workshop was held in an orchard of traditional fruit trees. It involved visits to eroded hillsides to learn about hardy local varieties onto which modern varieties have been grafted; and to a community managed landscape where the Peruvian Potato Park model[12] (see p. 20) is being re-created (inspired by a trip to the Potato Park five years earlier). A visit to a sacred site (a 320-year old pear tree) encouraged the elders to speak about their spiritual beliefs and worldviews and highlighted shared values across the communities. Participants visited the school in Jafr where a traditional orchard has been established and children are being taught traditional grafting techniques. In Tuggoz the meeting was held in a traditional Pamir house and involved a visit to the farmers' fields to learn about their traditional farming and irrigation system. It also involved a seed exchange fair, and separate group discussions amongst elders and women from the Tuggoz community and visiting communities. Food and cultural festivals were held in the evenings, for sharing traditional foods, songs and dances.

Overall, the workshop focused on the following key themes:

- The impacts of climate change on indigenous mountain communities.
- The role of diverse farming systems, indigenous knowledge and crops, spiritual values and worldviews, biocultural innovations and TK-science linkages in enhancing resilience.
- Biocultural heritage territories and community seed banks as tools for in-situ conservation and climate adaptation.
- International seed exchanges and links to the FAO International Treaty on Plant Genetic Resources for Food and Agriculture.[13]
- Recommendations for negotiators at the UN Framework Convention on Climate Change (UNFCCC) COP21 in Paris, December 2015, and for national governments.
- Strategies for collective action and knowledge sharing (e.g. an internet hub).

Mariano from the Potato Park Peru, presents a gift of seeds to Mirzosho in Jafr. Krystyna Swiderska

12 See: www.parquedelapapa.org
13 www.planttreaty.org

Climate change impacts and adaptation responses in each community

The workshop began with presentations by each community on the climatic changes they have observed in the last 30 years, and their responses. They also highlighted changes and activities since the workshop in Bhutan (18 months earlier). The matrix developed in Bhutan[14] was used to identify specific changes and responses in five main categories: glaciers and water; temperature and rainfall; pests and diseases; soils; and seeds and biodiversity. The farmers provided evidence of these changes based on their own direct observation, using traditional knowledge-based narratives. The same framework will be used in future workshops to provide continuous observations of climatic changes and impacts over time.

Communities often face a variety of challenges – climate change is adding to these. It is sometimes difficult to know which challenges are specifically related to climate change, and which are the effects of other environmental, social and global challenges. Nevertheless, communities' observations remain critical as the basis for developing effective responses.

Bhutan – Jangbi community, Trongsa District

Bhutan ranges in altitude from 1,000–7,000 masl and has a population of about 700,000. Jangbi is a remote community at about 1,300 masl, located in a sub-tropical rainforest with pine. The Jangbi community has its own language, *monpa*, which is endangered. The community has a language group to encourage the young generation to keep up the language. They also have a forest group, a bamboo group and eco-tourism group. Community members cultivate a diversity of food and vegetables, including maize, rice, wheat, buckwheat and also fodder crops. It is a traditional farming system, and they use organic manure as fertiliser. In the forest they grow three types of cane, and bamboo. They eat the bamboo shoots, and make many products from bamboo.

Although Jangbi is located in a national park, the community is allowed to keep all the revenues from the use of non-timber forest products. The government has provided them with certain areas to manage themselves by their forest group, and they have agreed on a management plan. Every five years the plan is reviewed by the government. In 2006 they established a campsite for eco-tourism. The community provides visitors with light, firewood, gas, etc., and assists with cooking and guiding. All the income from the eco-tourism goes to the community.

Climatic change impacts and responses

- *Temperature and rainfall*: Last year (2014) there was no rain at all for a month, followed by one month of non-stop rain. This not only affected the Jangbi community, but the whole area. The small stream near Jangbi became so big it was almost impossible to cross. They have never experienced that much rain before. It took three days to travel from Jangbi to Thimpu, three times longer than usual. They use religious rituals to respond to this increased rainfall.
- *Pests and diseases:* Last year their oranges were affected by a pest that made them fall before ripening. They don't know why. They were advised by the agricultural extension agent to pick up all oranges and throw them away to control the pest, but are still unsure how to avoid it in the future. They got almost no orange harvest at all. Wild pigs are also creating huge problems; they come and eat crops during the night. Now they have started to put up electric fences, and it appears to work effectively, so they plan to fence more. Previously there were also wolves and wild dogs, but people responded by poisoning them, and the number of wild dogs has fallen.
- *Seeds and biodiversity*: they are using local seeds from their own community, as well as certified seeds supplied by the government. They think it is good to have both – they are the same varieties, but from different sources. They feel secure that way.

14 See http://pubs.iied.org/pdfs/14635IIED.pdf

China – Naxi people, Stone Village, Lijiang, Yunnan

The Naxi ethnic community in Stone Village is located in Yunnan province, Southwest China, near the border with Tibet. The village is made up of a number of small villages in a mountain valley, at about 1,700 masl.

Climate change impacts and responses

- *Water and rainfall*: The fields are terraced and they have a very good traditional water management system. However, they have experienced many impacts from climate change, particularly spring drought. Previously (up to ten years ago) it rained regularly. This year there was no rain for the first six months until July – so those farmers without water resources for irrigation could only plant after July. Then it rained every day. Farmers perform many rituals in the hope that they will get more rain, and try to adapt by growing more drought resistant varieties, and shifting from rice to crops that need less water, such as maize.
- *Pests and diseases:* villagers' crops have succumbed to more pests and diseases (including new pests) due to drought and increased mono-cropping; they have revived traditional practices to get rid of pests, such as using smoke etc.

Activities since the Bhutan INMIP workshop

Since the meeting in Bhutan, villagers have been growing more diverse crops including maize and beans, and have returned to traditional farming practices, such as intercropping and mixed cropping. They are experimenting with growing traditional corn they got from Peru, and have tried to grow different soybean landraces from other parts of China – some grow well, others not so well. They are also now trying to bring back traditional varieties from their own village, along with the related knowledge. They continue to practise ancient spiritual beliefs, and following the Bhutan exchange are bringing back their traditional method of rice wine making using traditional herbal yeast. They are starting to collaborate with agricultural scientists to improve local landraces and breed more resilient varieties through participatory plant breeding. They are also setting up a 'Seed Park' biocultural heritage territory and a community-based seed bank inspired by the Potato Park in Peru.

China – Zhuang people, Nonlv village, Guangxi

Nonlv village in Duan county, Guangxi province, Southwest China, is at an altitude of 800 masl, in a tropical forest and Karst mountain area near the border with Vietnam. Rice is the most important crop for the village. The impacts of climate change are similar to those experienced in Yunnan (see above) – most notably drought, although it is not as bad as in Yunnan. They have also observed changes in the seasons and increased temperatures in the last ten years, as well as increased insect pests and diseases.

Ms Wei Yugui is the co-ordinator of the farmer co-operative in the village. in 2007 she started to collaborate with scientists on agricultural biodiversity and participatory plant breeding, and has learnt the importance of preserving different varieties of rice. Through participatory plant breeding they are developing more resilient and higher yielding varieties of maize and rice; and using genome data they have found 200 varieties of rice in their communities. In the season that extends from January to June they now try to grow about 11 varieties of rice, and in the second growing season they grow 18 varieties of rice. To address climate related challenges they have also brought back traditional varieties of rice and traditional practices for growing rice – using ducks and fish in the rice fields which feed on the pests, so there is no need to use chemicals. The rice is thus organic and is very popular in the market, fetching twice the price of conventional rice.

Activities since the Bhutan INMIP workshop

Last year the workshop participants got seeds in Bhutan which they first tested on their own farms, and then shared with other farmers – if it tastes good, they keep the seed. But most of the seeds they got

Wei shares gifts with Jafr community. K. Swiderska

Wei dances with Pamir dance group. G. Galvaing

from the exchange in Bhutan are not suitable for their altitude. This highlights the need for the network to be very specific about the local conditions in which seeds for exchange can be grown.

India – Lepcha and Limboo communities, Eastern Himalayas

These villages are at between 900 and 1,400 masl in subtropical forest near Kalimpong in West Bengal state, in the Eastern Himalayas of northeast India. The Lepchas have a unique identity in the Eastern Himalayas, having originated there thousands of years ago. They have discovered various ways to adapt to climate change. In due recognition of the need to conserve Lepcha culture and promote appropriate livelihoods, the State Government set up a Mayel Lyang Lepcha Development Board in Kalimpong in 2013. The board is directed by members of the Lepcha community, including Dawa a Lepcha farmer, and is supported by government administrative officers.

Climate change impacts and responses

The villages have experienced many extreme weather events this year. However, this was an exceptional year and these events cannot yet be considered a trend.

- *Temperature and rainfall*: A hailstorm with very large hail-stones weighing 150–200g lasted half an hour on 26th March this year destroying several crops (including cardamom) over 400 acres, affecting 200 households. In places hail pierced the tin roofs, causing damage to houses. Though hail is normal in April-May, it has never been so big or so early in the season. They also had hail in October-November 2014. As a result, crops were damaged in two consecutive seasons, causing severe hardship. They also had very heavy rain in July; while this is normal, the rain contributed to a lot more fungus into the bean crop, which had not happened before and could be explained by increased temperatures. They had very strong winds in March and April, uprooting trees, damaging many fruit trees and electricity poles – this was almost like a cyclone and had never happened before.

India team in Jafr: Ajay Rastogi, Mayal Lepcha and Dawa Lepcha. G. Galvaing

- *Pests and diseases:* are increasing – fruit has been falling before ripening in the last 3–4 years and this is spreading. Paddy has also been affected by a new disease in the last 3–4 years.
- *Soil:* erosion is very high because of the heavy rain – planting local broom grass is good for conserving soil and for fodder.
- *Seeds and biodiversity:* as a response to climate change villagers grow several varieties of paddy rice with different characteristics together in the same plot. This increases the probability that at least one variety will survive despite the more unpredictable and extreme weather. They always grow one of the early maturing paddy varieties in a small area to serve both as an insurance against adverse weather late in the growing season, and to create space for threshing etc. when the other varieties are harvested. The Lepcha community has more than 500 *Teptongs* (self-help groups). Each group has been given responsibility for some seeds and they plan to federate as a decentralised seed savers network which can function as a community seed bank.

Activities since the INMIP workshop in Bhutan

Dawa and Mayal (a Lepcha woman farmer) visited the Peruvian Potato Park in December 2014. Inspired by the Potato Park example (see p.20) Mayal has been setting up a Bean Park at about 900–1400 masl, involving two communities growing 34 bean varieties. Villagers are using a seed drying method they learnt in Bhutan, and their way of storing finger millet has also improved since then. They are now reviving a traditional millet which had almost become locally extinct, and 'naked wheat' which has become much reduced in cultivation and use. They have held a number of exchanges between the communities in the eastern and central Himalayas and have established several community seed banks. Through these exchange visits (supported by the SIFOR project[15]), they have got new varieties of millet, eight or nine varieties of bean and a radish from villages in the Central Himalayas, while the Central Himalayan villages got cardamom seedlings from them. They are trying to revive traditional recipes and held a food festival in Kalimpong involving 11 communities. Each had their own stall and the festival attracted 5,000 visitors. Villagers are now trying to improve hygiene in their community as they were impressed that the Potato Park communities were so clean; and they want to plant more trees even if just for their aesthetic value.

15 SIFOR – Smallholder Innovation for Resilience – is a five-year European Union-funded project which aims to strengthen biocultural innovation systems for food security in the face of climate change. See: www.bioculturalheritage.org

Dawa is reviving seeds and traditional agriculture. The Lepcha communities have conducted an experiment – if the rain does not come on time, they cover the rice seed with grass to conserve the moisture until the rain comes. They have also found that even if they harvest the maize before it is ready, it still ripens and they can get the same yield. Large cardamom remains one of their main cash crops and one of the local cultivars (Varlangay) available in the Lepcha community has become extremely popular in the region after cardamom in forest areas got hit by disease (Colletotrichum blight). Varlangey adapts very well in low shade conditions and requires less moisture and can therefore be planted in farmlands and not just under forest cover.

The Lepchas make offerings to gods before eating and only women can participate in that ceremony. They believe they are descendants of the *Kingchong Dzongbu Chu* (Kangchenjunga mountain, as others call it) and in an annual ceremony they offer prayers to ensure they have a good life and harvest. They used to live in caves – the Bean Park includes some of these caves and they offer prayers in them once a year. The Limboo people live together with the Lepcha in the villages and perform similar ceremonies. They use traditional fishing methods (with no chemicals). Lepchas have a relationship with nature and consider themselves to be children of the earth. They have set up 32 language schools to revive the Lepcha language.

Kyrgyzstan – Samarkandek village, Batken province

Samarkandek village is at an altitude of 1100 masl, about 1,000 kms from the capital city. It has a population of over 1,000 (more than 200 households). Batken province is well known for its apricot production. Since 2010, the community has collaborated with the Bio-Muras Public Foundation to conserve local apricot varieties and revive biocultural heritage. Since 2011, they have organised annual "Blooming Apricot" festivals for conserving biocultural diversity. Specialists from the Bio-Muras Public Foundation found over 15 apricot varieties around their village, and through festivals they have involved the elders and youth and so revived TK and biocultural heritage. To teach the younger generation, they have organised school nurseries of local fruit crops. They have also participated in Slow Food events in Italy and South Korea.

Climate change impacts and responses

In the last 15–20 years they have seen very visible climatic changes.

- *Temperature and rainfall*: 2015 was extremely hard because they had late frost and snow at the beginning of April when the apricot trees were blooming, and the frost was longer than usual. This meant they lost almost the whole apricot harvest, which is the main source of income for the local communities. They lost the early ripening varieties in particular, but they still got some harvest from late varieties (30–40% of the harvest). This happened not only in this community, but also in Bishbek and other regions. Previously they hardly ever had this problem. They are establishing a school nursery to raise locally adapted varieties which can withstand late frost. Since 2000, the temperature has been increasing each year. This summer was unusually hot, with temperatures sometimes 40–45 degrees or close to 50 degrees. Due to this, the snow melted very fast and a big mud-stream destroyed irrigation channels and they had no water for two months. It also destroyed the forest and went into their territory. There is also a lot of open-caste mining in the country which is contributing to the loss of glaciers and the consequent lack of water for irrigation. Groundwater is rising up in one area and creating a wetland. This is due to rainfall and the destruction of drainage systems. As a result, farmers are losing land for cultivating crops.
- *Pests and diseases:* There are more diseases in their territory now, with bacteria mainly affecting pear and apple trees. Some diseases are related to increased temperatures, while others are caused by insufficient phyto-sanitary controls when products move across borders.
- *Soils*: Kyrgyzstan has a strong organic farming movement; many farmers are organic and use a variety of traditional and new organic methods for fertilising the soil.
- *Seeds and biodiversity*: Having access to different traditional varieties of crops and good quality seed is vital for responding to these climatic challenges.

Activities since the Bhutan INMIP workshop

When the workshop participants returned from Bhutan they were inspired to do something about the problem of getting good quality seeds. They initiated some research, collected traditional seeds from farmers, and established a network between farmers and a community seed bank. They started this project in August 2015 in their community – they are working with four communities and neighbouring communities are invited to participate. They have also arranged an international apricot festival, 'Blooming Apricot'. The community is located on the border with Tajikistan and they exchange experiences over the border because the Tajik people have more experience with fruit trees. This has resulted in a revival of traditional knowledge and its transfer from elder to younger generations.

Sultan represents the Association of Honey Producers in Kyrgyzstan and the Federation of Organic Producers whose mission is the conservation of biocultural diversity and sustainable use of natural resources. The Organic Federation have also initiated some activities for climate change adaptation. In Kyrgyzstan they have a saying that after 50 years the population will change, and after 100 years nature will change. In the last two years the federation has started to implement an organic territory – '*organic aimak'* – which synthesises TK and modern scientific technologies. It has motivated people to use and conserve traditional knowledge and to change their perspectives on using land resources. About 21 mountain communities are involved. The federation is also teaching them to use some modern, efficient methods like drip irrigation because even though they don't have water shortages now, this could become a problem in future. It is also teaching communities to use biogas and better insulation.

Elders in the community feel that climate change is the reaction of Mother Earth to many human activities which have a negative impact on nature. Kyrgyz people were nomadic and in their tradition they respect nature and balance with nature; they believe that if they lose that balance they will face problems. They are exploring and collecting traditional practices for growing potato and grain without irrigation and chemicals. They are also working on restoring the community forest and ecosystems to provide water, soil etc.

Papua New Guinea – Yupna and Jiwaka people

Papua New Guinea (PNG) is a Pacific island nation just north of Australia, bordering Indonesia to the west. It has tropical rainforest in both coastal and lowland ecosystems up to an altitude of 4,500 masl. It has over 850 languages, reflecting the wealth of cultures and systems of agriculture and cultural expression that span the altitudinal profile. The traditional knowledge associated with each tribal group is also very diverse. The government recently established the Office of Climate Change and Development to oversee the development of policies for overcoming the adverse effects of climate change. Although PNG has many rivers, traditional agricultural practices have depended very much on rainfall, and irrigation has not been part of traditional practice in most communities. With changing rainfall patterns, it is uncertain whether traditional agricultural practices alone can be relied on to sustain the livelihoods of mountain communities.

The people have acquired traditional knowledge systems from their forefathers which allow them to rely on wild food resources from their marine, aquatic or forest ecosystems when crops fail. Such knowledge systems are common in many communities and are unique to specific microhabitats and ecosystems, such as swamps and waterlogged areas, coastal ecosystems, mid-montane and high altitude areas. Many wild food crops have been domesticated throughout history and the traditional naming and classification systems tell of the TK systems associated with these food crops. However, work to understand these traditional knowledge systems and practices and correlate them with mainstream scientific knowledge has been minimal or non-existent. Combining traditional knowledge with scientific research and development can help to develop local knowledge systems that can help overcome the adverse impacts of climate change in PNG.

The Yupna and Jiwaka people represent two unique communities in PNG; the Jiwaka people dwell in the fertile Waghi Valley at an altitude of about 2,000 masl, while the Yupna people live in the rugged mountainous region of the Finnisterre mountain range at an altitude of about 2,500 masl. The traditional agricultural systems in these two regions differ markedly, along with the choice of food crops that have been domesticated and have become part of traditional agricultural practices. Generally, traditional food

Representatives from PNG, Bhutan, Peru, India and Kyrgyzstan. G. Galvaing

crops common to the mountain communities in PNG are various species and varieties of tubers such as sweet potato (Ipomoea sp.), yams (Dioscorea sp.), taro (Colocasia sp.), cassava (Esculenta manihot), and also different varieties of banana (Musa sp.). These are complemented with wild edible seeds and nuts from the forest, wild edible fruits and leafy greens and protein provided by wild game, insects, reptiles and forest grubs.

Climate change impacts and responses

- *Temperature and rainfall*: In 2014 there were long dry seasons in some parts of the country and long rainy seasons in other parts. This year the pattern was very different – there were heavy rainstorms in April and May and there has been no rain since then. At the time of writing (September 2015) the communities were experiencing a severe drought. In August 2014, frost affected many farmers and most communities at higher altitudes lost a lot of crops. The government has declared a state of emergency and parts of the country are now facing famine. As their ancestors did not use traditional irrigation systems, only rainfed farming systems, they have no experience of coping with drought. The temperature has gone up. At high altitude the days are very hot and the nights are very cold. Malaria has spread to higher altitudes because of increased temperatures, and some agricultural pests are now feeding on non-traditional foods.
- *Soils* are very dry – plants are drying out, therefore water retention in soils has got worse. A lot of trees are being lost to forest fires.
- *Seeds and biodiversity*: if drought kills the crops, especially in the case of monocotyledons (eg. maize) and dicotyledons (eg. beans), they won't have any seeds for the next season. Other food crops, such as tubers, are usually propagated from cuttings. Drought will also dry up these crops, affecting their propagation in the next planting season. Wildlife has also been affected. Traditionally fallow periods were five to six years, but with population and conservation pressures, these have fallen to about three years.

Activities since the Bhutan INMIP workshop

Since the Bhutan meeting, the representatives from PNG have realised the vital importance of the knowledge systems contained within PNG's 800 different language groups. They have continued documenting those indigenous knowledge systems. They have a high diversity of sweet potato, banana,

taro and wild edible mushrooms and have done a lot of work to document the TK systems associated with this biodiversity. They are exploring the traditional names of different food crops and the knowledge associated with them, and want to conduct scientific tests to understand and correlate the TK systems to modern science and establish the nutritional content of these traditional food crops. They will then encourage planting of more of these nutritious crops in the communities to help people overcome the impacts of climate change. They are also involved in teaching and engaging the next generation of young people and students at all levels in these issues.

Peru – Quechua communities, the Potato Park

The Potato Park in Pisaq district, Cusco province spans an altitude of 3,100 – 5,000 masl, covers an area of 9,280 hectares and has a population of about 6,500 people. The park includes two mountains – a female and a male mountain – which they revere as their leaders. They believe that potatoes have a spirit and should not be cut. The park is managed by an association of five Potato Park communities. It is an Indigenous Biocultural Heritage Territory which has been managed collectively since 1998 – all the communities decide the rules for the whole area, and for their own community.

The ecology of the Potato Park is divided into three altitudinal ranges – upper, middle and lower. Each one has a name in Quechua. They now have high levels of potato diversity – about 1,400 varieties or types – and are working to conserve all the potato diversity of the region. Since 2004, they have gained 410 native potato varieties from the International Potato Centre (CIP), which had been collected from the local area in the 1960s but had since been lost. The communities categorise potatoes according to their use: some are for drying, for cooking and roasting, and some are only for soups. They make freeze-dried potatoes from special potatoes that grow in the higher parts – during the day they dry the potato and at night they freeze it. Their ancestors used to keep dried potatoes for more than 30 years if they stored them under the soil. They also conserve other Andean tubers, including about 92 varieties of *oyucos*, a relative of the potato. They have a rich diversity of quinoa – red, blue, yellow – which has high protein content; and different varieties of corn – about 11 of the 14 that exist in the Andes.

Climate change impacts and responses

- *Glaciers and water:* glaciers are melting and gradually receding. About 60% of the Ausangate glacier has been lost in the last 30 years. Mining companies want to extract coal in the region, which could bring added pressures.
- *Temperature and rainfall:* Temperatures are getting higher and more extreme. Since 2010, they have been noticing very strange rainfall patterns – they used to get rain in the whole valley in a uniform way, but now it rains in patches. The rains are also more intense. In 2010 they had torrential rain for two months. Normally the rainy season is November to April but in 2014 it rained until July, which affected their crops, including potato and corn. It is an 'El Nino' year in 2015/2016 so they expect even more rain. Recently is has been snowing like never before.
- *Pest and diseases* have got worse. These include worms that affect potato tubers and leaves and light blight; their response is to plant at higher altitudes where there are less pests in the soil because the temperature is lower. In the last 30 years, potato cultivation has moved up by 200 metres because of increased pests, correlated with increased temperatures.
- *Seeds and biodiversity*: The communities have a large diversity of crops as a response to climate change – while some will die, the majority will survive. Crop diversity is also important for food sovereignty. They reproduce 1,400 varieties of potato seeds and share them with other communities, allowing them to select seeds that resist pests and other climate change impacts.

Activities since Bhutan INMIP workshop

The Potato Park communities recently had a meeting with the regional government of Cusco and the Environment Ministry to develop local plans for adaptation to climate change. They also deposited half their potato collection in the Svalbard Seed Vault in Norway for their own food security and to contribute to global food security. They are organising Farmer Field Schools in the Potato Park to assess climate

change impacts and develop responses, including Participatory Plant Breeding to develop crops with high antioxidant content, and maize that is resistant to drought. The Potato Park is managed by community researchers and various economic collectives. They have a trust fund to which all economic activities (the handicraft group, natural products group etc.) have to contribute 10% and the funds are divided up at the end of the year. They have an inter-community agreement which they use to decide how to share all the benefits that the park produces. They also have a culinary sanctuary and a traditional restaurant because the women possess a lot of TK about food that needs to be protected. The benefits are shared according to the effort of each community member – so the community that has worked the most gets the most benefits. Each community is free to use the benefits as they wish in line with the customary rules of the park. Some use it for their leaders to travel to help defend their land rights, or to provide scholarships for children.

Mariano shares the Potato Park's experience in the orchard in Jafr. K. Swiderska

The Philippines – Higaonon tribe, Mintapod village

This community is at 1,400 masl in an area of tropical rainforest. It has 14,000 hectares of land, protected by ancestral domain title, including 85% forest cover. There is virgin forest, secondary forest as well as land for rotational farming; they continue their rotational farming because this is their culture. It involves a 10-year rotation, and contributes to the rich biodiversity in the forest. Their ancestral land is also registered as an ICCA – Indigenous Peoples and Community Conserved Area. It contains 13 communities; all have their sacred areas, managed by 13 '*savios'* (elders). Datu Amay (an elder) has received an international award for his forest conservation work. He lived in the forest alone from the age of 11 to 22.

The community believes in spirits associated with the forest, birds, water, air and honey etc. The forest is their larder, hospital, market and church. Datu believes that the forest should not be used or sold – it's the law of the forest. The forest is strictly protected by the ancestors. Thus they pray before cutting a tree, and if they take anything out of the forest, they only take as much as they need. This is how to ensure sustainability. The next generation will be able to benefit from this forest. Preserving traditional knowledge is a very good way of not having to depend on external interventions. The water in the rivers is very sacred. It is prohibited to throw dirty things in the water. When washing clothes, the first wash has to be thrown away on the land. This is the traditional way of respecting the water.

The Philippines team present their experience in the orchard in Jafr. G. Galvaing

Climate change impacts and responses

- *Temperature and rainfall*: They have had more and more typhoons every year since 2000. One year they had as many as 29. Previously they had few typhoons. Now summers are typhoon summers – they have about three times more typhoons a year than before. As a response, they only build very low houses made of hard wood. The forest provides an essential physical buffer against these increasingly frequent and severe typhoons. Last February, typhoon Senyang arrived, bringing very heavy rain for three weeks. It caused a lot of landslides, destroyed the road and the rice paddies, and damaged bridges. There were also landslides in the sanctuary, and all creeks and rivers were affected. Tree branches fell off and fish, wild animals and birds all suffered. This has been a hard hit for them, but they continue to protect the forest.
- *Pests and diseases*: rats are a problem for the crops nowadays, damaging all the harvest. The only major crops to survive are sweet potatoes, cassava and maize. The community feels that a lot of bad things have occurred since around 2000 – typhoons, rats, pests and diseases. New crops were introduced around that time. If they ask the Department of Agriculture for advice, they propose chemicals, for poisoning rats, etc. But the communities are not able to buy the expensive chemicals. Some agencies who work on sustainable agriculture have advised them to adopt multi-cropping.
- *Seeds and biodiversity:* In their traditional farming system, they know that the best way to secure their food and livelihoods is to harvest a range of crops and varieties, and ensure that a variety of trees will grow. They keep the land cultivated for one year, and other kinds of trees and herbs will grow in the second generation – the birds ensure that they do. This is how a fallow system works and it enriches biodiversity.

Thirty years ago, there were no problems with climate change, and land was abundant. Despite only limited rotational farming areas, they grew enough food, and there were no pests. Starting around 2000, new migrants arrived and residential areas have been growing. The new people are using hybrid seeds, and modern varieties of rice. Social development is also causing traditional farming to change. Before when they all used traditional varieties, the pests didn't attack. Since the non-indigenous migrants came, bringing roads and lights etc., the forest has changed and become less abundant, and the rats and birds have started to attack – not only the new varieties, but also the traditional seeds. More than half of the indigenous people have begun selling their lands, although Datu has not sold anything. Datu feels that climate change may be nature's revenge for the impacts of migration.

Activities since Bhutan INMIP workshop

In response to the need to protect the forest the community has declared 6,000 hectares of forest as sanctuary. They have also organised 30 people from the 13 communities to act as 'forest tribal guards'; each community has a minimum of two guards. Their task is to monitor the entire forest. If someone from outside the community asks for firewood, they can give it to them, but they never sell the wood. If someone takes wood without permission, there is a penalty, but if a family asks for wood for building their house it is allowed.

Taiwan – Kanakanavu community

This community is located in tropical forest in Southern Taiwan, at an altitude of between 800 and 2,000 masl. Despite the fact that it is a very old community, it has taken a long time to get recognition. Now they have their own name and their language has been identified by the United Nations as very endangered – it has even been registered as disappeared. However, it does still exist, but fewer and fewer people speak it. The community has started to teach their language, and bring it back from the classroom to their farms. In 2008, a typhoon destroyed the tribe. Apu, a cultural worker from the community, has worked to restore it, including revitalising the use of traditional plants and healing. She built a network in the tribe for mutual support, which includes elders and young people.

Climate change impacts and responses

- *Temperature and rainfall*: The community has experienced more frequent and destructive typhoons on the one hand, and a lack of rain on the other, both of which damage crops. This year a very big typhoon caused a lot of flooding, and destroyed water sources which led to mudflows. They feel that protecting their forest is the most important response for coping with typhoons. It has become hotter in the daytime and colder at night, so the temperature difference has increased.
- *Pests and diseases*: these have increased. The community uses natural methods to deter insects, such as chilli water.
- *Soils*: productivity is declining, and villagers have observed that traditional seeds can grow better than modern varieties in these conditions.

Apu from the Kanakanavu community, Taiwan, in Jafr. G. Galvaing

- *Seeds and biodiversity:* After the 2008 typhoon, the government wanted to help them to rebuild their community. However, their way of helping was to introduce new crops and modern seeds. That is why the community started their project of revitalisation – they are trying to bring back their traditional crops, and to introduce organic farming.

Activities since the Bhutan INMIP workshop

After returning from Bhutan last year, the community was inspired to start networking more widely**.** They invited more and more women from communities to join the project. Since last year, some universities in Taiwan have been interested in knowing how the people managed to continue living in the communities as opposed to migrating, and the process they went through.

Tajikistan – Jafr community, Rasht Valley

This Islamic community is located at about 1,600 masl. They mainly grow fruit trees and all families have a little orchard and vegetable garden. They also have goats, sheep, and three or four cows, mainly for household consumption. The animals graze in the mountains over the summer, and on nearby grazing areas for spring and autumn. Hay is collected for fodder for the animals in the coldest months of winter, when the grassland is covered by snow. In Bhutan, they saw that although mountain communities have difficulties, they have not always accepted new technologies for solving their problems – only those which have proved useful based on their own criteria. They know the value of traditional practices. Since their experience in Bhutan, they have more love for their landscape and for nature.

Climate change impacts and responses

- *Glaciers and water*: Many communities in Tajikistan are dependent on water from glaciers for their orchards and crops. There is concern that mountain glaciers are melting extremely fast. For example, Fedchenko, one of the biggest mountain valley glaciers in the world (the biggest in the post-Soviet Union), which also supplies water to neighbouring countries, has decreased in length from 77 to 71 kms and in width from 1km to 800m in the last 20 years. This year it was very hot in July and August and much of the snow on the mountain melted away. Villagers noted that when you live somewhere for a long time you observe the changes year by year.
- *Temperature and rainfall*: This year the Jafr community had an extremely dry and hot late spring and summer. This led to a big increase in crop diseases and they lost much of their potato and fruit harvest. Because of the heat the yield from honey-bees also declined. They are also experiencing more droughts. This year they had rain until May and then no rain for four months, which is unusual. They also had very heavy rain in one short period which they never had before. This caused mudflows and 12 houses were washed away in some villages further up. People whose villages were covered by the mudflow were relocated to another place in the Rasht valley. If there is increased frost killing trees (as in India), they use the local tree variety to enhance resilience.
- *Pest and diseases:* the very high temperatures this year brought a lot of pests, especially beetles. When there is drought and high temperatures they get insects, and when it is too wet they get fungus. The only possible responses they know of are either to use chemicals or to use local varieties which are already adapted. They have chosen to promote local varieties as their local trees and crops are usually better adapted to drought and diseases. While an introduced variety of alfalfa (‘esparset’) planted for fodder was affected by pests, the local variety was not.
- *Soil*: while some of their soil is sandy, most is clay. Both types have very low humus (about 0.5%) and phosphorous content. They could use mineral fertiliser, but it is expensive and not very good – organic fertiliser contains all the elements needed, and helps to build organic soil content and soil structure, and also enables access to organic markets. There is soil erosion on the hillsides due to deforestation combined with pressure from grazing.

- *Seeds and biodiversity:* In spring, farmers from the Rasht valley look for seeds in other valleys because they don't have a seed bank. While this does not give them access to the best quality seeds, farmers buy them due to the low price. However, they sometimes get diseases.

Walking workshop visit to orchard on eroded hillside, Jafr. K. Swiderska

One innovative farmer – Mirzosho, who is a traditional farmer and trained agronomist – has started to revive traditional fruit trees in the Jafr community. He observed that the local varieties of fruit trees were disappearing, and started collecting seeds and cuttings from the trees and from farmers in other communities who keep local varieties. He is planting orchards to regenerate eroded hillsides which had no vegetation five years ago. Now they have lots of fruit trees, which are reducing soil erosion and bringing back biodiversity, such as insects. To establish the fruit orchard he planted local/wild varieties which can withstand the increasingly dry conditions and then grafted five species of introduced varieties onto them as they are better for the market. Grafting allows a tree to produce fruit after two years, while growing from seed can take four years to get fruit. If a variety does not do well, he doesn't promote it.

The community uses different planting methods in different parts of the hillside, but not on the same bit of land. In the sunny areas they plant local varieties which are resilient to drought – eg. apricot, almond and cherry trees. In the shaded areas, the soil and growing conditions are different so they plant different species – apples and pears. 'We can't control nature but we can always adapt' Mirzosho explained. The scientific literature says you can't plant on slopes of more than 12 degrees; but they plant on 46 degree slopes because their ancestors planted orchards on slopes as steep as this. When the climate changes, people should use their TK to improve their livelihoods – they don't need to rely on help from outsiders.

Other farmers are now following Mirzosho's example – in the last two years many villagers have started to take up and support his work. Many young people have left the villages, but when they come back to the village Mirzosho teaches them how to do grafting and establish orchards to get an income. This is encouraging young people to return to the village. The strength of peoples' spiritual beliefs related to mountains depends on the economy – when they can't earn an income, the beliefs go away. With support from The Christensen Fund,[16] Mirzosho is scaling up this work across the valley.

16 A US foundation that aims to back the stewards of cultural and biological diversity, see: www.christensenfund.org

Mirzosho has also established a **traditional orchard** for conservation, which has 52 varieties of apple, 34 varieties of pear and 22 apricot varieties. He now has more income than before because he sells seeds and plants from the orchard, produces honey and has built a tourist lodge. He got much inspiration from his visit to the Potato Park in Peru (see p. 20) and decided to create this 'Fruit Park', for the benefit of the whole community. Tourists buy the products from the orchards and the park – such as tea, honey. Mirzosho now plans to package these products to improve marketing and income, with a small project grant from the Aga Khan Foundation.

The community has also established an orchard in the village school with the help of school children. The aim is to get children interested in agriculture, to promote traditional knowledge transmission between generations, to increase local crop diversity and to provide a bit of income for the school. Children are not taught about agriculture nowadays. They spent one day putting up a fence and another planting the trees. In the process the children were taught grafting techniques. The trees were planted in a circle so that they look beautiful when they blossom. A group of schoolboys has also planted an orchard on an eroded hillside near the village.

Inspired by the visit to the Potato Park in Peru, Mirzosho has also established a community-managed **Food Park** in a beautiful valley near the Jafr village. This multi-functional landscape conserves wild crop relatives (including apples and pears) and medicinal plants; allows women to harvest wild foods and plants for income (farming is done by men); and provides pasture for community livestock grazing and space for farmer experimentation. It also protects a sacred site – a large pear tree which is about 320 years old and still bears fruit – and a watershed – a pipe has been installed to provide water for the community. The landscape is also important for allowing continued evolution and gene flows between altitudes and ecological niches for adaptation to climate change.

Fruit trees in the Food Park are protected by planting them in amongst the shrubs so livestock can't eat them. Mirzosho has also grown potatoes obtained from the Potato Park five years ago – he planted botanical seed (rather than potato tubers) as that is the best way to avoid the spread of viruses. The first year the potatoes were very small, but after selection over five years he has achieved a good crop of potatoes. In this way he has adapted Peruvian potatoes to Tajikistan conditions, creating new genetic diversity in the process. He has also grafted tomatoes onto potatoes to produce a crop below and above ground, as they are both of the same genus (Solanum). The landscape also provides an opportunity for generating income from trekking, and they will also explore the idea of producing bottled water.

It was difficult to get a permit to use the land to establish the Food Park as all land in Tajikistan is owned by the government. Mirzosho, a traditional farmer and trained agronomist, was recognised as the best farmer in Tajikistan, and the government asked if there was anything he wanted. Mirzosho requested that the land for the Fruit Park be given to the community andthey got a 100-year loan to manage the land. There was some resistance from the community at first as some activities (eg tree cutting) had to be restricted.

Mirzosho's traditional orchard and beehives, Jafr. G. Galvaing

Tajikistan – Wakhi people, Tuggoz Community, Wakhan Valley

The Tuggoz community is located in a river valley in the Pamir Mountains in southern Tajikistan, at about 2,500 masl. The community maintains a traditional Pamir culture. The ethnic family of the Pamirs has been spread across China, Pakistan, Afghanistan and Tajikistan for at least 4,000 years; the strong Pamir culture has embraced other religions and cultural influences (eg. Islam), but with their own interpretations. The integration of Islam with other pre-Islamic cultures and religions has preserved the ancient Zoorastrian and Arian traditions and cultures, which otherwise would have had to convert fully to Islam.

The workshop was held in a traditional Pamiri house (locally known as a '*chid*') owned by Kodirsho, a local farmer, and the Pamir culture was explained through its construction. The central room has a square skylight window opening which represents love and life, which come in from the top and shine on everyone, unconditionally. The room is divided into four square sections representing the four elements of the Universe: earth, water, wind and fire (this is a strong influence of the Zooroastrian religion which existed in the region prior to Islam). By going through these elements, as we go through the four sections of the room, we can see the universe. Then we have the five supporting pillars which are named after the five angels according to Zoorastrian interpretation, and after the five family members of the prophet Muhammad according to Islamic Interpretation. The *Kitsor* (the angel who guards the fire) is traditionally close to the fire, where the food and bread are cooked. In the central room, men and woman sit on different sides; women are keepers of the fire, and men bring the wood. The door to enter the room is usually very low so that people have to bend down: this is like celebrating the sun. The entrance door should be to the east, also to celebrate the sun. The Pamir houses have been built like this for thousands of years; when Islam arrived some 1,000 years ago, they integrated the religion into their culture so that now all 10 prophets are represented in the house.

Skylight in traditional Pamir house, Tuggoz. G. Galvaing

The main crops grown are wheat, barley, millets, pulses, beans and potato (the latter is a recent introduction, mostly post-Soviet). The Pamir region is a centre of diversity for wheat, and there are about 52 varieties of wheat in the Tuggoz local area. Apricots and apples are also common. People keep goats and sheep and a few cattle, donkeys for transport and oxen for ploughing. The cultivated area is irrigated with water from the mountains, which is led to the fields along constructed canals. Part of the system for irrigation and ploughing is done by oxen and has rows (furrows); the other part is done by hand, and involves raised beds which are better for growing crops, but require more work. Kodirsho showed participants a map to explain how they have laid out the rows and beds. Irrigation comes from channels along two sides of the field. Next year they will make the rows and beds in a different direction. The order depends on the humus and energy; everything is calculated in detail.

Sowing is guided by the traditional agricultural calendar, which is developed annually based on a sun calendar made by placing a stone with a hole in it in the valley. When the sun falls into the hole at a certain angle, the planting season starts. The basis for the calculation is made by an experienced and knowledgeable wise man, who integrated the calendars of all the farmers in the valley into this one. It is important to follow the calendar, rather than paying attention to actual weather conditions, in order to ensure a good harvest. The crops will balance between the changing weathers. This year it was a hot

spring, followed by a dip into cold weather, and then a drier summer. The crops compensated for the losses in the spring, although they had an unusual wind. From their experience, if they miss the right sowing season as advised by the calendar, they never get a good yield. The calendar tells you details about the planting times for different crops, which areas to plant etc., in order to maximise yields. For example, this year, from 10–20 May they can only cultivate wheat, and for barley they have to do all the planting in one day. Kodirsho plants two traditional varieties of wheat. He tried using a modern wheat variety but found that yields declined after one or two years and he had to use a lot of chemicals to get any harvest. The local wheat varieties produce higher and more secure yields in the dry and poor soil conditions. Farmers use mixed cropping of barley, wheat and beans. The beans ensure nitrogen fixation, and soil is also enriched using animal manure.

Farmers in Tuggoz explain planting and irrigation channels. G. Galvaing

They have a Village Technology Group for wheat production, involving collaboration with scientists from a local agricultural research institute. Together they study the farming system and how it works, collecting and analysing scientific data, in order to improve it. In this way, the traditional farming calendar and the irrigation and planting systems are developed and improved each year using both traditional and scientific knowledge. It is now their second year of research and they have measured the soil temperature at the date of sowing according to their calendar. So far it appears their traditional practices are in line with “scientific logic”.

Climate change impacts and responses

- *Glaciers and water:* Villagers have not yet noticed many changes in their community that they can link to climate change. However, this year the level of water was higher in the river in the early spring than ever before. Although they did not notice that the glacier melted more, they also had more snow. They remember from their childhood that they took animals to graze in this place, in this same season, and now it is still covered with snow. So the glacier is expanding, but they think that this is due to increased snowfall, rather than changes in temperature.
- *Temperature and rainfall*: Lots of orchards in the Pamir were affected by the high amount of snow this year; trees were damaged and even died. In April it was very warm but then became very cold (down to -7 or -10 degrees), and this destroyed the flowering and the coming harvest in many places. There were also large-scale mudflows in every district in the Pamir this summer. In Shugnan, the mudflow blocked a river, formed a lake 3km long and up to 50m deep and completely covered 75 houses. In Vanj district, mudflow damaged houses and cars and killed 7 people. They did not have that much flooding in Tuggoz, however, and there was not so much damage, but it was really bad downstream. Previously, fruit used to ripen earlier, now it takes longer. Apricots, for example, were 15 days late this year; and there were also some delays with tomatoes. Despite the unusual season this year, they did manage to get a harvest by following the calendar.
- *Pests and diseases:* They have few pests. They do not have rats, but birds can try to eat their harvest; they do not kill them, but just scare them away.
- *Soils* are poor, and all cultivated land is dependent on irrigation using water from the high mountains and glaciers. It is a lot of work to expand land for cultivation, if at all possible. Mudflows and other kinds of disasters, including earthquakes, are common. These represent the greatest risks, rather than changes in climate.

- *Seeds and biodiversity*: Villagers use their traditional seeds, and sow strictly according to their sun calendar (see above). Following the calendar is the priority, even if the seasons and climate were to change. Although there might be variations, they do not think anything will change so much that they would need to rework the calendar.

Kodirsho receives gift from the Naxi Stone Village, China. G. Galvaing

Thailand: Karen Pga-ke-nyaw people, Hin-lad-nai village

The Pga-ke-nyaw people are a sub-group of the Karen. The Hin-lad-nai village is in the tropical rainforest of northern Thailand, at an altitude of between 600 and 1,200 masl. For centuries, villagers have used a traditional rotational farming system and managed their natural resources based on customary laws and practices. In the last 30 years, they have regenerated their forest which had been logged without their consent, while maintaining their traditional rotational farming system, terraced paddy fields, agro-forestry etc. They have developed new high-value products: they now market honey, natural tree tea, bamboo shoots and other non-timber forest products. Part of the income goes to a village fund for the collective needs of the community, including managing and protecting their community forest and traditional cultural landscape. The aim is to increase income so that they can secure their livelihoods based on their rotational farming system, while conserving biodiversity and mitigating climate change. The fallow period is getting longer (between seven and ten years) because villagers now have greater income from the forest due to more sustainable management, agroforestry and the marketing of non-timber forest products.

In response to government concerns about carbon emissions, they have conducted studies in collaboration with scientists which show that their rotational farming system is carbon neutral, and provides for more than 90% of the food needs for the community[17]. This model shows that indigenous people can coexist very well with forests and ecosystems and achieve sustainable management based on traditional, indigenous knowledge, as well as science.

Climate change impacts and responses

- *Rainfall*: rain is increasingly unpredictable and no longer follows a seasonal pattern – it rains out of season and there has generally been a decrease in rainfall. If there is no rain, villagers cannot plant paddy. However, some years there is too much rain and paddy production is affected

17 Northern Development Foundation, 2011. Climate Change, Trees and Livelihoo: A case study on the carbon footprint of a Karen community in Northern Thailand. http://unfccc.int/resource/docs/201/smsn/ngo/240.pdf

by flooding. This has also had a negative impact on rotational farming because if there is too much rain the vegetation will not burn. Thus, it is important for the resilience of the community that their agricultural system includes diverse farming practices: paddy fields and rotational farming systems complement each other to provide food in times of climatic stress. Since the Bhutan workshop they have had hail-stones the size of apples, breaking roofs and forcing people to shelter under their houses. This has never been experienced before in the memory of the communities.

- *Temperatures*: these have increased and this is believed to have contributed to streams drying up (since there are no upstream water users, and forest cover is intact). They have also had very strong winds, which damaged the forest. While they can't control the hot weather, villagers can build resilience by managing the forest very well to keep it diverse and productive. This also creates more food sources for bees, and they are continuously increasing the number of bee hives in the forest. They use various varieties of natural bees which are smaller than common domesticated bees, but which can survive more extreme weather because they have existed in the area for thousands of years. Some special varieties also make honey that is known for its specific health properties and fetches a very good price.
- *Pests and diseases*: villagers have increased resilience to pests by mixing crops with wild and semi-domesticated plants and planting a variety of crops together in the rotational farming area. They also cultivate agroforestry systems, and within the forest (eg tea bushes).
- *Seeds and biodiversity*: Diversity is a source of resilience because planting a mixture of crops and varieties ensures some will always survive. Villagers also rely on diverse production systems, eg. agroforestry, paddy, rotational farming, so that at least some crops will survive. Increasing the diversity of seeds, replanting, and increasing the varieties of plants in the forest also help to ensure there are flowers in different seasons to attract bees and other pollinators and ensure honey production, an increasingly important source of income.

Activities since the Bhutan INMIP workshop

Since the Bhutan meeting, the community has expanded beekeeping in the forest to include more villages and has increased the networking between villages. As proposed in Bhutan, they have set up a Traditional Knowledge Bank in the community for informal education. They have also developed their own community brands for honey and tea – 'Host Beehive' and 'Wild Origin' – and are beginning to market and sell these packaged products in Thailand and abroad. Through collaboration with Slow Food Thailand they have started selling them in a farmers' market in Bangkok. This initiative has been pushed forward by a community member who had worked in marketing.

An important achievement for the community was the establishment of a Special Cultural Zone, which was supported by a Cabinet Resolution in 2010, and now involves several communities. Through this resolution the Ministry of Agriculture recognises rotational farming as the 'Intangible Cultural Heritage' of the Karen. This was a great victory, as rotational farming is otherwise prohibited by Thai law. Hin-lad-nai is continuing to research and build the evidence base for the sustainability and importance of rotational farming for biodiversity, their culture and livelihoods.

Co-ordination and intergenerational learning are also important. Young people need to work together with adults and elders at all times. This is very important for securing the good management practices for the future. Their rotational farming system is not recognised officially, so they also have to involve the government to raise awareness about its importance; and they need to start to promote it as a model for other communities. Learning and networking between communities in the same valley is very important.

For traditional knowledge transmission, any kind of activity needs to involve young people. They need to use social media (eg. Facebook) to communicate amongst young people; and to organise activities to motivate young people to come back to the villages, after getting experience from outside. TK should also be transmitted through the school curricula, but they could not rely on the government to promote this. The community has developed a curriculum on its own to ensure their school provides an adequate and culturally adapted education.

Group discussions: sacred resources, and women and elders' exchanges

Sacred resources and biocultural landscapes

A discussion around a 320 year old sacred tree in the 'Food Park' in Jafr showed that all the communities share the same basic values despite their different cultures and religions. A shared sense of the tree's sacred nature united the group and stimulated discussion about spiritual values and holistic worldviews. A prayer by Mariano, a Quechua farmer from the Potato Park in Peru, emphasised the inter-connections between the sacred tree, the mountains and all nature. The elders from the Philippines and Thailand also emphasised the links between people, mountains, trees, streams and our dependence on them, and the need to respect them and pray, and ensure the rights of their indigenous stewards are recognised. These shared values provide the basis for collective stewardship of biocultural landscapes. They also provide a strong foundation from which the network can build collective responses at international level.

Sacred pear tree in the Food Park, Jafr with farmers from Kyrgyzstan and Peru. K.Swiderska

Women's exchange

In the evaluation of the previous INMIP workshop in Bhutan, some of the women said they would have liked to interact more with the women from the host communities, and the elders said they would have liked to have an exchange with the community elders. These opportunities were arranged for in Tuggoz. These meetings were described by some as the highlight of the whole journey – allowing for rich sharing, a sense of common values and much laughter across cultural borders. There was no prescribed theme for these exchanges.

Women from Tuggoz participating in the exchange. P. Malmer

The visiting women first asked the women from Tuggoz about their main challenges in their daily lives. The Tuggoz women responded that all the physical work was hard for them. As almost all the men have migrated to Russia and other areas for work, the women do everything: farming, cooking, feeding the animals, getting firewood, washing clothes, and all the work in the house and on the farm. The men only come back every second year and they always miss them. They explained that while some women follow their men, particularly young couples who go to Russia together, some must stay and take care of the community, the fields and the children. "I am one step from the grave, what can I do in Russia?" as one elder woman expressed it. Some young people also get married in Russia and stay there.

But for those who want to stay, even a good harvest is simply not enough to survive the year. They need additional income. The harvest is enough to survive for maybe six or seven months. They also grow fruit, which is plentiful at harvest time, but is only for use by the household; there is nowhere to sell it. A few tourists pass by, but they bring everything they need; there is no income for the village from tourists.

How then did people survive before? the visitors asked. 'In the Soviet time, there were collective farms; 100 years ago, it was only 7 households in the community; now there are 54'. So although they have expanded some land, it is not at all sufficient to feed them. One of the community women was a teacher for 36 years. Now she is retired, and gets 30 USD per month – enough to buy one bag of flour. 'All my children are educated, better to go to a place where they can find a job. But now it is difficult also in Russia'.

How many children does a family in Tuggoz have? In the past it was common to have 12 children, but now the average is four to six. A lot of people are having twins – they do not know why. The community representatives from China said they were allowed just one child per family – the fine for having more than one child is 8,000 USD. This discussion created much exchange about experiences from the different cultures, on how to give birth, praxis for maternity leave, and how many children they would ideally have.

What would be your question to the Tajikistan President, if you had an opportunity to ask anything you want? 'It would be about the need for better medical care; we have a medical point, but for any serious disease, we need to take to Khorog, or even Dushanbe. We would also like to ask for a higher quota of students for this area. So they can come back and for example work as a doctor in the community'.

The meeting shared more reflections on family practices at different phases of life. For example, who takes care of crying kids in the night? What are the special rituals for women at funerals in different cultures? In the Pamir, women should cry and there is a specific kind of 'singing' or wailing. What about marriages? Can women decide themselves whom to marry in our different cultures? The discussions revealed that traditions can be completely different. In Pamir, men pay when they get married, whereas in India, the parents of the girl have to pay. How can it be so different, we wondered together, and joked about how we could make the best of our common situation by swapping our realities and traditions just for a few days. We could have gone on talking for the rest of the night, but the Tuggoz women had to leave; it was time to go back to all their daily responsibilities, and finish off the harvest.

Elders' exchange

The elders and men gathered under a large tree. Datu Amay, the elder from the Philippines, shared his experiences. While he has been here in Tajikistan looking around, although he sees a lot of differences in their traditional style of life, they also do very similar things as in the Philippines. One of the most important things is land, both for livelihoods and as a sacred resource. Look how people value their land, how much importance they give to their land, and what the forest means for their community. The forest is everything for his community: it is where they pray, where they get food, they cannot imagine themselves without it. The elder from Tuggoz said they share a similar love for their land in his community. The farmer from Jafr asked how the people from Tuggoz can love their land when it is so poor. The elder replied that it is their home and they would not want to live anywhere else.

Datu Amay, elder from the Higaonon tribe, the Philippines. G. Galvaing

Developing collective responses to climate change

Regardless of what happens in the international climate change negotiations, local action is vital. Climate change is a pressing problem, but also provides an opportunity for indigenous communities to develop new initiatives and get more recognition and support. We need innovations, such as the product labelling developed by the Thai communities, which is helping to conserve their forest and increase incomes. But we should not leave aside the issue of rights – if indigenous peoples are not recognised and are not rights holders, nothing will happen in terms of safeguarding biocultural heritage for climate resilience. The workshop discussed four collective responses that could support local actions to strengthen biocultural heritage for climate resilience:

1) International seed exchanges
2) Establishing an international network of Biocultural Heritage Territories
3) Establishing an international network of Community Seed Banks
4) Developing a Declaration for governments and climate change negotiators (see Annex 1)

International seed exchanges

Seed exchange is a traditional practice which provides access to new crop varieties to allow for adaptation and enhance crop diversity. It has enabled the diversity of crops and seeds to spread over large distances and even across continents. For example, the highest diversity of sweet potato is found in Papua New Guinea even though it originates from the Andes. At the workshop in Bhutan, some seeds were exchanged between communities. However, the results were mixed. This highlights the need to ensure seed exchange occurs between communities at similar altitudes and with similar agro-ecosystems. In Papua New Guinea, maize from China grows much better than local maize, but pumpkin from China proved susceptible to pests. In China, rice from Bhutan did not perform well at the lower altitude and more tropical climate. In Tuggoz (Tajikistan), a farmer is planting buckwheat from Papua New Guinea and maize from Jangbi in his kitchen garden. In Jafr (Tajikistan), potatoes obtained from the Potato Park (Peru) during a learning exchange five years earlier have been adapted successfully after five years of selection, but maize from the Potato Park suffered from disease and did not grow well in Jafr.

Seed exchange, Tuggoz. G. Galvaing

During the meeting in Tajikistan a seed exchange was organised involving most of the communities, as requested in Bhutan. This was followed by a session to share information on the conditions in each community that shared the seeds: the altitude, whether it is tropical or not, temperature, rainfall and frost conditions. Participants stressed the need to share the results of the seed exchange at the next meeting. Participants also emphasised the need to ensure that the seeds exchanged are germ-free by working with relevant practitioners and experts, and that seed exchange is done legally. The FAO International Treaty on Plant Genetic Resources for Food and Agriculture (FAO Treaty) has created a Multilateral System[18] which can in theory be used by communities as well as countries and gene banks for this purpose (see below). This would also facilitate the recognition of farmers' knowledge of and

18 See www.planttreaty.org/content/multilateral-system

rights to seeds. Most of the countries in the network are parties to the FAO Treaty, except China, Taiwan and Tajikistan. Thailand has signed but is not a party.

Establishing a network of Biocultural Heritage Territories

The INMIP co-ordinator (Alejandro Argumedo) proposed establishing an international network of Biocultural Heritage Territories (BCHTs; see Box 1) for in-situ conservation of crop diversity and biocultural heritage for climate adaptation. Such a network would contribute to implementing multiple articles of the International Treaty on Plant Genetic Resources for Food and Agriculture, in particular Articles 5, 6, 9 (on Farmers' Rights), 12.3h and 17. Farmers' Rights. Multi-functional landscapes are important to conserve both domesticated and wild crops and to enable experimentation by farmers in response to climate change (eg planting in different areas in the landscape, domestication of wild relatives). They also enable crop evolution and adaptation to continue, for example by by shifting to higher altitudes in response to increased temperature. The idea would be to conserve crops in centres of crop diversity for climate adaptation by mountain communities, and the network could facilitate horizontal learning on biocultural heritage territories amongst its members.

There are already a number of biocultural heritage territories in the INMIP network – the Potato Park Peru; Stone Village in China, which is establishing a Seed Park; the Jafr community, which has established a Food Park; the Hin-lad-nai community in Thailand, which has established a Cultural Zone; and the Philippines community, which has an ancestral domain title. Biocultural heritage territories such as these are fully owned and managed by indigenous communities – the conservation models are endogenous and belong to their culture. In this way the INMIP network already has knowledge of how to establish and manage such territories. Recognition of the network at international level, for example by the FAO Treaty, could promote recognition of biocultural territories by national governments. We could also explore the creation of a new global designation for 'biocultural territories', for example as a new UNESCO World Heritage Site category. Establishing this network would strengthen this proposal.

The vision for BCHTs (see Box 1) has grown from the experience of the Potato Park in Peru. Mariano, the farmer from the Potato Park, explained that the Potato Park has three main components: food and livelihoods, agro-biodiversity conservation, and land rights. There are six communities in the Potato Park, and the community presidents have formed a legally recognised association. There is a management group that meets every two months to evaluate progress, and take decisions on next steps. The Potato Park also contains areas of experimentation and innovation for climate adaptation. Their revenues from eco-tourism are growing: 60 groups of tourists come each year, with 10–15 people per group, to visit the park, see dances, exhibitions, etc. The park's micro-enterprise groups bring the different communities together to share knowledge, and income is invested in a communal fund. All the rules for the Potato Park are based on customary laws, and the park has a collective land title, and rights to all natural resources above the soil. The concept of the Potato Park reflects the holistic worldview of the Quechua peoples in the Andes, as well as of other communities. The Potato Park is guided by its own specific BCH concept, the *ayllu*. This is made up of three communities: the humans and domesticated

Box 1. What are Biocultural Heritage Territories?

Biocultural heritage includes the traditional knowledge, biodiversity, landscapes, cultural and spiritual values and customary laws of indigenous peoples and local communities, which are all inter-connected and inter-dependent[19]. The vision for Biocultural Heritage Territories is captured in the following definition[20]: 'Land use mosaics encompassing indigenous and traditional land tenure, production and exchange systems, cultural identity, community organisation and simultaneous goals of endogenous development and biodiversity conservation.' Endogenous development means using a community's own concept of development.

19 see: www.bioculturalheritage.org

20 See Argumedo, A. and K. Swiderska (2014). Biocultural heritage territories. IIED flyer. November 2014. http://pubs.iied.org/G03843.html

animals; the sacred; and the wild. Reciprocity and balance among the three communities leads to well-being (*sumaq causay*).

The country groups discussed the proposal to establish an international network of Biocultural Heritage Territories, focusing on three key questions:

1) Do you agree with the proposal? Yes/no.
2) What should the main objectives of the network be?
3) What is your vision for BCHTs/their key features?

Each country supported the idea of establishing an international network of BCHTs. It was agreed that the network should share practical guidance for establishing BCHTs so that other communities can establish a BCHT. A key challenge will be national legal frameworks especially where there is no provision for communal land ownership or landscape management. The network should set up pilot BCHTs in each country which can then be scaled up – there is already a common vision, but it has to be adapted to each country's legal situation. The network should also facilitate international seed exchanges.

The detailed minutes from the discussion on forming a BCHT network are contained in Annex 2.

Establishing a network of Community Seed Banks

Participants shared their experiences with CSBs and methods for seed storage. It was clear from the discussions that indigenous and traditional communities are doing vital work to ensure that many different crops varieties and species are not lost. This work is important not only for the food security and resilience of their communities, but also for their countries, and for the world as a whole. Seeds in the field can continue to evolve and co-evolve in response to climate change, unlike those stored in gene banks. But communities are given very little support for their in-situ conservation work. Most resources are invested in ex-situ conservation in gene banks. The FAO Treaty has a small grants fund to support farmers' in-situ conservation efforts, but farmers have to apply via their national FAO Treaty focal points. We also heard about the importance of establishing links with scientists and gene banks for accessing traditional seeds for adaptation, and the challenges that communities often face in getting access to seeds in public seed banks.

Community Seed Banks (CSBs) are important for conserving crop diversity in the field, for ensuring access to seeds for food security and climate adaptation, and for enabling recovery after extreme events. The co-ordinator of INMIP, Alejandro Argumedo, proposed establishing an international network of Community Seed Banks. The network could promote the exchange of knowledge and experience on CSBs, support their establishment amongst communities in the network, and facilitate the exchange of seeds between communities. Within the network there could be closer links between communities with similar farming systems and agro-ecosystems. The network could help to raise the profile of Community Seed Banks and to enhance government recognition and support. In practice, the network of CSBs would be closely linked (and part of) the network of biocultural heritage territories. Participants all agreed with this proposal for establishing an international network of CSBs.

Some communities have established CSBs and others want to establish them. The proposed network of Community Seed Banks could enable communities with experience of CSBs to provide guidance on establishing community seedbanks to other communities. Communities may also need some technical guidance (eg from international experts). For example, seeds that are exchanged must be clean and disease-free, and communities may need support from scientists in their country to ensure this. International seed exchange should also comply with the law. This could be achieved by using the FAO Multilateral system (MLS) for seed exchange, and its standard Material Transfer Agreement (see note 16), but countries would need to be signatories to the FAO Treaty. Participants of the MLS are generally governments and international gene banks, rather than communities, but the system is meant to be open to communities as well. The Potato Park in Peru has recently entered its collection into the MLS. However, the MLS regulates seed exchange based on western laws, so the network may also need to develop a community protocol to guide seed exchange based on customary laws (eg, reciprocity, sharing, respecting sacred values), which can be used alongside the formal FAO systems.

Further details on the experiences and observations shared by each country are contained in Annex 3.

Concluding session: INMIP work planning and co-ordination

Establishing an internet hub for INMIP

The main purpose of developing an internet hub for INMIP should be to share and exchanging traditional knowledge – establishing a 'traditional knowledge bank' for sharing knowledge, good examples and practical guidance, as proposed at the INMIP Bhutan workshop.[21] There is clear demand for sharing knowledge and guidance on biocultural heritage territories and community seed banks. INMIP has applied for some funding to set up this internet hub. The information for the hub should be provided in English, but English does not fully capture TK, so it would need to be translated into English by people who understand indigenous knowledge and culture.

It was commented that tribal leaders should not reveal secret knowledge, which is not to be shared with everyone. For example, many don't want to publicly share knowledge about herbal plants, to protect the intellectual property rights of indigenous peoples. It was agreed that this was very important, and that one area of the webpage should only be accessible to network members. The website should also have a publicly accessible section to share information about the network and the issues facing indigenous mountain communities, and share latest news and reports from the network. It could have a section on 'Latest news and blogs', like the biocultural heritage website. Either IIED or ANDES could set it up. It would need some continued support for updating it.

INMIP governance and next meeting

The 10 country co-ordinators voted for Alejandro Argumedo to continue to be the INMIP network co-ordinator. It was suggested that the next INMIP meeting could be in the Peruvian Potato Park, alongside a Satoyama meeting on Biocultural Heritage Territories which will be held there in October 2016. RSF Social Finance[22] has indicated their desire to fund the network on a long-term basis, but additional funds would be needed for local costs. Another option discussed could be to wait until 2017 and try and secure funding from the Christensen Fund regional programmes to hold it in Kyrgyzstan or Papua New Guinea. However, this would miss the opportunity of developing key messages for the next UNFCCC COP22 in December 2016. Also, PNG have no crops or cultivated areas to show at the moment because of the terrible drought, but perhaps they could host the subsequent meeting. Kyrgyzstan is keen to host the next INMIP meeting, but some of the biocultural systems would be similar to Tajikistan. Taiwan also expressed interest in hosting the next meeting. However, most participants voted for the next INMIP meeting to be in the Potato Park in October 2016.

Evaluation and reflections on the 'walking workshop' in Tajikistan

Thailand. The overall process and the walking workshop were very good, but too much time was spent driving. It is important to have three generations present, including young people. Presentations should be easier to understand, the host should inform us how to do them (eg. video, Powerpoint) and each community should be given very clear guidance about the structure to follow.

Papua New Guinea. We learnt a lot about techniques to overcome harsh conditions. It was great to have the exchange with women and men in separate groups. People's monitoring of seeds is very good, and it will help us to understand what is happening.

21 IIED (2014) Mountain Communities Workshop on Climate Change and Biocultural Heritage. An international exchange on indigenous knowledge, values and strategies for adaptation, Bhutan, 26 May–1 June 2014. http://pubs.iied.org/pdfs/14635IIED.pdf

22 See http://rsfsocialfinance.org

India. Practice is very important; this workshop was an excellent opportunity to learn. Exceptional places to visit, it was worth the long travel. Reporting on climate change impacts is an important purpose of our network, we hope we can make a strong contribution.

Bhutan. We learnt a lot including about the importance of community seed banks, and the important role of elders in sharing knowledge about the past with the younger generation. It was very good overall.

Peru. Mariano enjoyed visiting Tuggoz and Jafr to learn about their traditional practices. That is when he realised that in-situ conservation is really important. I enjoyed the seed exchange in Tuggoz a lot.

Kyrgyzstan. We got a lot of important information and ideas to strengthen our activities in our country.

Philippines. Thanks to climate change we are gathered here. Our group is like a fruit salad – it is unique and when put together it has a very fresh taste. We will share this information and involve local people in our area. I was so impressed by the Rasht Valley, it has a lot of fruit. Man in the forest cannot eat because the monkeys are eating the fruits much faster than we. I was very happy when we visited the museum, because he has the same appreciation of saving indigenous heritage.

China. We will take the knowledge and experience we have learnt to our communities and women's groups. I (Naxi farmer) am very interested to know how the seeds perform in other communities' fields so I look forward to the next meeting.

Tajikistan. This kind of gathering is very important, it can influence the food programme of the government. The time was too short. I hope that sometime you will discover what we wanted to show you, we will do it in the next meeting! Welcome again to Tajikistan!

Taiwan. We are very thankful. It is important to emphasise women and young people in the declaration. People here are very strong, there is very much energy here.

Children grafting, Jafr. P. Malmer

Annex 1. The Tuggoz Declaration on Climate Change and Mountain Indigenous Peoples

International Network of Mountain Indigenous Peoples

We, over 50 indigenous peoples and traditional farmers representing 21 communities in 10 countries, together with civil society and research organisations, gathered in the communities of Jafr and Tuggoz in Tajikistan from 11 to 18 September 2015, in order to analyse the impacts of recent climatic changes on Mother Earth and on our food and farming systems, and to develop responses to this crisis.

Our communities include the Monpa of Jangbi village, Bhutan; the Naxi of Yunnan and Zhuang of Guangxi, Southwest China; the Lepcha of northern India; the Samarkandek, Doboly and Taldy-Bulak villages of Kyrgyzstan; the Yupna and Jiwaka people of Papua New Guinea; the Jafr village and Wakhan people of Tajikistan; the Quechua communities of the Potato Park, Peru; the Higaonon tribe of Mintapod village, the Philippines; the Kanakanavu community of Taiwan; and the Pga-ke-nyau of Hin-lad-nai and Ba-pae-khee villages, Thailand.

We are happy to announce that we have established an International Network of Biocultural Heritage Territories for in-situ conservation and holistic adaptation to climate change. The network will ensure the continued evolution and adaptation of our local crop varieties, livestock, wildlife and forests, and the protection of our rich cultural heritage, traditional knowledge and spiritual values that sustain and enhance this biodiversity. We have also established an International Network of Community Seed Banks, and a related farmers' seed exchange programme, for in-situ conservation and adaptation to climate change.

Mountain ecosystems are home to many indigenous cultures and languages and are rich but fragile repositories of biological and cultural diversity, water and other critical ecosystem services that are sustained through indigenous stewardship practices. Of unique importance are the indigenous agricultural traditions that have provided important food crops critical for the food security of the world, and that sustain an enormous diversity of locally adapted and resilient crops and livestock for adaptation to climate change. These are the result of the traditional knowledge, innovations and practices of our peoples and communities over generations. Therefore, the survival of our knowledge systems and cultures are critical for the survival of humanity.

We found that in many mountain regions, indigenous peoples are already facing drastic changes in their food and agriculture systems due to extreme and unusual weather patterns, and that these have become more apparent in the last 18 months. In Papua New Guinea extreme drought (no rain for the last 6 months) and frost has led the government to declare a state of emergency as many communities have no food; the Stone Village in Yunnan (southwest China) has experienced extreme spring drought for the last 5 years; in the Philippines and Taiwan, typhoons have become more frequent and destructive; in India and Thailand, giant hailstones have damaged housing and crops; in Kyrgyzstan late spring frost and snow destroyed apricot and other fruit harvests; and in Tajikistan, unprecedented mudflows due to fast glacial melts have destroyed more than 150 houses and killed 7 people this year. Many communities are also suffering from reduced water availability and increased pests and diseases associated with changes in rainfall patterns and increased temperatures; and some have experienced extreme winds and very heavy rain which destroy crops.

Even though we have contributed least to global emissions, we are suffering disproportionately from the impacts of climate change. However, we have been marginalised from participating in climate change policy and planning processes at local, national and international levels.

As an international network concerned for the future of mountain ecosystems, the livelihoods of our communities, and the food security of the world, we call on all governments and climate change negotiators to:

1) Urgently agree and implement radical cuts in their emissions to stop the destruction of our food and farming systems, livelihoods, biodiversity, forests and cultures in fragile mountain environments.
2) Recognise the important role of indigenous peoples and traditional farmers in enhancing climate adaptation and mitigation, and ensure that our rights are fully respected in all mitigation and adaptation policies and programmes, including rights to our ancestral territories, natural resources, spiritual values, cultures and traditional knowledge systems, ways of life and farming practices.
3) Fully recognise and respect our traditional knowledge, innovations and practices that are based on empirical evidence and observation, and their equal and complementary value to scientific knowledge.
4) Ensure the full and effective participation of mountain indigenous peoples, including women, youth and elders, in climate change policy and planning processes at international, national and local levels, in accordance with our right to Free Prior and Informed Consent.
5) Give priority to the needs of vulnerable communities, including mountain indigenous peoples, women, youth and elders, in the allocation of climate finance and ensure that financial resources for adaptation reach local communities.
6) Support the development of local adaptation plans through community-led participatory processes; and ensure appropriate safeguards for forest peoples in the context of mitigation financing.
7) Protect local seed systems and genetic resources and the indigenous farming systems, territories and landscapes that sustain and enhance them, through the legal recognition of indigenous Biocultural Heritage Territories, and the protection of Farmers' Rights and indigenous peoples' intellectual property rights.
8) Fully recognise and respect our cultural and spiritual values, worldviews and languages; systematically integrate traditional knowledge and languages into formal and informal education systems to ensure their transmission to future generations; and recognise the eligibility of traditional knowledge holders and practitioners to obtain university qualifications and degrees.
9) Legally recognise and protect the rights of indigenous peoples and traditional farmers to participate fully in natural resource management and in all decision-making relating to their natural resources and territories; and acknowledge the role of women in climate change adaptation, local seed systems, natural resource management and food security.
10) Ensure the full and effective implementation of the UN Declaration on the Rights of Indigenous Peoples and the recognition of indigenous peoples, through national laws implemented by dedicated government departments.

We call on indigenous peoples and traditional farmers to assert their Food Sovereignty and to first and foremost give importance to the food and nutrition of our children, and we call upon national governments to fully implement the Right to Food.

Finally, we want to reaffirm our commitment to working together and in our own communities towards our goals of ensuring food sovereignty and fostering biodiversity-rich agricultural systems and the protection of our Biocultural Heritage and local rights.

Annex 2. Minutes from discussion of Biocultural Heritage Territories Network

Tajikistan, Jafr community: When we consider culture and bioculture, we need to learn from one another– there is no special model (eg, Mirzosho learnt from his trip to the Potato Park). It is very important to have land that represents your culture. It is very important to support different land uses, and establish a model in one territory to bring together all these integrated elements. If it works in one place, it can be replicated. But it is difficult in practice to establish a biocultural territory as there are many legal issues – in Tajikistan land is owned by the government, there is no community land ownership. So first, we must consider legal aspects of establishing biocultural territories. When they wanted to establish the Food Park in Jafr, it was very difficult to get the legal rights. The government was totally opposed at first, but now it is recognised as the best model. They applied to the Land Use Committee and explained how the park would contribute to environmental objectives. It was also difficult to get the community to have a common vision – some want to graze, others want to cut trees – they have different perspectives. If we want to do this, we have to explain in detail to the communities to bring them together, so that they recognize it is for their benefit. The Food Park is already a biocultural territory, but they would benefit from being part of the network – 'it is easy to break one finger, but five together is difficult'.

Tajikistan, Tuggoz community: Currently they have special crop land and pasture land. They are in favour of integrated landscapes, but it is difficult to convert one kind of land to another and to get the government to recognise the rights of communities to manage government land.

Thailand: The group agrees with the idea of forming a network – but it could be established as an indigenous organisation. The vision of a biocultural heritage network appears similar to what they have done in Thailand – they have established a Cultural Zone focusing on collective rights and cultural heritage. Once a pilot area is established, we can lobby for it to be approved and expanded – if it is a good model, it is important to expand it to other communities. We can share the steps for establishing a Cultural Zone which we have already documented. Objectives of the network should be:

1. The most important aspect of BCHTs is the right to make decisions on all aspects of natural resource management. Autonomy – the right to manage.
2. The network should continue to provide the space for meetings to exchange practical knowledge.
3. Each country needs to create their own model of BCHTs, for their own country, which can then be expanded to other communities. The model is like a learning process, it needs to be updated.
4. Need to make space for transmission to younger generation. The network should create a University of Indigenous Biocultural Heritage for young people – it could create a young indigenous peoples' council at international level to actively engage them.

We would like to add to the outlined vision for biocultural territories. It should be clearer about community economy, based on their own context, as this is very important for autonomy. Your own community organisation needs to have resources. The vision should be linked to rights of management of biocultural resources; and to transmission to youth. Traditional production systems are important to emphasise. It is also important that they are legally recognised.

Kyrgyzstan. We agree to establish a network of biocultural territories. To create BCHTs we need to learn from the experience of others and get step by step guidance, so we can adapt other models to our own policy situation. They can have private land ownership. We should start in our countries, to explain the need for BCHTs. We could hold some conferences at national level, and start activities in the communities. We should first establish a pilot BCHT, and then share the experience with others in our country, and also create a network at local level. Biocultural Territories should include links to educational systems (eg. school nurseries). We totally agree with the vision for biocultural heritage territories, as explained here.

Philippines: Yes we want to establish a network of BCHTs. We have practised biocultural heritage in our communities for time immemorial, so we must continue. The first aims of BCHTs are in terms of governance and empowerment. We need an indigenous leadership programme and we need to educate our community about BCHTs and establish a school of living traditions for kids. Maintaining the tribal justice system, capacity building for farmers, woman, youth, and strong participation of indigenous people in decision making are very important. We need to engage in training programmes on human rights and social justice. Secondly, we already have a very comprehensive Ancestral Domain Development Plan for the 13 communities, but we need to update it. We have a national commission on indigenous peoples' rights. The plan focuses on social justice, tribal justice, a skills training programme for different groups, and cultural integrity – enhancing our beliefs, customs and traditions and indigenous systems and practices.

India: Yes, we want to establish a network. The community is in a recognised global biodiversity hotspot. Cultural identity can become a source of livelihoods, rights and knowledge. We agree that establishing such a network and getting recognition by UNESCO would help to lobby within countries. Our challenge is that unlike in Peru, common property resources such as streams, rivers, caves and forests belong to the government. How to convince the government to grant long-term tenure and managerial rights over these areas? In addition, if the government proposes an infrastructure project that cuts across the landscape (eg, a road or irrigation canal), this can divide communities as some people may support it for short-term gain even if there is no clear benefit for the community. In addition, pressure from the government and those that stand to make short-term gains means that communities run the risk of not being able to decisively say no to projects proposed by the government even if they do not fall in line with either cultural values or with the community's vision of sustainability of the landscape. We agree with Alejandro's vision and should work within our constraints to achieve what is best possible.

Papua New Guinea. Yes we want to establish a network. We have examples and models of BCHTs, and it would be useful to have some step by step guidance with examples from Thailand and Peru. We have more than 800 tribal groups all with their own biocultural identities, but we can start with two or three model sites. The government owns only 3% of land; our work is to convince the communities to adopt BCHTs. One objective of BCHTs is documenting TK systems and to develop this in a sustainable way for the benefit of the communities, for example by using the biocultural heritage label. The government has formulated an ambitious Vision 2050 development agenda, that incorporates the UN Millennium Development Goals, as its national development strategy up to the year 2050. The communities could link their BCHTs to the government's Vision 2050 to get the PNG government on board.

China. Agrees to establish the network. The spirit should be of sharing traditional knowledge so it can benefit more people.

Taiwan. Yes, it is very good to have this network, and start a forum. Communities can ask questions, and experts in the network can share solutions – our own solutions as responses. If we have a knowledge databank, that will empower indigenous peoples to be the owners of traditional knowledge. We should also work on developing a biocultural heritage label.

Peru. Yes we should establish a network. Its objectives should be to: 1) Exchange seeds and information on how to use them; and 2) help get acknowledgement of IPs at international level, to help promote this at national level. Mariano agrees that the right to make decisions is very important. He agrees with Alejandro's vision for BCHTs – it emphasises biodiversity conservation and reflects the *ayllu* so it belongs to the Quechua vision.

Bhutan. Yes we should establish a network. Its objective should be to share knowledge and exchange seeds between different indigenous people of the country. With the help of this network, IPs can also understand the problems in climate change. We agree with Alejandro's vision for BCHTs.

Annex 3. Minutes from discussion on a network of Community Seed Banks

Papua New Guinea. We are worried about not having seeds for the next planting season because of the drought; we heard Mirzosho (Tajikistan) had to buy seed from other communities, and these were not of good quality. With more extreme weather, households will run out of seeds. With a community seed bank, there is more chance to recover from disasters. Because of the prolonged drought, all the crops have died and the seeds that were in the field have either disappeared/died or are severely damaged. We have never experienced this weather pattern before. We use cuttings from tubers to plant, and take the seeds and put them in the roof of the kitchen to dry. To establish CSBs, we need to get the communities to organise themselves internally. We are 800 peoples/tribes, but we will try to establish one or two CSBs. We can effectively contribute to establishing the CSB network and once we have achieved that, we are sure that government support will be forthcoming.

India: We have a decentralised community seed bank, for sustainable use of seeds. We distribute seeds to farmers in the community, and the farmers return at least twice the amount. If the crop fails, there is back-up in the seed bank. The biggest value of a CSB is to be sure to have seeds, so that if something happens like the hail storm this year, the seeds are not lost. Every year, the seed bank is growing, involving new communities and sharing seeds with them. They use the ordinary community seed storage practice – seeds are stored at the top of the house in a bamboo construction. To store the seeds, the ash of burnt firewood is dried and rubbed over the seeds. When we keep seeds in a container, we put dried herbs on the seeds and pests cannot come to them. We put the seeds in a bamboo basket. We let the big gourds mature, dry and empty them to store the seeds inside, sealing the hole with cow-dung.

Peru: In the Potato Park, we have three levels of seed banks: people contribute seed to the community seed bank, to a gene bank in Lima, Peru (the International Potato Centre, CIP), and we have sent botanical seeds to the international seed bank in Svalbard, Norway. The point of sending them to Norway is so that the seeds are documented and safeguarded for 15 to 100 years, for the food security of their communities and of the world. The Potato Park communities have an agreement with CIP, which has returned 410 varieties of potatoes to the communities, and the communities are testing them in the landscape for climate adaptation. The agreement means that CIP cannot take out any intellectual property rights on the potatoes from the park.

The Potato Park community seed bank is managed by the Potato Guardians group which includes technicians from each community, and by the President of the potato park. They have a special building to store potatoes, where it is always cool due to air flowing over water under the floor. This means they can keep the tubers for several years without using electricity. They store seeds of each variety, 40 to 50, but could go up to 100. Storing potatoes requires a lot of space; seeds can be kept for longer and take up little space. They have about 1,400 different edible varieties in the community seed bank; they send the inedible varieties to CIP in Lima. The municipality supports the Potato Park's efforts to conserve crop diversity. They have an agreement with the local government to support the local work, and also get support from the NGO ANDES, which works in the potato park. We are in favour of a network on CSB. We already have community seed banks, and we want to share our experiences. Seeds for sharing should be organic.

Tajikistan:

There are two types of seed banks:

1) Community seed banks, for use every year, to ensure they have seeds for the next year. This is for short-term storage of good quality seeds.
2) Gene banks, where seeds are stored for long-term resilience, but farmers do not always have access to such seed banks.

We can only store potatoes until the next season, not for several years. For several fruits, it is not possible to keep seeds as there is 60–70% fertility loss. But it is possible to keep vegetable seeds. So it is not possible for all the communities to do what they do in Peru and India. Someone should list all the species in the communities and their characteristics. If every family keeps their seeds, the CSB will be at the local level, a network between the households: a 'decentralized community seed bank'. In Jafr, if they introduce seed from outside, they first see how it works in the landscape. When we see that it works, we can give it to other people. We keep these seeds in the basement in order to keep them cool. Humidity should not exceed 50% – we use dry wood to reduce the humidity.

There are difficulties with seed preservation all over the world. In the Rasht valley, we have problems with seeds almost every year. Even if we have programmes to provide the whole country with potatoes, farmers start to look for seeds in Pakistan and other parts, but never get good quality seeds. The proposal from the Jafr community in Tajikistan is to establish a potato park within their biocultural territory. Farmers' associations should maintain the production of potato seeds. This is very delicate work and needs a lot of resources, thus the Ministry of Agriculture should provide support for farmers' seed associations. Food security depends on farmers' work. It should be supported by governments and others. Farmers also need access to seeds in the government seed centre/gene bank, run by the Science Department of Tajikistan. How to ensure how the farmers save their seeds in the gene bank, and can access their seeds? They do not have this mechanism established yet.

We are in favour of a network on CSB. In order to achieve our aims, we have to share experiences. When we decide to run an international network, we need a plan for how to conduct it. When we exchange seeds, we must make sure we do not exchange pests and diseases. We should also consider developing a special agreement to export and import seeds at international level – our seed exchange should be according to national laws.

Thailand: Our seed bank is in the field. When we had a three year fallow cycle, we lost some of the seeds. With a seven-year cycle the seeds continue to live in the rotational area. It is difficult to keep seeds for three years in seed banks, we need to keep the rotation of farming to keep the seeds as well. It is different for potatoes. Women collect a diversity of seeds and store them in the kitchen and along the barns. They also keep home gardens, so they can just collect seeds when needed. We agree on forming the network of community seed banks. Maybe we need to establish smaller groups for cross-collaboration between similar farming systems, such as rotational farming or fruit orchards. These can exchange closely, maybe also at village level. In Thailand they have two systems, but one group has switched to cash crops.

China. We grow rice. Every year, a lot of seeds are sent to the community centre, and we also share seeds with other communities. We sell some seeds too, but more often we just exchange. It is better to grow crops rather than store the seeds. We have 20 varieties of rice in the community seed bank. We try to keep a certain amount of seed for preservation every year. We will ask each farmer how much they need, and how much they grow. We do not have very good equipment, so they grow varieties in the field, the seeds in the field are for the whole community to use. We agree to establish a network of CSBs.

Philippines: Rice, maize and beans cannot be kept anywhere cold or hot; root crops are always in the fields, that is where we preserve them. We have 13 varieties of sweet potato. We cannot preserve them in the houses, so we just grow them in the farm. We used to have more crop varieties but some got lost, maybe because we did not know how to preserve the seed, we just planted and planted. We face problems in terms of planting traditional rice, because if the crop fails, we would have to revive all these seeds from other communities. Not all communities can sustain the rice varieties – it depends on soil conditions. When you are sowing in uplands they are difficult to grow, but in the lowland areas there are better opportunities. How to revive the very important traditional rice seeds? We have no seed bank in the community, and we need some technical support to establish a CSB. Maybe we need household seed banks. We can start to collect seeds from around the island, and to explain and inform communities, to restore these traditional seeds.

Kyrgyzstan. We just initiated work to establish a community seed bank. Most farmers now use hybrid seeds, and have to buy new seed every spring. For various reasons we have lost a lot of diversity of local crops. We did some research and a survey, and found that a lot of local farmers are interested in finding traditional seeds that they grew in the past, adapted for local conditions, because the hybrid seeds need so much fertiliser. They are not adapted, and most of them come from outside. We want to establish a CSB to provide traditional seeds to local farmers. Our vision is to grow traditional seeds and distribute them amongst farmers. To establish a community seed bank, we tried to find custodians of the seeds in the region. As a first step we established a nursery of fruit trees at community level. Sultan is helping to conserve potatoes, and includes local varieties of potatoes in the CSB. We strongly agree to establish such a network, not only for exchanging seeds, but for exchanging experiences with CSBs with certain countries, in the light of climate change.

Taiwan. We have a seed bank where farmers can preserve and have access to their seeds. In our community, all household keep their own seeds. We want to bring back these issues about seed banks to the community; the experience from here might benefit them a lot. Seed preserving is like a way to farm. People grow food to eat, but now they grow for living and sale. Those crops, and plants for food, are now a place for seeds. GMO seeds are grown now, mainly for economic income. We have a national seed bank that took the seeds and knowledge from the community an institution that preserves seeds but is oriented towards protecting markets. Communities in Taiwan have also started to preserve their knowledge in local farming systems. Traditional seeds were grown and spread by the wind, but now you have non-traditional seeds, and the pattern of spread is also changing. This is a very big challenge for us. There is a lot of seed knowledge held by women. Maybe we can have a group to have more women involved in seed banks, this is important for knowledge diversity. During the 2008 disaster in our community a lot of vegetables disappeared, but an elder woman shared her traditional seeds. We can have a discussion about women's ecological knowledge. We support the idea of establishing a network.

Bhutan. We have a shortage of seeds. We cannot access seeds from other countries. It is very important to share experiences.

Special guest from Ministry of Agriculture, Tajikistan. The issues being discussed are very important for our country. We have a programme for reforming agriculture, and diversification of agriculture. We have an institution in Tajikistan for control of seeds. Before we distribute seeds we get from other countries (eg China) we test them, and then we allow them to be distributed. There is a working group exploring issues of the national gene bank and seed access for farmers, but no final decision has been reached.

Annex 4. Participants list

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The International Network of Mountain Indigenous Peoples (INMIP) aims to exchange traditional knowledge and seeds for climate adaptation and food sovereignty and to protect biocultural heritage and farmers' rights. It currently includes communities from 10 countries in Latin America and Asia, and is coordinated by ANDES (Peru) and IIED (through the SIFOR project – Smallholder Innovation for Resilience).

ANDES and IIED teamed up with the Mountain Society Development Support Programme of the Aga Khan Foundation in Tajikistan and SwedBio at the Stockholm Resilience Centre, to organise the 2nd INMIP learning exchange in Tajikistan on 11–18 September 2015. This report presents the results.

Event Materials

Food and Agriculture

Keywords:
Smallholder Innovation for Resilience (SIFOR), traditional knowledge, biocultural heritage, climate change adaptation

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