



# Investing in Sustainable Mountain Development

Opportunities, Resources and Benefits

Sustainable Mountain Development Series

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Opportunities, Resources and Benefits

2016

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Cover photo: Construction of Khimti–Betali road, Nepal (P. Starkey)

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## Foreword

Sustainable global development requires investment in mountains. The central role of mountain areas to the well-being of people worldwide has been voiced repeatedly over the past 30 years. Mountain areas are not only home to more than 900 million people, they also supply essential goods such as water, energy, timber, minerals, medicinal plants and more to people living elsewhere. The international community increasingly recognizes these crucial functions of mountain areas, also highlighting them in the just-launched Sustainable Development Goals (SDGs). Nevertheless, the sustainable development of many mountain regions lags behind that of other areas, and poverty alleviation remains a core challenge. It is estimated, for example, that more than one-third of mountain people in developing countries are vulnerable to food insecurity.

We know that investing in the sustainable development of mountain communities and conserving mountain ecosystems would provide long-term benefits for more than half of the global population. Thus, investing in mountains is essential and could offer attractive opportunities for investors interested not only in short-term gains, but also especially in long-term returns on their contributions.

At the same time, it remains clear that investing in mountains poses significant challenges. Mountain resources are often fragile, requiring careful approaches for investments to be successful. As a rule, mountain ecosystems are sensitive and do not recover easily from disturbances. Ecosystem disturbances may jeopardize the basis for people's livelihoods and significantly raise the risk of disasters such as landslides or flash floods. In addition, providing support – such as social services, agricultural assistance, or new infrastructure – to people living in dispersed settlements in remote areas is often costly, which frequently discourages key actors from making related investments.

These challenges call for creative investment mechanisms and strategies such as pooling resources from different contributors to reduce risk. This might include bringing together actors from government institutions, the private sector and civil society. Fortunately, we have made great progress towards this: In July 2015, 193 UN member states reached an agreement in Addis Ababa, Ethiopia, on a joint framework for financing sustainable development. A corresponding Action Agenda calls upon a wide range of actors in order to broaden the financial base for investments and to increase cooperation. While the agenda does not specifically mention mountains, it refers directly to the development needs of many countries or regions that feature mountainous areas.

This edition of the Sustainable Mountain Development Series underscores that investments in mountain regions need to be creative and must account for social and environmental dimensions in order to generate sustainable long-term returns. It presents a broad range of case studies from around the world. The studies illustrate the diverse opportunities, challenges and dimensions of investments and how they can contribute to successful mountain development – not only for the benefit of mountain communities, but also to advance sustainable development worldwide.

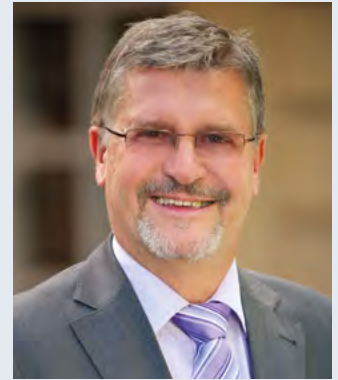
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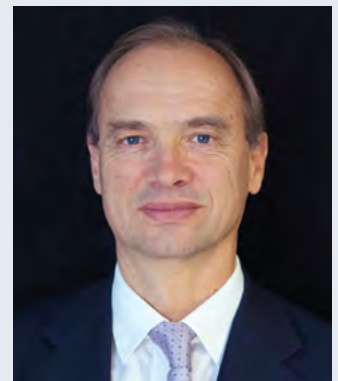
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# Investing in sustainable mountain development





Axel Borsdorf, Thomas Kohler, Stephen Gelb, Felicitas Bachmann, Susanne Wymann von Dach

# Sustainable global development needs investment in mountains

Investing in mountains is decisive for the future of mountain regions and for the planet as a whole – and hence also for achieving the global Sustainable Development Goals. Mountains must have a permanent place on global and national development agendas, including investment agendas. This chapter explains why investment in mountains is important, and presents an overview of the actors engaged and the tools available.

Sustainable development is key for people living in mountains ...

Mountains cover 22 percent of the global land mass, and are home to 13 percent of the world's population [1]. The strengths of mountain communities and mountains' unique ecosystems offer significant opportunities for development. Yet development in mountains still lags behind many other parts of the world.

- Poverty rates and food insecurity are higher in the mountains than elsewhere. This is because of the combined effects of a harsh climate and difficult topography that limit food production; a weak economy with a lack of livelihood alternatives beyond farming; limited accessibility; and insufficient basic infrastructure and services such as schools and health facilities.
- Many mountain communities are exposed to high outmigration, especially of men, leaving behind women, children and the elderly. It is thus an increasing challenge to maintain local institutions, community life, farming systems and the provision of ecosystem goods and services.

Agriculture in the lower-lying steppe depends on water from the Tian Shan mountains, Kyrgyz Republic (© M. Foggin)

- Mountain people are exposed to a wide range of natural hazards, including such which do not exist elsewhere, for example landslides and avalanches. More than half of all mountains – 55 percent – are susceptible to destructive earthquakes, compared to 36 percent of lowlands [2]. Mountains are among the regions most affected by climate change, which threatens water provision to lowlands including many of the worlds’ largest cities [3].
- Mountain communities, particularly those in rural and remote areas, are often neglected in national policies, as their voices are not heard at the centres of power and decision-making. Mountains are also often scenes of conflict, especially where they straddle national boundaries, include areas that are contested between countries, or are inhabited by people marginalized due to their physical remoteness, ethnicity and culture.

Correcting the imbalance and addressing these challenges requires substantial investment by the global community, national governments, private sector and civil society. Only then can the Sustainable Development Goals (SDGs) be met in mountain regions as well [4].

### ... and important for people living elsewhere

But mountain areas make a crucial contribution to global development, with a wide range of goods and services originating in mountain regions. These are essential inputs for development in other areas of the world – and offer a wide range of opportunities for investment:

- Mountain areas provide fresh water to more than half of the global population.
- Mountains are major suppliers of renewable energy from hydropower, the largest source of renewable energy, which provides 19 percent of the world’s electricity.
- Mines in mountain areas provide the majority of the world’s strategic non-ferrous and precious metals [5]. Half of the world’s tungsten comes from the mountains of southern China, and over one-third of the global copper supply originates in the Chilean Andes.
- Mountains are centres of biodiversity, harbouring half of all global biodiversity hotspots, and they contain the genetic resources of many major global staples such as potatoes, maize, barley and sorghum.
- Mountain forests provide millions of people with timber and non-timber products.
- Mountain regions offer sites for recreation and tourism in an increasingly urbanized world.

Demand for all these ecosystem goods and services is higher than ever before across the planet, and is increasing rapidly as populations and economies grow. Securing the flow of these goods and services thus presents multiple opportunities for all forms of investment.

### Diverse forms of investment in mountains

Investments involve the use of resources today to create productive and reproductive capabilities aimed at securing production and consumption of goods and services tomorrow. Not only would investments address the development backlog and improve the well-being and security of people living in mountains, they would also secure the flow of ecosystem goods and services such as energy, water and other items from mountains to lowlands, where these supplies are increasingly needed.



Forms of investment			
Financial instruments	Form	Description	Main types of investors
	Equity	Financial capital provided by the investor, who receives the returns	Domestic and international private business sector
	Credit/loan	Financial capital provided by a lender (creditor), with requirement for repayment	Domestic and international private business sector, domestic public investors, international development cooperation
	Grants	Provided without requirement for repayment	Domestic public investors, international development cooperation, NGOs, philanthropic institutions, research-funding institutions
	Remittances	Provided by individuals mainly for individuals and households	Diaspora
	Compensation mechanisms for ecosystem services <sup>1</sup>	Provided by service users to service providers	Civil society, philanthropic institutions, domestic and international public investors, domestic and international private business sector
In-kind instruments	Labour, goods and services	Provided without financial remuneration	Civil society organizations, philanthropic institutions, research institutions

<sup>1</sup> Includes payment for ecosystem services as well as other benefit-sharing mechanisms.

Today's diverse forms of investment offer new opportunities. Resources can be both financial and in-kind, including labour and personal commitment. However, no investor will provide resources unless the investment is expected to yield some sort of benefit or return. The investment and its return may be private, as in investments by privately owned companies. Or the project and benefit may be public or social, as in investments by governments (national, regional or local), international development cooperation, other publicly or collectively owned entities (state-owned enterprises, co-operatives), NGOs and philanthropic institutions. Many investments combine private and social characteristics. Given scarce resources, investment projects which are expected to yield higher returns are more likely to be funded and undertaken, and this applies to both private and public investments. Lastly, investment in sustainable development should be informed. Research thus has an important role to play in knowledge generation and brokerage, in terms of counselling investors about opportunities and challenges in mountain regions.

### Attracting resources is challenging

Mountains face the challenge of attracting investment: It is more costly to bring investment resources (goods and services, specific expertise) into mountain areas, develop needed skills and transport goods produced to markets. In addition, populations may be sparse and so offer less local market potential and political support in return for public investments. A lack of investment in regional economic and social development encourages outmigration, which again undermines the prospect of potential returns on investment. A lack of investment in efforts to increase the resilience of communities and ecosystems, including support of proven traditional practices of sustainable resource management [6], leads to disproportionate damage from natural disasters and higher costs of climate change, and these risks in turn lower the potential returns on investment. There is no doubt that mountains need greater attention and focus from policy-makers, and the application of sufficient resources.

## Not enough policy attention

Mountain areas are mentioned explicitly only four times in the SDGs. And they are not mentioned at all in the Addis Ababa Action Agenda on Financing for Development [7]. Mountain areas are a low priority in most national and international development policy debates, especially in the developing world. This is concerning, given the development backlog in mountains, and their important role as providers of ecosystem goods and services.

## Evidence of opportunities and benefits

The present publication looks at investment in mountains from the perspective of sustainable development. It considers economic, social and environmental aspects and outcomes of investment, for the benefit of mountain people as well as the entire global human community. The case studies from around the world emphasize the wide range of opportunities that exist for investment in mountain regions. Although the case studies often have a broad focus – addressing several dimensions of sustainable development – in this publication they are organized into the following fields of action:

- **Enhancing regional economies** in all sectors. This includes farming and pastoralism, industry (also mining and energy) and services, considering both rural and urban areas in mountains through grants, credits and contributions by the private sector and civil society (Section 2).
- **Fostering social development** by improving access to basic infrastructure and services including health, education and knowledge. This is done by building and supporting strong institutions for equitable and inclusive development through grants, remittances and contributions by the private sector and NGOs (Section 3).
- **Safeguarding mountain ecosystems** by sustainable land and watershed management for disaster risk reduction, climate change mitigation and adaptation, and initiatives promoting green economy and infrastructure. This is done through compensation for ecosystem services, in-kind contributions by civil society, private investments and grants (Section 4).

This publication sheds light on the increasing diversity of possible mechanisms to finance sustainable development involving a wide range of different types of investors. The case studies provide a small but promising selection of the manifold initiatives that have sprung up in recent decades relating to investment in mountains and the actors, mechanisms and sectors involved.

Investments in mountains will contribute critically to achieving the SDGs, not only in mountain areas, but far beyond. Investments will be a crucial and indispensable component of this ambitious global plan of action for people, planet and prosperity.







2

# Enhancing regional economies



Thomas Kohler and Axel Borsdorf

# Achieving sustainable economic development

Dynamic development of Pooh village in Jammu Kashmir, North India (Ikoimages/shutterstock.com)

Mountains – topographically varied, unique in resources, microregional in structure, and remote – need specific and tailored investments to enhance their economies. Ideally, such investments would tap regional potentials, both human and natural, and improve accessibility. To be sustainable, investments should have a long-term perspective and help strengthen the position of a region and its people on the national political agenda.

## Opportunities and challenges

Enhancing economic development in mountains is most efficient if regional potentials, both human and natural, are taken as a starting point. Mountains are richly endowed with resources such as water, minerals, and agricultural and forest products, many of which are high in value and can form the basis for a diversified regional economy. In addition, the scenic beauty of many mountains is a key asset for tourism.

Making use of these assets requires good accessibility, which thus remains a critical factor in economic development in the mountains. Transit routes across mountains can generate local employment and spur regional economic growth. However, ensuring good accessibility is a challenge, and building adequate infrastructure – access roads, railways, transit corridors, hospitals, schools, and energy and communication facilities – requires higher investments than in the lowlands. This has

made mountain regions increasingly dependent on external funding, as building and maintaining such facilities is beyond the means of mountain communities with their often small populations, weak economies and limited local income. Moreover, in many mountain regions, taxes are collected by the central authorities and subsequently, the regions are dependent on the allocation made by these authorities. Private-sector investments can be substantial, especially in large-scale facilities for hydropower generation, timber extraction, mining and tourism. Unfortunately, most such investments to date have focused on profit, putting in second place social and environmental aspects of development.

### Pathways to enhancing economic development

The stories in this section are promising examples of investments that have built on the human and natural potential of mountain communities and their habitat, triggering sustainable economic development but also revealing that in some cases, trade-offs are inevitable. Shocks often mark the beginning of change and open up opportunities for new developments, as shown by the case of artisanal gold mining in Mongolia (P. Singo and F. Hruschka, pp. 16–17). A result of the country's economic collapse in the early 1990s, the sector has since been integrated into the formal economy with national and international support, and miners now benefit from more income and higher social and environmental standards. In contrast, cases of large-scale hydropower investment in Laos have highlighted the inevitability of accepting trade-offs (A. Heinemann and C. Hett, pp. 18–19). Discussions on these often controversial large-scale investments should be held on a project-to-project basis while taking into account considerations from basin to national levels.

The case from Ethiopia (G. Taylor, pp. 20–21) shows the key role played by improved road access for better market integration and social development in mountain regions, but also emphasizes the need for a long-term approach enabling high upfront investment with delayed returns. Finally, the problem of urban poverty and lack of infrastructure in mountains of the developing world is addressed in an example from Vietnam (M. Raghunath et al., pp. 22–23), following a novel results-based approach for better targeting urban development and ensuring that money is effectively invested for the benefit of the poor and a more sustainable urban future.

External interventions can boost regional economies if they are in the interest of local communities and if conducive policies are in place, as shown by the study on pastoral development in the Hindu Kush Himalayas (Yi S. and M. Ismail, pp. 24–25). The example of Andean handicraft promotion (A. Haller and M. B. Meza, pp. 26–27) illustrates the potential of small enterprise development, in this case initiated and supported by an external civil society organization, to supply high-quality products to the national and global markets. The Ark Foundation (F. Bagnoud, pp. 28–29) is a promising example of how government seed money can create a basis for attracting high-tech enterprises to a mountain region – in this case the industrialized mountain region of Valais in Switzerland – with the aim of diversifying the economy and securing the region's future.

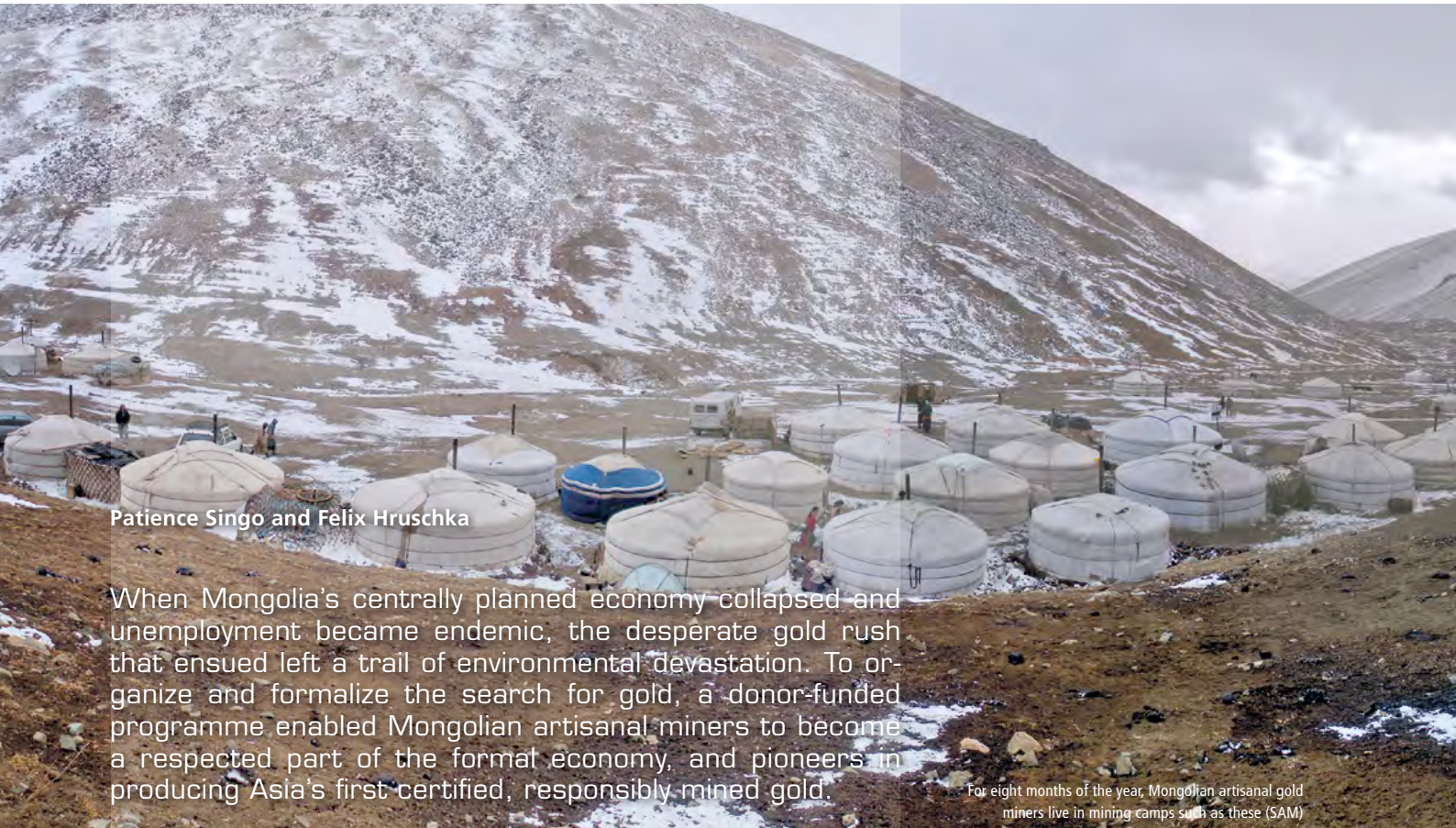
The case studies in this section highlight investments made by a diversity of actors, as well as different investment mechanisms, in the Alps, Andes, Hindu Kush Himalayas, and mountains of Mongolia, Southeast Asia and Africa. The cases presented all share the same aim: that of investment-induced sustainable regional economic development that takes into account the specific conditions of mountain regions and mountain people. Despite the challenges associated with this aim, each case study conveys a sense of optimism and hope for the future.



Training boosts small-scale enterprise development in Nepal (Employment Fund)



# A golden future for the steppes



Patience Singo and Felix Hruschka

When Mongolia's centrally planned economy collapsed and unemployment became endemic, the desperate gold rush that ensued left a trail of environmental devastation. To organize and formalize the search for gold, a donor-funded programme enabled Mongolian artisanal miners to become a respected part of the formal economy, and pioneers in producing Asia's first certified, responsibly mined gold.

For eight months of the year, Mongolian artisanal gold miners live in mining camps such as these (SAM)

After 70 years as a centrally planned socialist republic, Mongolia transitioned towards a Western multi-party system and market economy in the early 1990s. Following the collapse of most state-owned enterprises and an abrupt economic downturn, Mongolia's mineral endowment enabled the country to recover quickly. Large mineral deposits attracted foreign investment in the industrialized mining sector, and artisanal and small-scale mining (ASM) surged. Up to 100 000 Mongolians turned to ASM to escape poverty and build new livelihoods.

Artisanal mining directly and indirectly supported over 15 percent of the population. However, it was characterized by rudimentary methods of mineral extraction, serious environmental impacts, tax evasion, illicit minerals trade, dire safety conditions and paltry social welfare. This prompted widespread opposition by both the public and the state, with attempts by the state to halt ASM by force, arresting and torturing miners and dispossessing them of their equipment.

In 2005, the Swiss Agency for Development and Cooperation (SDC) launched the Sustainable Artisanal Mining (SAM) project to support Mongolia in its efforts to develop a responsible and sustainable ASM sector. The project's main strategy was to reverse the vicious circle in which ASM was trapped. Integrating ASM into the formal economy was expected to provide incentives for formalization and responsible practices, while creating stakeholder confidence in the development potential of ASM. In 2014, the project strategy shifted towards a human-rights-based approach, empowering rights-holders to realize their rights and strengthening duty-bearers to comply with their human-rights obligations. Formalizing ASM also meant economically strengthening all stakeholders along a transparent and formal gold supply chain.

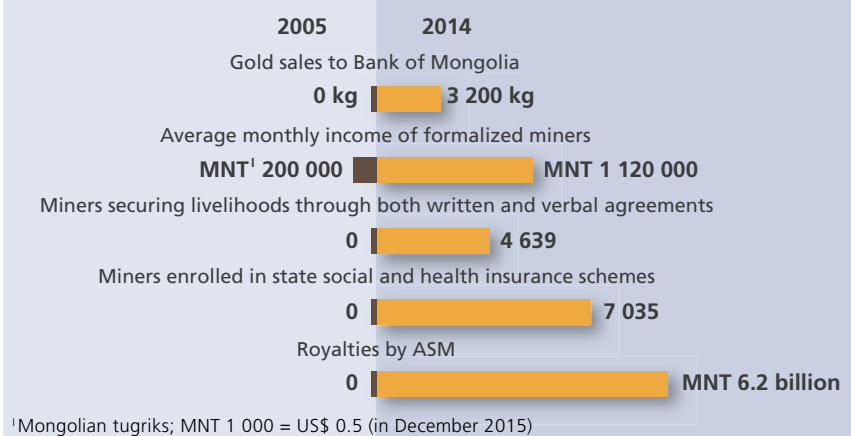


*"As we started to take responsibility for our mining operations, attitudes within our community and our society have changed. They no longer see us as threats to their well-being, but rather as partners and contributors to the development of our community."*

Byambadorj, former head of XAMODX association of miners

## Lessons learned

### A snapshot of SAM project results



SDC contributed CHF 10 million to the SAM project between 2005 and 2014. The funding was allocated to training and advisory services for ASM producers, and to support government counterparts in developing successful strategies to formalize ASM.

As a result, more than 7 000 miners are now working formally, under agreements between local ASM organizations and the local government. They are registered for social and health insurance, and pay taxes. In 2014, the average monthly income of formalized ASM gold miners was 18 percent higher than in 2013. Best practice examples of environmental reclamation, occupational safety and increased local development contributions are emerging. The recently established ASM Federation is increasingly becoming a strong and effective policy actor and advocate for miners' rights. The Ministry of Mining as well as ministries responsible for labour, social protection and health have committed to pursuing further formalization of the ASM sector. And notably, the public and political perception of ASM has improved considerably.

In the past, gold production from ASM disappeared almost entirely on the black market. Formalization of ASM and the formerly illegal gold supply chain achieved that in 2014, approximately 25 percent of the gold officially purchased by the Bank of Mongolia originated from ASM. At 2014 average gold prices, these 3.5 tonnes of gold bought from artisanal miners in the national currency were equivalent to US\$ 140 million in foreign exchange and US\$ 3.5 million in royalties. The same amount of money was injected – through artisanal gold miners – directly into the local rural economy.

Artisanal and small-scale mining (ASM) is a poverty-driven activity that provides essential livelihoods and income for rural communities. ASM in Mongolia consists of formal or informal mining operations that mainly employ simplified forms of exploration, extraction, processing and transportation for production of gold, coal, fluorspar and other minerals. It involves men and women, youth, adults and the elderly, who either work individually or in family groups or partnerships.

- Formalizing the artisanal and small-scale mining (ASM) sector allows gold miners to increase their income by eliminating the substantial cost of informality (e.g. bribes). It also enables governments to collect a reliable revenue stream and generate foreign exchange reserves.
- Applying a human-rights-based approach – empowering rights-holders and strengthening duty-bearers – ensured the project's effectiveness.
- ASM has the potential to become a key driver of local development and an important pillar of macroeconomic stability, provided it is supported by an enabling legal framework.



# Looking beyond individual hydropower projects



Andreas Heinemann and Cornelia Hett

The booming economies in Asia are energy-hungry. This has prompted poorer countries with high hydroelectric potential in the uplands to invest in hydropower projects to boost their macroeconomic development. Dam projects have mushroomed, with significant local and basin-wide impacts on the livelihoods of people up- and downstream – raising serious questions about trade-offs in all dimensions of sustainable development.

Nam Ngum 2 hydropower dam, completed in 2011, in Lao PDR (A. Heinemann)

Laos is among the world's least developed countries. But in recent years, the economy of this mountainous country has grown rapidly, through the use and extraction of its natural resources. In 2011, the hydropower and mining sector made up almost half of Laos's annual GDP growth of 7.5 percent; in less than ten years, revenue from hydropower alone is expected to comprise one-fifth of GDP [1].



Laos's fast-developing and energy-hungry neighbours – China, Thailand and Vietnam – are the main investors in the hydropower sector and main buyers of the electricity generated in the country. The theoretical hydropower potential of Laos is estimated at around 28 000 MW [2], and investments in hydropower electricity, mainly for export, are thriving. Currently, 13 hydropower projects are in operation, 20 are under construction and over 60 are at different stages of planning, of which not all may materialize. Most of the existing and planned projects are located along the Mekong and its tributaries (Figure). Total foreign direct investment in the 12 foreseen Mekong mainstream dams (10 in Laos and 2 in Cambodia) is estimated at US\$ 25 billion [3]; gross income from hydropower generation (over 14 000 MW) is estimated at US\$ 3.7 billion per year [4].

The dams will have significant ecological, economic and social impacts on people and their livelihoods – not only on those who live close to the dam sites, but also on the millions who live downstream and are dependent on agriculture and fishery [4, 5]. This highlights the importance of moving from current project-by-project planning to a more integrative approach that considers the cumulative positive and negative environmental and social impacts of all projects [6].

## Lessons learned

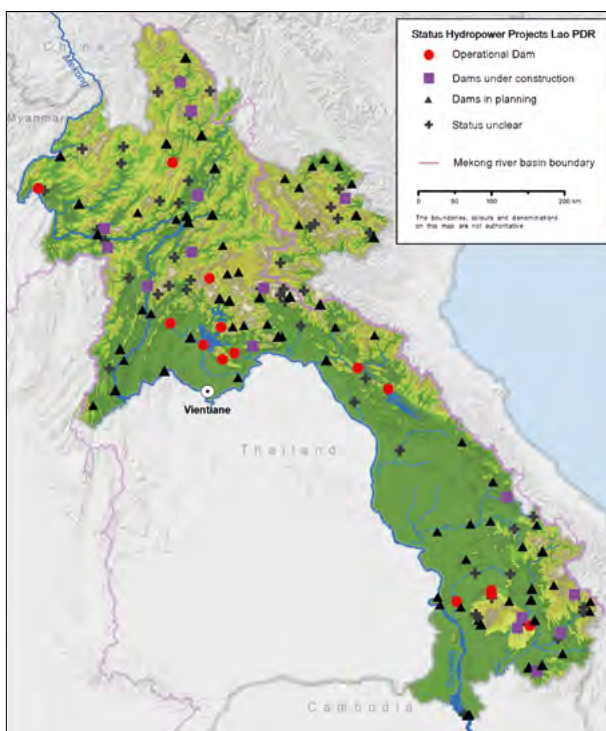
The most obvious local effects of dams and reservoirs are linked to resettlement. A spatial analysis of all hydropower projects planned and under way has revealed that 105 000 people in 293 villages would have to be resettled [7]. These are almost solely upland villages with an average poverty rate of about 47 percent (compared to 34.7 percent at the national level) [8], where more than 80 percent of the inhabitants belong to ethnolinguistic minorities. Hydropower projects may offer potential development opportunities to these villages, for example through increased accessibility. But the investments raise critical questions on local cost–benefit sharing and equity issues, such as negotiation power for better local outcomes.

Decision-makers and planners need preliminary information about economic, social, environmental and development trade-offs when potential investment projects are first discussed. The ratio between the number of people affected by resettlements, their poverty status and the expected MW output of each planned hydropower project may provide first indications about the project's expediency (Figure). To realize the flagship hydropower project in Laos, Nam Theun 2, for example, 1.2 households per MW installed had to be resettled. This is six times lower than the average ratio of all planned plants, which indicates that more than 7 households per MW installed would have to move.

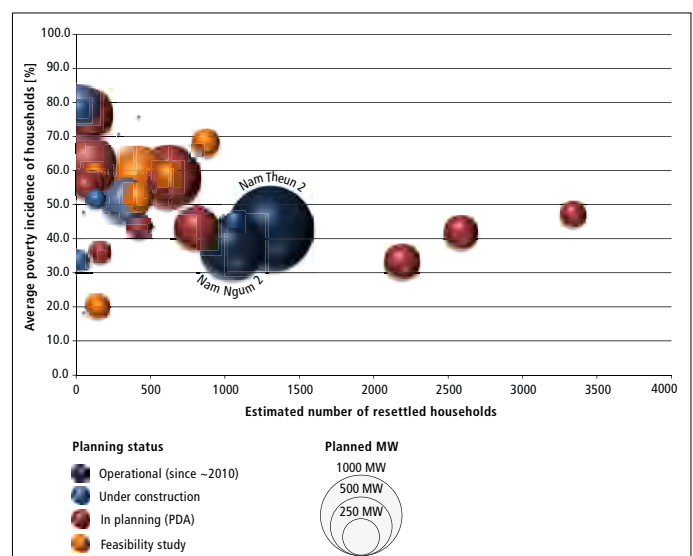
Such initial “assessments” allow a first comparison of the different projects in different geographic and social contexts. However, they cannot uncover either the actual local costs and benefits, or equity outcomes, which depend on other factors such as the nature of the actual resettlement programme and the sociopolitical context. Planning of hydropower plants thus requires spatially inclusive and comprehensive assessments that balance local and cumulative downstream costs and macroeconomic benefits, and consider equity and inclusiveness.

- The current project-by-project approach to the development of hydropower should be expanded to take into account cumulative impacts of hydropower on the national and river-basin levels.
- Spatial planning of investments in hydropower requires an initial comparison of all projects in the planning phase, in terms of socioecological costs and macroeconomic benefits of potential locations and contexts.
- Resettlement due to planned hydropower projects affects mainly poor and marginal villages, raising concerns about local cost–benefit sharing and equity issues.

Planned and existing hydropower projects in Laos (updated based on [7])



Contextualization (poverty and resettlements) of hydropower projects at different stages of planning in Lao PDR



# Mountain access brings benefits, but at a cost



Gary Taylor

Due to difficult physical access, remoteness and isolation defines daily life for most people living in the mountainous areas of sub-Saharan Africa and Asia. Recent rural road programmes, for example in Ethiopia, have demonstrated the positive effects of improved rural road infrastructure on poverty alleviation and food security, but also revealed remaining financial and technical challenges.

People walking to market with their animals on a rural road in Hintalo, Ethiopia (P. Starkey)

Because of the lack of roads and transport services, the majority of the rural population in the mountains of Ethiopia are heavily dependent on traditional means of transport, primarily walking and the use of animal transport. Investing in motorable roads to open up access to these areas can bring about dramatic improvements to the local economy. But investing in the construction of rural roads to connect small scattered communities is both costly and technically challenging. For the investor, the problems are twofold. First, there is no general agreement on how to establish the appropriate technical standard of road to be provided. In mountainous areas providing motorable access of even a basic level can be technically difficult and expensive. Second, and critically, there is a lack of evidence linking the level of investment to the likely benefits.

The UK-funded Ethiopian Rural Travel and Transport Project (ERTTP) has provided some answers but challenges remain [1]. This project was carried out in eight *weredas* (districts) in different regions of Ethiopia using a local-level planning approach. The immediate changes brought about by providing reliable motorable access were significant, particularly in areas without previous access. The table gives some examples of the changes in travel times.



*"I used to travel to Wukro on foot and spend more than a day bringing commodities to sell. As a result of the road that connects our village, Gebra Kidana, to Atsbi, I can now pay 8 birr for the bus journey and it now just takes me one hour to get there!"*

Words of Tesfaye, a retailer from a rural market in an ERTTP Wereda

Reduction in travel times as a result of road construction			
Route	Wereda	Before	After
Dera to Indaselassie	Atsbi Wenberta	5–5.5 h walking	25 min motorized transport
Jaragedo to Mekaneyesus	Estie	12 h walking	2.5 h motorized transport
Sheboka to Bako Market	Bako Tibe	2 h	30 min
Toba to Fofa market	Yem	12 h round trip	2 h round trip

### Selected impacts of road construction in Ethiopia [1]

#### Increased agricultural production

The construction of the Daleti–Oda Bildigulu road has provided an incentive to farmers to increase the production of sesame and other products for the market. Prior to the construction of the road (2003/04), the production of sesame was 20 quintals (2 000 kg) per farmer. After the construction of the road (2007/08), it increased, sixfold, to 120 quintals (12 000 kg).

#### Rise of farm gate prices

With the construction of the Atsbi–Edaga Hamus road, the farm gate prices increased more than threefold, especially for tomatoes and vegetables. The farmers also stopped carrying their produce to the markets since businessmen came with their trucks to buy directly from the farms. This increased the farmers' bargaining power and confidence.

#### Expansion of micro-finance institutions (MFIs)

Due to the new road access, the number of *kebeles* served by MFIs in Bako Tibe *Wereda* increased from 5 to 30 and the number of households receiving credits increased from 1 245 to 3 933. Over 450 of the loans were to female-headed households.

#### Improved access to health care

The construction of rural roads in Oda Godere *Wereda* improved access to pre- and post-natal care, as well as for emergency medical attention. On average, three expectant mothers used to die per year due to complications resulting from lack of access to medical services. In the years immediately after the improvement of the roads and the introduction of public transport services, no deaths occurred.

Current road investment appraisal procedures are not designed to address step changes in rural access such as those illustrated in the table above [2]. This is because these large reductions do not result in a simple pro-rata increase in traffic. Opportunities arise and journeys are made that previously were not possible. Moreover, traders may start visiting farms to buy produce, reducing the need for farmers to travel to markets. The social and economic changes brought about by these large reductions in travel times are far-reaching and typically occur over decades, as farming practices change and market linkages are developed. For example, in Eastern Nepal, the provision of motorable access to the Kosi Hill Area transformed a once food-deficit area to an exporter of agricultural products. However, this process has so far taken over 30 years [3]. Nevertheless, an evaluation of the ERTTP in Ethiopia revealed some of the changes that started to occur only a few years after the improvement of access. The potential of improved access to transform the social and economic situation of mountainous areas is widely appreciated. However, the lack of accepted methods for appraisal means for the time being major investment decisions are often politically driven.

There are numerous examples of major national programmes to improve access to rural areas, including hill and mountainous areas. The ongoing Universal Rural Road Access Programme in Ethiopia will eventually improve over 70 000 km of rural road to connect all *kebeles* (sub-districts) with an all-weather access at an estimated cost of US\$ 1.3 billion [4]. In India, the large Pradhan Mantri Gram Sadak Yojana (PMGSY) programme is improving over 700 000 km of local roads to connect rural villages at an estimated cost of US\$ 52 billion [5, 6]. Although the initiation of both programmes depended to some extent on technical and economic studies, the investments were ultimately driven by high-level political decisions. The lack of robust evidence to substantiate investments in rural access is one of the key areas being addressed by the UK-funded Research in Community Access Partnership (ReCAP). However, until more robust evidence becomes available, high-level political will may continue to be the major driver of investments in rural access.

- The provision of access to mountainous areas can dramatically transform the rural economy. However, the benefits may take many years to be fully realized.
- Successful programmes to improve rural access depend heavily on decentralized planning and implementation.
- Due to the current lack of robust evidence linking investment costs to benefits, major decisions on public investments in rural access to mountainous areas continue to depend heavily on political will.



Labour-based construction of Khimti–Betali road provides employment and access, Nepal (P. Starkey)

# Results-based financing for sustainable urban development



Madhu Raghunath, Huyen Thi Phuong Phan, Linh Xuan Le, Ngan Hong Nguyen

An innovative approach that links funding directly with verifiable results has been applied in seven towns in the Northern Mountains of Vietnam, the region with the highest concentration of extreme poverty in the country. The purpose is to strengthen the towns' capacities to plan, deliver and sustain infrastructure services, enabling them to act as engines of regional economic growth and poverty reduction.

Improving roads and drainage contributes to safer environments in low-income areas in Tuyen Quang City, Vietnam (H. Phan)

Rapid urbanization is taking place all over Vietnam, also in the Northern Mountains, the poorest region in the country. Many people in this mountainous region belong to ethnic minorities; they are highly dispersed and face extremely difficult conditions with limited access to land and water. Their main economic activities are agriculture, mining, forestry and some tourism. Not surprisingly, a huge number of rural poor people migrate to towns: today, between 13 and 30 percent of people live in urban areas, and this is expected to rise to 45 percent by 2020. While up to 50 percent of the population in the towns in the Northern Mountains live in multidimensional poverty, the growth of these towns also presents significant opportunities for inclusive growth and poverty alleviation. Urban centres can enable economic dynamics that improve not only urban livelihoods but also rural living conditions, through remittances as well as new market opportunities for products.

However, these mountain towns face immense infrastructural and institutional challenges. There is a widening gap between their growing need for infrastructure investments and the financial resources available. Moreover, town and provincial administrations tasked with urban development are fragmented and under-resourced. They are unable to respond adequately to local needs, or to leverage local resources effectively; they have weak capacity and few incentives to make investments on time and within budget.

In response to these problems, a National Urban Development Program was set up in the Northern Mountains in 2015 and will last until 2021, applying a novel programme-for-results approach (Box). Under the coordination of the national Ministry of Construction, the Program encompasses three primary activities: (a) performance-based funding for local infrastructure; (b) capacity building; and (c) support for na-



## Lessons learned



Construction of a kindergarten that will provide a healthy and safe place for over 600 children in Thai Nguyen City, Vietnam (H. Phan)

tional policy development and oversight. The total investment is US\$ 300 million; the Program will benefit 817 076 residents (in seven towns, with populations ranging from 55 000 to 330 000 people). The performance-based funding will support projects in urban infrastructure that were identified as priority investments in the town's master plans. Town authorities are responsible for planning and implementation.

The capacity building activities aim at enabling town governments to improve planning and to prioritize investments with high economic and social returns. Special focus is given to poor households, to ensure that investments benefit the bottom 40 percent of the population. The expected physical outputs will be public goods that generate positive impacts such as upgraded living conditions and transport, reduced travel times and expenditure, and improved access to social infrastructure. The overall improvements in the town environs will help stimulate economic growth, creating more employment opportunities in the towns and surrounding rural areas.

Although it is too early to assess the results, initial activities have demonstrated a departure from business as usual. They helped ensure that infrastructure investments were done in time and in good quality. Annual town plans were prepared with transparent disclosure of planned investments. The towns are also working on increasing their annual source revenue to be able to finance operations and maintenance of the infrastructure built under the project. As disbursements are tied to annual performance, the Program expects that a change in culture and behaviour will be institutionalized. In turn, the towns would develop into sustainable and inclusive urban centres, supporting economic growth and poverty reduction in the mountainous north of Vietnam.

### The performance-based approach

The unique feature of the Program is the direct linkage between disbursement of funds from central and local governments and the World Bank, and the achievement of specific results in the following areas: (i) institutional strengthening; (ii) delivery of infrastructure services; (iii) sustainable infrastructure investments; and (iv) national policy, support and oversight. Specific disbursement-linked indicators (DLIs) put time-bound targets under each results area to incentivize the participating towns to provide timely delivery of infrastructure in good quality, and to engage in institutional measures such as annual budget planning, urban asset management, and increase of own source revenues. A Program Action Plan with detailed measures in areas such as procurement, financial management, fraud, anti-corruption, land acquisition and citizen engagement is also tied to the DLIs to ensure that infrastructure investments are implemented in compliance with international standards and good practices.

- The first experiences made with the novel programme-for-results approach are positive. Investment in town infrastructure is based on prioritized annual planning, and planning processes are more transparent.
- The towns are working on increasing their own source revenues in order to become less dependent on external funding.
- Careful monitoring is essential to assure that business as usual does not creep back into urban infrastructure development; given the sums involved, the stakes to achieve this are high.



Upgrading works on this road will facilitate transportation for local residents and support local businesses in Duong To Hieu, Vietnam (H. Phan)



# Improving the value of rangeland services



Yi Shaoliang and Muhammad Ismail

The economic valuation of rangeland ecosystem services has helped the countries of the Hindu Kush Himalaya realize the national and regional significance of vast rangelands. The increasing government support through both funds and policies has enabled the pastoral communities to participate in and benefit from this external assistance in rangeland management.

Modernity has arrived at this traditional herders' camp in Tibet, China (Yi S.)

Rangelands cover about 54 percent of the 4.2 million square kilometres of the Hindu Kush Himalaya (HKH) region. They are the primary source of subsistence for thousands of mountain communities. They also provide a host of ecosystem services to the 1.3 billion people living downstream. However, rangeland resources and pastoral communities are often neglected by policy-makers and national investments.

Since the start of its Regional Rangeland Programme (RRP) in 1995, the International Centre for Integrated Mountain Development (ICIMOD) has been working with national partners in Afghanistan, Bhutan, China, India, Nepal and Pakistan – research institutions, government departments and NGOs – to address these shortcomings. Since the beginning, the programme, funded by the Austrian Development Cooperation in three phases, has invested around US\$ 1 100 000 in manifold activities from local interventions to policy development, while the partners' contribution amounted to US\$ 1 500 000.

A survey of 1 315 households across five countries (Bhutan, China, India, Nepal and Pakistan) in 2011 revealed that across the HKH, livestock management alone provided annual services amounting to US\$ 4 578 per household (US\$ 590 per person), including 69 percent of marketed value and 31 percent of non-marketed value of milk, meat, transport services, fuel, etc. On average, livestock and livestock products accounted for 69 percent of total household income. However, these products represent only a small fraction of the total services provided by rangelands: the example of the Tibetan Plateau showed that as much as 90 percent of the ecosystem services are non-provisioning services such as soil and water conservation and biodiversity maintenance. These findings raised policy-makers' and stakeholders' awareness of the value of rangeland resources, and revealed the need to enhance local participation to sustain multiple rangeland services.



*"In Pakistan, ... 43 percent of the beneficiaries [of the Regional Rangeland Programme] succeeded in improving on existing income sources, while 38 percent started a new income activity. ... The RRP activities helped 53 percent of the respondents to earn 10 percent more, while 33 percent started earning about 20 percent more."*

Ashiq Ahmad Khan, impact analysis consultant, 2012

## Lessons learned



The RRP promoted a collaborative management process through which herders, government bodies, businesses and research institutes were able to share their experience on managing rangeland resources. A variety of co-management models were tested and over 20 rangeland user groups were supported with funds and technical assistance in the planning and implementation of co-management activities like reseeding of degraded pastures, rotational grazing, adoption of new energy technologies, action researches on rangeland restoration and policy dialogue. These activities have helped improve the capacity of the villagers to participate in rangeland management and to exchange good practices across national boundaries. The examples of China and Nepal (Boxes) illustrate some of the programme's broad impacts at different levels, ranging from improvement of pastoral communities' livelihoods to national policies.

### China finances the scaling-out of effective rangeland improvement approaches

In China, rangeland user groups and associations were set up in two townships in Hongyuan County, Sichuan Province. A roundtable mechanism was established so that representatives of rangeland users, government departments, extension workers and other stakeholders could have regular meetings to discuss rangeland management issues on an annual basis. With the herders investing their lands and labour and the government departments investing seeds and technologies, over 1 000 hectares of fodder seed producing area was developed. The harvested seeds were sold to herders in other regions for rangeland improvements and the hay was harvested as a local winter reserve. The herders were paid for their lands and labour contribution, and received a share in income from seed-selling. Moreover, winter fodder storage was promoted and has greatly reduced losses from animal mortality. Seeing the success of the programme, the central government allocated over US\$ 20 million to extend the programme model to the five pastoral provinces of China.

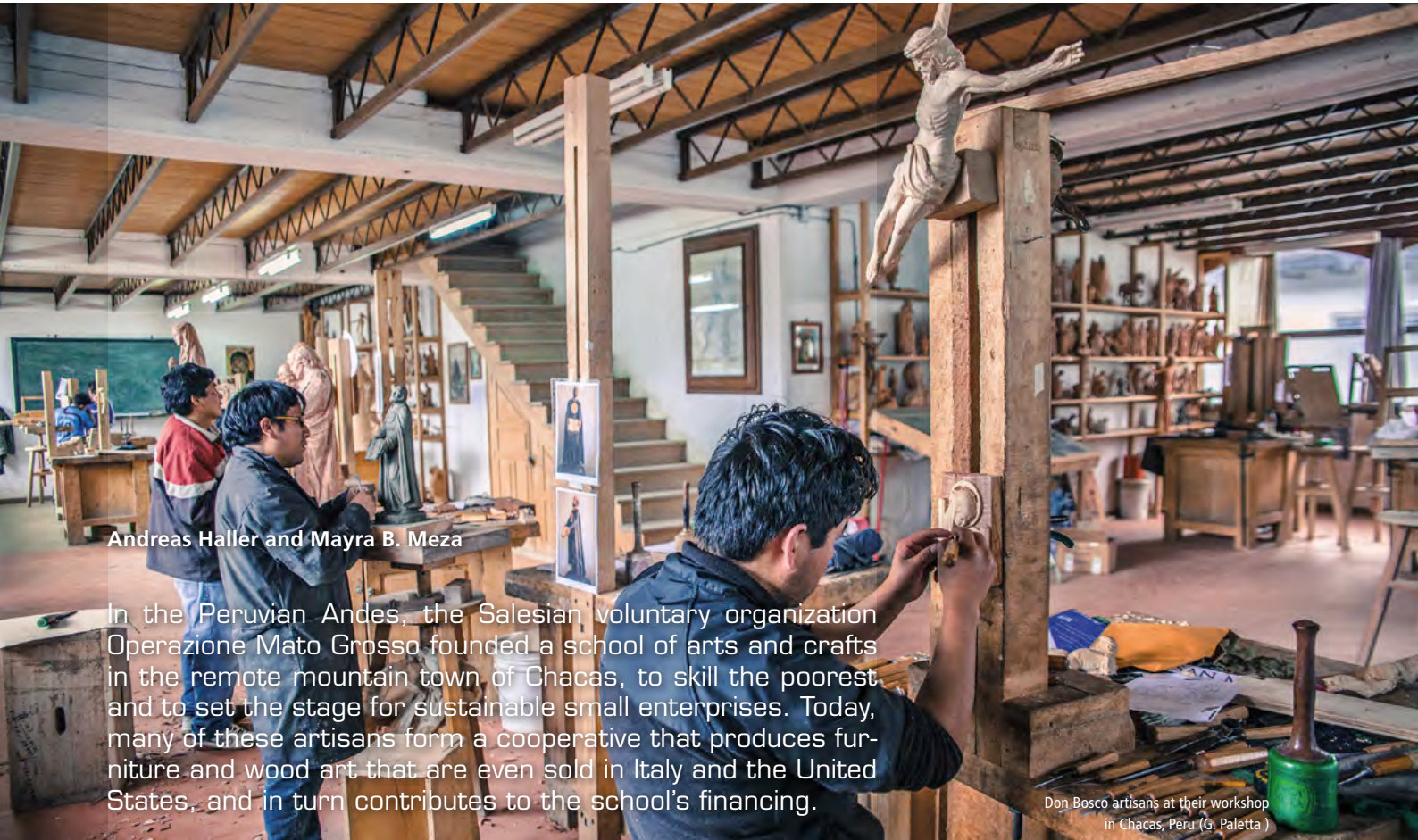
### Nepal invests in Rangeland Policy

In Nepal, issues arising from implementation of rangeland management activities in the fields led national partners to realize the need for sound rangeland policies. With funds from both the government and RRP and technical support from ICIMOD, national partners took the lead in the process of developing the first Rangeland Policy of the country. This was a consultative process at national and sub-national levels that involved the government departments, pastoralists, sedentary farmer communities, researchers and business sectors. The Rangeland Policy of Nepal, which among others puts due emphasis on stakeholder participation in resource management, the right of the migratory herders and multifunctionalities of the rangeland ecosystems, was approved by the cabinet in 2012.

- Complementing project funds with contributions from the partners and national government is essential for the sustainability of a programme and can result in new initiatives by national governments that multiply the initial investments, as the examples of China and Nepal show.
- Ecosystem service valuation is very useful in helping the decision-makers and general public realize the importance of rangeland resources.
- Transboundary cooperation can be very effective in promoting technology transfer and dissemination of good practices.



# Artisans of the Andes: an economic and social success



Andreas Haller and Mayra B. Meza

In the Peruvian Andes, the Salesian voluntary organization Operazione Mato Grosso founded a school of arts and crafts in the remote mountain town of Chacas, to skill the poorest and to set the stage for sustainable small enterprises. Today, many of these artisans form a cooperative that produces furniture and wood art that are even sold in Italy and the United States, and in turn contributes to the school's financing.

Don Bosco artisans at their workshop in Chacas, Peru (G. Paletta)

Situated east of the Cordillera Blanca, the mountain town of Chacas has been transformed from a centre of poverty to a prospering focal point of Andean craftsmanship. In 1979, Operazione Mato Grosso (OMG) started to train young people as artisans – aiming at founding a locally based cooperative of craftsmen, and improving the local people's living conditions.

Pupils admitted to the five-year school of arts and crafts – initially 12, currently about 50 per year – are offered a full study grant including board and lodging. At the end of their training, the young artisans obtain a tool set that enables them to pursue their career – be it in Chacas or elsewhere. The project's financing is mainly based on the pillars of voluntary work (several Italians currently work as teachers or support administrative processes), donations and revenues generated through the sale of furniture and wood art in the Chacas-based cooperative. The cooperative Artesanos Don Bosco has about 650 members, who take orders via the cooperative's central administration; on average, an artisan can earn about twice the Peruvian minimum salary of PEN 750 (US\$ 235). Commissions come, among others, from Peruvian public entities, ecclesiastical authorities or international customers. Italy and the United States are the cooperative's most important foreign target markets: in 2014, they imported 38 percent and 33 percent of the cooperative's products, respectively, followed by Chile (18 percent), Togo (7 percent) and others. Artesanos Don Bosco has a share of about 3 percent in the total Peruvian wood furniture exports [1], and in Peru's Ancash region they already ranked 88<sup>th</sup> among all exporting enterprises in 2011, their exports reaching a value of US\$ 409 478 [2].



*"When I was a child in the 1960s, some 50 years ago, young boys of the village were often forced to go to the coast for work, for instance to Chimbote or Lima. Thanks to the Italians this has changed. Now, our young chacasinos are becoming renowned artisans and their work is sold to foreign countries – imagine!"*

Quote by a  
Chacas-born male interviewee

## Lessons learned

- Development financing based on donations and voluntarism can be a fruitful alternative to traditional forms of investment, provided these initiatives are entrepreneurially managed and steered towards self-sufficiency.
- Cooperative forms of inclusive entrepreneurial initiatives, linking training and small-scale rural industries, are likely to trigger a more comprehensive economic development. This is particularly so if cooperative members forgo maximization of their personal incomes in favour of the cooperative's reinvestment in training for future generations.



Colonial-style buildings with restored, wood-carved balconies (A. Haller)

The project's funding is mostly donation-based and does not represent a form of classical investment, where investors aim at having a share in the profits. What makes this project sustainable is that the school and cooperative are being developed towards self-sufficient and thus future-proof institutions: not only by generating revenues from handicraft sales, but also by creating local human capital (for instance knowledge, skills or ability) to ensure the training of the next generation of artisans, who in turn contribute to the development of Chacas and its environs.

In the district of Chacas, the number of small enterprises belonging to the manufacturing sector had increased to 22 by 2008, with 14 of them founded after 1999 [3]. Since there are no other types of manufacturing in this rural district, the increase can largely be linked to the OMG initiatives, which apart from an economic and training focus also concentrate on health care. This doubtlessly contributed to the advancement of the Chacas district in the Human Development Index (HDI) ranking. According to UNDP [4] Chacas' HDI rank rose from 912<sup>th</sup> among all Peruvian districts in 2003 to 892<sup>nd</sup> in 2012. Positive effects are also visible in the village itself. Local artists, guided by OMG, have carefully restored wooden elements such as traditional balconies of the many colonial buildings that form a unique ensemble of outstanding historical value. Moreover, newly constructed buildings follow the existing building culture, and thus continue using wooden balconies, doors and windows as characteristic features. Chacas is gradually becoming a destination for individualist travellers who appreciate Andean nature and culture off the beaten track. For this reason, OMG has already started to train young locals as mountaineering guides, and to establish mountain huts in the Cordillera Blanca.



The artisans of the Peruvian Andes are passionate about their work (G. Paletta)

# Innovation and technology to diversify the regional economy

Frédéric Bagnoud

How can an alpine region prepare itself for the economic challenges of tomorrow? Since 2004 the Canton of Valais in the Swiss Alps has been putting its faith in innovation and new technologies. The idea is to diversify its economy, as the traditional agriculture and tourism sectors are shrinking. The strategy is embodied by The Ark Foundation, which puts money into practical projects in the local economy, creating a seed bed for new investments.

Sion and its surroundings in the Rhone valley, Switzerland, and some of the innovative enterprises backed by The Ark (F. Perraudin, Valais Wallis Promotion)

The character of the Valais, originally a rural canton, is closely bound up with its mountains. It is a canton with numerous holiday resorts as well as extensive vineyards and orchards on the hillsides and in the Rhone valley. But today the Valais is above all an industrial area, especially in the valley. Industry and technology account for no less than 30 percent of its GDP, while tourism comes in at about 8 percent and agriculture at barely 1 percent [1]. The Valais has two major centres of chemical industry, Visp and Monthey, that are home to large companies such as Lonza, Syngenta, Debiopharm and BASF. It also has a number of small to medium-sized enterprises (SMEs) – about 550 [2] – working in technology, industry and energy. Furthermore, the region has a number of cutting-edge research institutions. This mix of skills and attractive lifestyle makes the Valais an ideal location for investment in economic projects. Being part of Switzerland, the Valais also enjoys a relatively stable economic climate. In 2004, the Canton of Valais set up The Ark Foundation, tasked with constructing the Valais of the future. The emphasis is on three industries with high added value: information and communication technology, life sciences and engineering sciences. They are being promoted through the creation of new technology companies (start-ups), support for existing SMEs wishing to adopt innovative approaches (whether in business or in products) and/or the establishment of strong links between academic research and the market.

Each project financed by The Ark is approved by a selection committee. In the end, more than 80 percent of the foundation's annual budget (about US\$ 7 million in 2014) is allocated to business projects. Each sum put in by The Ark opens up possibilities for complementary investment. For example, in 2014 each dollar invested in start-ups in the Valais generated US\$ 5.25 worth of applied research projects,



## Lessons learned

- Businesses in peripheral regions are still struggling to find investors despite their innovative ideas and the distinguished and significant support of The Ark.
- Establishing links between tradition and technology and introducing innovative enterprises to a basically rural area is a long-term undertaking. The Ark has made a good start. In 2013, the Valais was ranked fifth among the Swiss cantons for the establishment of high-tech start-ups [3].
- The Ark's success is owed to the fact that all levels of government – national, cantonal and communal – are participating in the initiative.

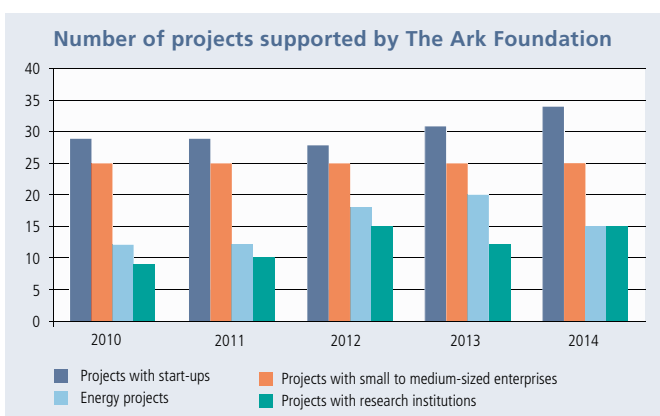
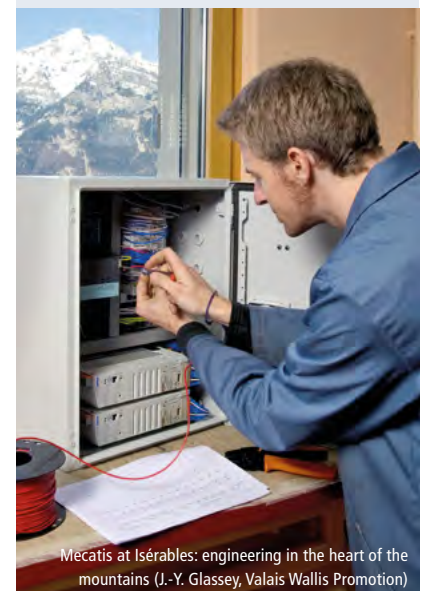


and led to US\$ 11.69 worth of investment in the form of equity and loans. So The Ark's activities have a knock-on effect that gives a real boost to the regional economy, which is bound to improve investor confidence.

Financing for The Ark comes mainly from the public authorities: the Canton of Valais (48 percent), the Swiss Confederation (28 percent) and communes (7 percent). The balance comes from money carried over from the previous year and various other sources (2014 figures).

Even if this is not the main aim, some of the initiatives backed by The Ark promote links between the Rhone valley and the mountains. A new technology park, PhytoArk, opened in 2013, offering infrastructure for processing alpine flowers. The Valais is Switzerland's main region for the production of alpine plants, most of which are used for making sweets and herbal teas. The role of the PhytoArk site and The Ark Foundation is to build the value chain locally, and to encourage the establishment of activities with high added value, such as the extraction of plant ingredients and the production of food supplements, functional food and cosmetics. The first start-ups in this field are already emerging, helping to create new skills and providing new outlets for producers of alpine plants.

Some technology firms have even chosen to set up their business in the mountains. One is the mechanical engineering company Mecatis, which employs about a dozen people. A start-up with initial financing from The Ark, it is located in Isérables, a village perched on the mountainside at an altitude of 1200 metres. The company uses the cable car that links the village with the valley as a lift, even for bulky material.







3

# Fostering social development





Felicitas Bachmann and Susanne Wymann von Dach

# Building on mountain communities' strength

Educating young people to advance sustainable development, Xieng Khouang Province, Lao PDR  
(S. Wymann von Dach)

Social development in mountains is aimed at improving people's access to services and resources; building strong, locally anchored institutions; empowering local communities; and increasing the resilience of mountain livelihoods. This includes reducing disaster risk; broadening income opportunities through innovation and job creation; and improving social security by strengthening social networks and formalizing working conditions.

## Opportunities and challenges

Mountains are home to about 13 percent of the world's population [1]. Many mountain inhabitants belong to ethnic minorities, 90 percent live in developing countries, and an estimated one-third live in urban areas. In the global South as in the North, mountain people have traditionally adapted in varied ways to the environment, developing a rich and diverse culture as well as cooperative governance and institutions tailored to their specific needs. But their manifold and adaptive capacities no longer suffice to address today's challenges, which are triggered by local, regional and global change. Livelihoods in the mountains, especially in rural

areas, strongly depend on the use of scarce natural resources. Mountain people face limited options, alternatives and access to services; they also have to contend with outmigration of the young generation and an increasing risk of natural hazards. More political support and investment are needed that build on mountain communities' strength, culture and practices – and that pay due attention to ethnic minorities and marginalized groups.

### Pathways to fostering social development

The Sustainable Development Goals strongly emphasize such inclusive economic and social development aimed at helping people reach their full potential, and enabling women, men, youth and vulnerable groups – children, elderly people, people with disabilities and ethnic minorities – to have equitable access to goods and services.

Providing access to education and jobs is essential to fostering sustainable social development. As shown in Nepal (B. Shrestha, pp. 34–35), the private sector plays a key role in developing skills and providing market-oriented vocational training – preconditions for gainful employment. Typically, investments in social development are made by governmental and non-governmental organizations or international development cooperation, often in the form of grants. In many places, remittances are an important financial factor for development in mountain communities. As a case study from Pakistan (A. Benz, pp. 36–37) shows, re-investing remittances in the education of the next generation can be a key to employment, rising incomes and powerful translocal social networks. Nonetheless, in many other cases migration has shown disastrous effects on mountain communities and livelihoods, with economic progress only reached under inhumane conditions and at high social cost.

Achieving inclusive social development involves promoting empowerment and self-determination. It also requires the participation of all population segments in social and economic activities and political decision-making processes. This is the aim of a project in Pakistan targeted at people with disabilities (L. Hashmat et al., pp. 38–39). In Chile, the desire to preserve cultural identity and ancestral lands is the motor that drives a small ageing farming community (R. Sánchez and S. Campusano Villches, pp. 40–41) to spend a considerable amount of their modest income on securing their nature reserve against the interests of external actors.

Social development can also be strengthened by increasing the resilience of mountain livelihoods to shocks and stresses. This can be done by investing in sustainable resource management and disaster risk reduction to safeguard the physical basis of mountain livelihoods and protect people from natural disasters. The latter is the aim of a transnational early-warning project in the Hindu Kush Himalayas initially financed by donors and now increasingly attracting support from climate funds (M.S. Shrestha and N. Shrestha Pradhan, pp. 42–43). Social development also means improving access to resources and services and fostering secure living and working conditions. In Colombia, a private investor enabled small-scale artisanal miners to professionalize their practices through the Fairmined Certification process (N. Uribe and M. Piersiak, pp. 44–45) and hence to improve their income, livelihoods, social security and working conditions. As the different case studies show, social development can be fostered by a broad range of investments and cannot be separated from safeguarding environmental integrity. It also builds a foundation for boosting regional economies.



Woman with low vision, empowered to make her own living (LIGHT FOR THE WORLD)

# Private-sector training for gainful employment



Banu Shrestha

An estimated 450 000 youths enter the Nepalese labour market each year, 90 percent of them unskilled. Their poor basic education confines them to low-paying jobs in Nepal, or high-risk jobs abroad. The Employment Fund sponsors market-oriented vocational training for poor and discriminated-against young people, paying the private-sector training providers on the basis of achieved results, i.e. successful job placement.

To date, more than 100 000 youths have been trained by the Employment Fund in Nepal (Employment Fund)

The Employment Fund (EF) was established in 2007, a joint initiative of the Government of Nepal, the Swiss Agency for Development and Cooperation (SDC) and HELVETAS Swiss Intercooperation. The EF is active in 67 (out of 75) Nepalese districts, and is currently funded by SDC, the UK Department for International Development (DFID) and the World Bank, with a budget of US\$ 8.5 million in 2014 [1]. Its main objective is to promote gainful employment for young women and men, especially those belonging to economically and socially disadvantaged groups, by fostering market-oriented training and job creation.



EF has a two-pronged approach. First, the Path to Prosperity (PtP) component provides occupational and life-skills training to disadvantaged youths, and links them to employment. Second, Micro-Enterprising for Job Creation (MEJC) enables business-minded youths with technical and business-skills training to start up a small enterprise. MEJC graduates are expected to create and register a new business, and thus to create new jobs, preferably for PtP graduates. In addition, EF has successfully piloted the apprenticeship model of training in collaboration with different umbrella organizations of industries and chambers of commerce.

EF cooperates with private-sector Training and Employment Service Providers (T&Es) responsible for quality training and for ensuring trainees' transition to gainful employment. After the skills training, T&Es must ensure either wage employment or self-employment for their graduates at or above the pre-defined minimum income of NPR 4 600 (US\$ 46) per month on average for a minimum of six months (termed "gainful employment") [1]. In order to match the training offer to the labour market demand, the T&Es conduct a rapid market appraisal as part of their technical proposal. T&Es are compensated for their performance, i.e. EF

## Lessons learned

payments to T&Es are results-based and comprise the training costs and incentives. A differential pricing mechanism is applied to incentivize T&Es to reach the target population. If a T&E is able to reach the highest priority target groups, which are difficult to place in gainful employment – women or youths, from castes or ethnic groups experiencing discrimination – it will receive a higher “top off”, calculated as a percentage of the training costs.

To fulfil their aim of reaching all target groups, T&Es are encouraged to use a mobile training approach, i.e. conducting training at the beneficiaries’ own location. In the past, EF used to give community-based organizations a “finder’s fee” for linking women to training. Now, T&Es themselves counsel women and their family members on the benefits of training. Flexible hours, female trainers and the companionship of other women or family members at the workplace can encourage female participation in training and employment. Equally important is training in trades that the family members are already engaged in, facilitation into networks of past trainees and linkage to finance.

A robust monitoring system for active compliance and results monitoring is in place. EF engages in mainstreaming results-based training by providing technical assistance to the Ministry of Education’s Enhanced Vocational Education and Training (EVENT) project. The project’s objective is to expand the supply of skilled and employable workers by increasing access to quality training programmes. A number of elements of EF’s approach (e.g. rapid market assessment, results-based service procurements from T&Es, differential pricing system) have been adapted to suit EVENT.

- Results-based financing forces training providers to deliver high quality. As the training providers are responsible for the employment of their graduates, it is in their financial interest to offer them the skills in demand on the labour market.
- Inclusion of disadvantaged groups in skills training and gainful employment can be enhanced through financial incentives, linked to employment outcome, for training providers.
- The rapid market appraisal supports the design of informed training and employment plans, and contributes towards the achievement of gainful employment outcomes.



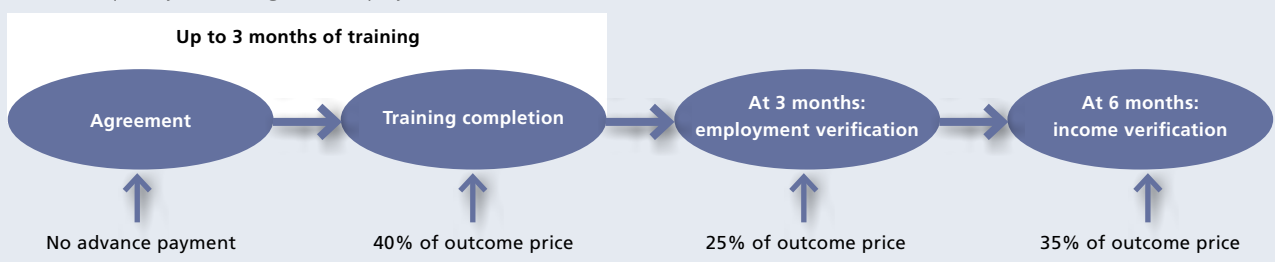
### Outcomes

- More than 100 000 youths have been trained to date, of which more than 70 percent are gainfully employed.
- The Employment Fund’s results-based skills training approach is replicated by government agencies and other organizations in Nepal.

	2014 targets	2014 achievements
<b>Path to Prosperity (PtP)</b>	12 300 youths trained	12 986 youths trained
<b>Micro-Enterprising for Job Creation (MEJC)</b>	3 500 youths trained ≥ 50% of graduates create an additional job for others	3 022 youths trained 67% created an additional job 81% established an enterprise
<b>Total</b>	15 800 youths trained ≥ 75% gainfully employed	16 008 youths trained 72% gainfully employed

### Results-based financing system to pay training providers

Payment is based on the number of graduates who successfully complete training and are subsequently linked to gainful employment.



# The power of translocal networks and remittances



Andreas Benz

The importance of remittances in supporting development is well known and has been proven in many case studies. However, the case of Gojal in northern Pakistan shows that remittances unfold their real power only through being invested in education in and outside the migrant's places of origin, and through the communities' expansion of translocal social networks that link families across a multitude of places.

Aga Khan Higher Secondary School for Girls in Karimabad, Pakistan (A. Benz)

The rural high-mountain region of Gojal, home to about 20 000 inhabitants of Ismaili faith, has achieved impressive developments and advancements of people's well-being since the 1940s. At that time the region faced extreme poverty, recurrent famine and pervasive illiteracy. Today, education and gender equality in Gojal have reached a level that is virtually unparalleled in other rural areas of Pakistan. Among a range of conducive factors such as state and non-state interventions and improved road access, the people's mobility and migration strategies were key to enabling these developments.

Migration from Gojal gained momentum in the 1940s with the region's integration into Pakistan. Initially the Gojali migrants focused on Karachi, where they found support from the local Ismaili community. They soon spread to other lowland cities and continuously expanded their migration networks. They maintained their strong intra-communal ties, backed by a pronounced corporate Ismaili and Gojali identity. The income of the mercenaries and unskilled labourers of the first generation of migrants was used to enable other family members to acquire higher education in the cities. After their graduation, this second generation often built highly skilled professional careers, in turn supporting a next generation's migration for their higher education and subsequent professional careers. This triggered an upward spiral of rising education levels and increasing income among the Gojalis (Table). Survey data show that Gojali households on average spend about one-third of their disposable income on education, provoking an exceptional rise in higher education and professional employment.

In the migrants' places of origin, their remittances were also used for other purposes, such as modernizing agricultural production or establishing small-scale enterpris-



*"The big development started when the first educated migrants came back to the region with their professional skills and knowledge. A huge number of our professional people returned and joined the education and health sector. They focused on our area and obviously that was a big change for development. And again they assisted their families and the other people in the village in going for further professional education, particularly also women."*

Khuda Dad, government officer from Gulmit, Gilgit

## Lessons learned

The education status of the two Gojali villages of Hussaini and Passu				
		Pakistan (2011)	Hussaini (2012)	Passu (2012)
Mean years of education (25+ years)	Male	6.2	9.4	11.0
	Female	3.1	5.8	6.6
Adult literacy rate (14+ years)	Male	67.0%	88.3%	95.8%
	Female	42.0%	71.0%	75.8%
Share of university graduates in population (25+ years)	Male	10.1%	30.4%	38.6%
	Female	4.9%	14.2%	16.7%
Multidimensionally poor (in % of population)		44.2% (2012/13)	3.7%	3.1%

Data sources for Pakistan: UNESCO UIS online database, OPHI Country Briefing June 2015: Pakistan; for Hussaini and Passu: Survey Benz 2012

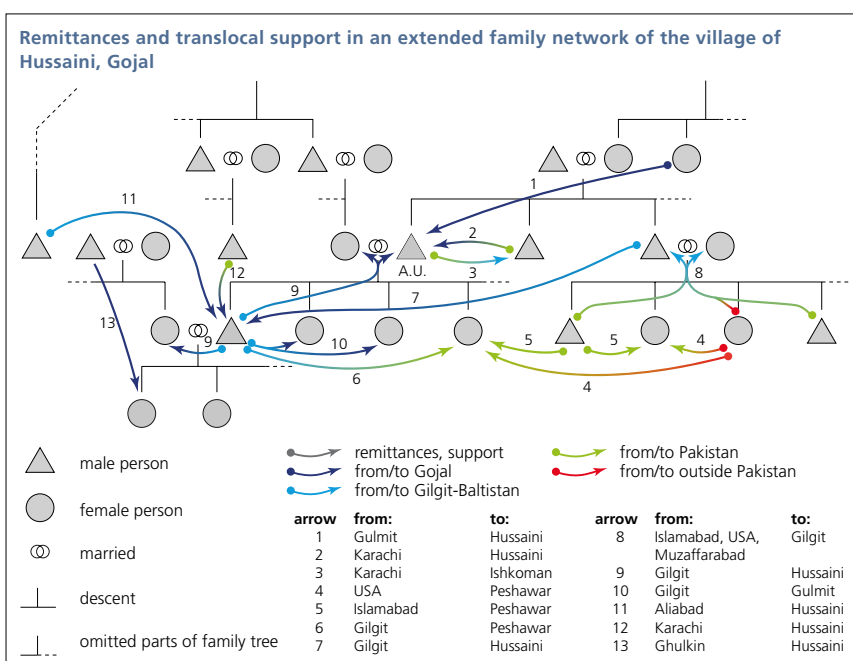
es (e.g. general stores, restaurants, hotels, transport services or transborder trade). These business ventures were often set up by returning migrants investing their saved earnings from labour migration. Remittances were also used for subsistence and house construction. Overall, the importance of agriculture declined in favour of off-farm income generation, which now forms the central pillar of Gojali livelihoods. The share of income from agriculture has fallen, from 54 percent in the mid-1990s to 37 percent in 2005 in the Gilgit district [1], and to about 20 percent in the villages of Hussaini and Passu. As local investment opportunities are limited, investments in education and professional careers outside Gojal have in the long run contributed more to mountain development and people's well-being than local investments.

Currently, about one-third of Gojal's population is absent as migrants. Members of households, family networks and village communities are spread across a multitude of places but have remained closely interconnected through strong social ties and exchange flows. Remittances flow not only from migrants' target to sending regions, but also between third places outside Gojal. This is well illustrated in the example of A.U.'s household from Hussaini where many support flows were directed not to Hussaini, but to family members staying in third places. Based on the well-established norms of mutual assistance and income redistribution among the Gojalis, the success of one migrant became beneficial to many others.

- Investing remittances in education provides the key to professional employment, rising income and increased well-being.
- Migration results in mountain families being spread across a range of places, with remittances not only flowing back to migrants' sending regions but also to third places. A substantial part of mountain development takes place outside mountain regions.
- Development planning and policies seeking to advance human-centred development should provide not only a conducive framework to invest remittances in the sending region but also account for the translocal social networks reaching far beyond the region in focus.



The modernization of mountain agriculture, Pakistan (A. Benz)



# Inclusion and empowerment of people with disabilities



Lubna Hashmat, Sabine Rehbichler, Malte Fährders

Living in Pakistan's mountain area is extremely challenging for people with disabilities. The arduous terrain makes it difficult to access health services, and limits opportunities to participate in capacity building or economic and social activities. Grants from governmental and non-governmental organizations are facilitating community-based inclusive development, as well as the rehabilitation and empowerment of people with disabilities.

Women with different disabilities are taught local wool-spinning techniques in the northern provinces of Pakistan (CHIP)

There are many isolated pockets of habitation in the northern provinces of Pakistan, due to its mountainous topography. Conditions are especially tough in Gilgit Baltistan province, home to five of the world's 14 eight-thousand-metre peaks. Basic goods are not available on a regular basis, and sometimes transportation is impossible.

Persons with disabilities (PwDs) are among the most deprived segments of society in Gilgit Baltistan, lacking access to health and educational facilities, vocational skills, income-earning opportunities and social activities. Before 2012, only 2 percent of children with disabilities attended school, and less than 15 percent of adults with varying levels of disability were engaged in economic activities. In short, they were heavily dependent, and largely excluded from economic and social life.

Promoting inclusive development is the overall goal of the Civil Society Human and Institutional Development Programme (CHIP). Originally initiated by Swiss development organizations, CHIP became an independent NGO in 2005, based in Pakistan. CHIP began its work for persons with disabilities in some districts of Pakistan. Given the high need – the World Health Organization (WHO) estimates that 15 percent of the world's population lives with a disability [1] – the organization is present in all provinces today, and receives funds from the Government of Pakistan and international NGOs.

In 2006, CHIP started the inclusive development programme in the Skardu and Ghanche districts in Gilgit Baltistan. The current project "Rehabilitation and Inclusion of Persons with Disabilities in Skardu and Ghanche, 2012–2015" is supported by LIGHT FOR THE WORLD with a grant of € 322 300. The current project aims to include people with disabilities in all aspects of life.



*"CHIP's assistance has allowed me to use my skill set and earn a respectable living for myself."*

Iqbal, 23, hearing- and speech-impaired carpenter

*"Thanks to CHIP, one day I will be able to fulfil my dream of becoming a teacher!"*

Ali Shah, 12, joined conducted sensitization sessions

## Lessons learned



Despite his physical disability, Abdur Rahman maintains a wool- and carpet-weaving microbusiness (CHIP)

At first, CHIP supported blind people, later extending its outreach to people with physical, hearing and speech impairments. The nature of the intervention also became more comprehensive, growing from physical rehabilitation to educational, economic and social inclusion according to the age, gender and medical condition of those concerned.

The methodology aims at strengthening local community-based organizations (CBOs) to become effective and inclusive development actors. This is done through a twofold approach: 1) supporting organizational development as a whole, by providing training, mentoring and coaching; and 2) sensitizing and capacitating the organization to identify persons with disabilities, refer them to relevant rehabilitation services and effectively include them in their own structures and programmes.

Struggling through the mountainous landscape, hostile weather and landslides with minimal facilities at their disposal, CHIP and its partners have played a life-changing role for the beneficiaries, who, since 2006, have totalled 800 people with disabilities in 50 villages of Skardu and Ghanche. In 2014, CHIP was awarded the title “Best NGO in Baltistan”.

- Disability is usually left to the public and non-profit, mainly charity, sectors, and rarely attracts private investments.
- The inclusion of PwDs into social and economic activities improves their quality of life, but also reduces the burden on their family members and caretakers.
- The systematic selection of community-based organizations for partnership is crucial for the sustainability of the project, as disability can only be successfully mainstreamed by organizations that are really committed to inclusion.



Yousuf Shan had polio at the age of five; he now attends school in Skardu (LIGHT FOR THE WORLD)

Main achievements and activities of the project to empower persons with disabilities (PwDs) (2012–2015)		
Areas of intervention	Project achievements	Activities promoted in the project period (covering 18 old and 32 new villages)
<b>Health</b>	704 PwDs (= 166% of project target) received medical diagnosis while 423 (105% of target) received medical rehabilitation. (Baseline: 0%)	<ul style="list-style-type: none"> <li>• Identification of PwDs through specifically trained community mobilizers (who are mentored by disability experts).</li> <li>• Facilitation of medical assessment and access to rehabilitation services and assistive devices.</li> </ul>
<b>Education</b>	148 out of 175 children with disabilities (= 85%) are enrolled in mainstream schools. 27 children suffering from severe disability are included in special schools. (Baseline: 2%)	<ul style="list-style-type: none"> <li>• Selection and accessibility audit of mainstream and special schools where children with disabilities can be admitted.</li> <li>• Provision of education material.</li> <li>• Training of teachers on teaching children with disabilities and on disability equality.</li> </ul>
<b>Economic</b>	313 PwDs (= 139% of project target) are engaged in economic activities. (Baseline: 13%)	<ul style="list-style-type: none"> <li>• “Career counselling” of PwDs.</li> <li>• Facilitate training of PwDs on business management and in setting up enterprises.</li> <li>• Promote training through apprenticeship with local businesses and in existing technical training institutes run by CBOs.</li> </ul>
<b>Social</b>	77% (target: ≥ 80%) of PwDs are included in social and recreational activities. (Baseline: 21%)	<ul style="list-style-type: none"> <li>• Awareness-raising at communal level regarding causes of disability and importance of rehabilitation and inclusion (theatre performances, wall-chalking and media campaign).</li> <li>• Talent shows of PwDs as part of their confidence building and linkages with disabled people’s organizations (DPOs).</li> </ul>
<b>Empowerment</b>	65% (target: ≥ 80%) of adult PwDs are included in CBOs and self-help groups. (Baseline: 4%)	<ul style="list-style-type: none"> <li>• Training of 12 CBOs and 1 DPO on community mobilization, disability equality, organizational and financial management, resource mobilization, with regular monitoring and mentoring.</li> <li>• Facilitate inclusive strategic planning of CBOs.</li> </ul>



# Protecting ancestral lands



Rafael Sánchez and Sergio Campusano Villches

Los Huascoaltinos Nature Reserve in northern Chile was established in 2004 by a small farming community seeking to protect their ancestral lands, water resources and biodiversity. These farmers have successfully used their own resources to finance a series of lawsuits against some of the world's largest mining companies, in order to avoid losing their natural and cultural heritage.

Los Huascoaltinos Nature Reserve in northern Chile (R. Sánchez)

The farming community living in the upper valley of the Huasco River in the Atacama Region of Chile established a private nature reserve – Los Huascoaltinos – to protect its ancestral lands. In the early 20<sup>th</sup> century, 381 000 hectares were passed on to the inhabitants of this region, and in 1997, the Chilean government legally transferred these lands to the community. The nature reserve covers 240 000 hectares, 19 percent of which constitute a federally recognized priority site for biodiversity conservation. The goal of the reserve is to preserve the biodiversity and water resources of the territory; to improve natural resource management; and to facilitate ecotourism, environmental education and research activities.



The Huascoaltino community consists of 241 members, most of which are socially vulnerable due to their weak socio-economic status and cultural background. More than 30 percent are illiterate, and almost two-thirds are retired. Their livelihoods depend on raising goats and mules; growing beans, wheat, citrus fruits and avocado; and pensions granted by the government. The average monthly income is US\$ 200. The community is led by ten directors and a president, who are elected every four years. Each community member is subject to an annual fee of US\$ 20, which – together with the earnings from leasing land to telephone companies for the installation of antennas – is used to cover maintenance costs and property taxes (US\$ 18 000 for all 381 000 hectares), fund a social welfare system to help community members in emergency situations, and provide microcredit loans.

The property taxes paid by the Huascoaltino community serve two purposes. First, they are used to honour commitments to the state: failure to pay these taxes in a timely manner may allow the state to auction off the community's land. Second, these payments provide a record of the Huascoaltino community's permanent interest in the nature reserve since the early 20<sup>th</sup> century. This record serves as a means to protect the reserve from either government institutions or private companies.

## Lessons learned



The Huascoalino community defend their land against private companies' actions (R. Sánchez)

Mineral deposits including gold, silver and copper are located in the core of the nature reserve. This has triggered ongoing conflicts between the community and mining companies interested in exploiting these resources. The Chilean government considers these conflicts to be conflicts between private entities and therefore not the government's responsibility. Thus, the Huascoalino community itself has had to finance the recurrent lawsuits against these mining companies since 2001.

The purpose of the reserve is to protect the environment and to preserve the historical use of the territory. Thus, Los Huascoalinos Nature Reserve has a much deeper meaning to the community than just its financial value. It is a place where they can find inner and mental peace and benefit from unparalleled ecosystem services. Therefore, protecting this territory is a way of protecting their culture.

The Huascoalino community has managed to successfully overcome any confrontations with either private companies or government institutions (i.e. National Forestry Commission, Ministry of Environment, Ministry of Mining), all of whom wish to exploit the natural resources. However, in the long run, the community members also foresee other major issues, including the negative effects of climate change and the ageing of their own people. These issues not only pose a threat to the preservation of the reserve's ecosystem but will also result in a redefinition of the objectives, values and cultural heritage patterns that have brought the community members together.

- By establishing a private nature reserve, the Huascoalino community was able to protect their natural resources and their culture.
- Although a big share of the costs involved are paid by earnings from leasing land to telephone companies, the annual fee paid by the community members is an important expression of stewardship and commitment and makes them feel entitled to demand responsible behaviour from their leaders.
- The future generations will have to decide if they want to follow in the footsteps of their predecessors, i.e. to protect their territory from any external factors, or if they want to adopt new strategies.



Population ageing is a major challenge for the future of the nature reserve (R. Sánchez)

# Reducing risk through early warning



**Mandira Singh Shrestha and Neera Shrestha Pradhan**

In the Hindu Kush Himalayas every year heavy monsoon rains result in severe flooding, threatening lives and livelihoods. Grants from donors have made it possible to implement regional and community-level flood information systems that use recent advances in monitoring and communication technologies. Investing in such modern forecasting schemes has helped reduce flood risks and damage.

Flooding of the Bagmati River, Nepal, in 2002 (J. Merz)

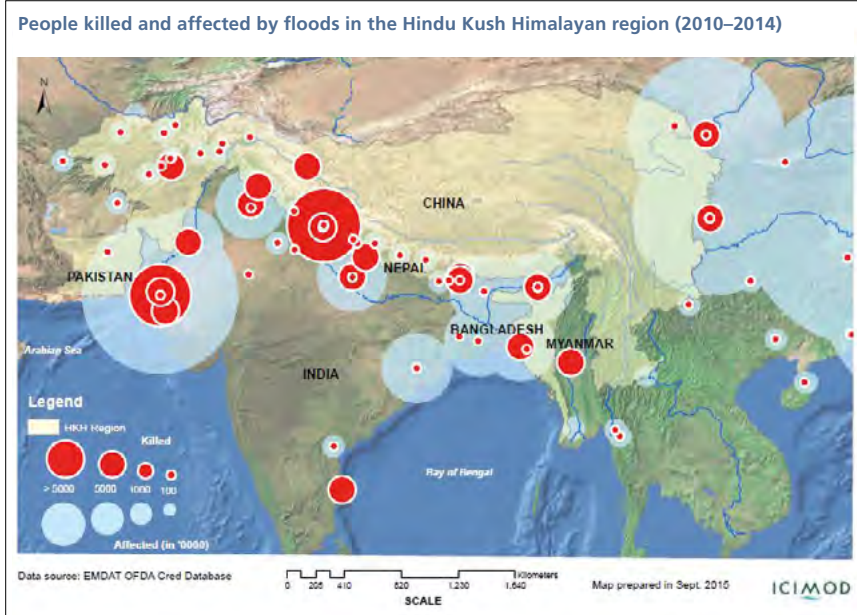
Every year devastating floods inundate large areas of the Ganges, Brahmaputra and Indus basins, crossing national borders. The floods result in loss of lives and livelihoods as well as in the displacement of millions of people, threatening achievement of the United Nations Sustainable Development Goals (Figure). This calls for effective cooperation between the countries concerned: Bangladesh, Bhutan, China, Nepal, India and Pakistan. However, the bilateral river treaties and data sharing agreements currently in place are not sufficient to avert flood catastrophes on a transboundary scale.



More systematic regional cooperation in hydrometeorological (hereafter, hydromet) data collection and sharing is necessary, to enable effective and timely forecasting of floods and disaster prevention as well as flood management at the regional level. In 2009, the International Centre for Integrated Mountain Development (ICIMOD), the World Meteorological Organization (WMO) and ICIMOD's partner countries Bangladesh, Bhutan, China, India, Nepal and Pakistan initiated the development of the Hindu Kush Himalayan Hydrological Cycle Observing System (HKH-HYCOS). The project's overall objective is to minimize the loss of human lives and property damage.

HKH-HYCOS was financed by a € 2 million grant from the Government of Finland. The project helped build the capacity of the partner countries' national hydromet services and modernized the hydromet networks in the region: a total of

## Lessons learned



- Investments in effective modern early-warning systems can prevent flood disasters and loss that in the long term pay off the initial investments. This reduces people's vulnerabilities, leading to more sustainable development.
- Improved hydrometeorological skills of partners by technology transfer, capacity building and knowledge sharing can attract additional investment in hydro-meteorology in the region.
- Promoting regional cooperation and building trust and confidence is a long-term process requiring continued dialogue and engagement.

38 hydromet stations (9 in Bangladesh, 9 in Bhutan, 12 in Nepal and 8 in Pakistan) were upgraded to share real-time data. In addition, an automatic regional flood information system was established to facilitate the transboundary exchange of real-time data and know-how. The new system allows the visualization and extrapolation of real-time data from the stations to any geographical location by providing information on the river-water levels and amounts of rainfall. At the local level, a low-cost technology using wireless and solar-powered transmitter and receiver stations and mobile phone text messaging was developed to disseminate flood information to vulnerable communities downstream (Box).

The data transmitted in real time are used to develop flood forecast products and to validate model results, such as in satellite-derived products. These products are used by partners to forewarn communities of increasing river-water levels, helping reduce risks. In August 2014, for example, the flood outlook was used by Nepal's Department of Hydrology and Meteorology to issue a flood warning. It did so by means of a flood bulletin which was widely disseminated through its website.

The hydromet services of Nepal, Bhutan and Bangladesh have since been able to attract sizeable investments for the modernization of their hydromet networks. Activities funded through HKH-HYCOS have improved the capacity of the hydromet services to take up these projects, and contributed to building climate resilience for people at risk.



### Community-based flood early-warning system (CBFEWS)

In 2013, five CBFEWS were installed in Jiadhal and Singora rivers in Assam, India. These involve local communities; a local NGO, Aaranyak; and the District Disaster Management Authorities, serving 45 flood-vulnerable communities downstream. With an investment of US\$ 1 000 per instrument, CBFEWS in Dihiri was able to save assets worth US\$ 3 300 in one flood event in 2013. The project, scaled up in Nepal and Afghanistan after receiving UNFCCC's Momentum for Change 2014 Lighthouse Activity Award, is supported by ICIMOD's core fund, Himalayan Climate Change Adaptation Programme and Koshi Basin Initiative.

# Gold to be proud of: Fairmined Certification

Natalia Uribe and Marcin Piersiak

A three-year grant from Swiss luxury watchmaker and jeweller Chopard enabled five pioneering small-scale gold enterprises in La Llanada, southern Colombia, to acquire Fairmined Certification. Fairmined is a globally recognized assurance label; it certifies gold from artisanal and small-scale mining organizations that meet global leading standards for responsible practices.

Fairmined gold (M. Franco)

Artisanal and small-scale mining (ASM) is a critical source of income for approximately 100 million artisanal miners in about 80 countries worldwide [1]. This is also the case for about 70 percent [2] of the families of the municipality of La Llanada (approximately 5 800 inhabitants [3]), in southern Colombia, where ASM is a principal livelihood strategy. Despite significant progress, the sector is still characterized by a high level of informality, a lack of entrepreneurial vision, poor administrative management, inefficient and unsafe mining practices, a lack of formal contracts, a low rate of affiliation to social security schemes, and difficulty in obtaining inputs for the extraction activities. The miners in La Llanada are organized in a cooperative, Coodmilla, created in 1977 by the former workers of an American mining company that closed its mines. The Coodmilla cooperative has roughly 140 associates, who individually or in groups have small artisanal mining enterprises working in the area where Coodmilla has exploitation rights.

Since 2013, thanks to a three-year grant from Swiss luxury watchmaker and jeweller Chopard, the Alliance for Responsible Mining (ARM) has been able to support five Coodmilla associates interested in pioneering the work towards Fairmined Certification. Certified organizations have access to international markets under favourable conditions. They sell gold at a fair price, i.e. higher or at least equal to 95 percent of the price fixed by the London Bullion Market Association, obtaining an additional Fairmined Premium of US\$ 4 000–6 000 per kilogram, intended for long-term investments in the social, economic and environmentally sustainable development of the miners, their families and the surrounding community.

In the certification process, ARM's experts assessed each of the pioneering organizations' extraction and processing practices, as well as the value chain and their organizational capacity, against the requirements of the Fairmined Standard. Tailor-made improvement plans were developed in participatory sessions. Health and safety provisions, and training programmes on environmental and organizational management were implemented. Leaders were motivated to change mind-



*"The Fairmined Certification is the approval that the requirements of ARM's Standard are being fulfilled. Jewellers need to buy gold that complies with the Standard, to be assured of buying metals produced in accordance with good mining practices, and the miners have the advantage of a fair price and the premium to ensure that they will continue to improve these practices."*

Paul Guerrero, one of the five pioneers in the certification process (March, 2015)

*"We are learning the exportation process; we are grateful to the [donors] because they have facilitated the path towards international commercialization, especially because we want the world to know the miners' work, which they inherited from their parents."*

Alexander Riascos, Commercialization and Marketing for the La Llanada mining cooperative Coodmilla, 2014

## Lessons learned



- Investments made by private-sector companies involved in responsible sourcing can be key to helping build a responsible mining supply chain and generate positive transformation in society and the environment.
- Cooperation between public institutions (local, regional and national) and private initiatives is needed to ensure sustainability of formalized and responsible artisanal mining.
- The Fairmined Standard and Certification scheme is a successful instrument in incentivizing formalization processes in the artisanal and small-scale mining sector, and thus in improving working conditions and livelihoods of miners.

sets and become responsible entrepreneurs through professional business training and participation in networking and information events. Supported by ARM, each entrepreneur set up an internal control system to supervise mining operations and ensure full traceability of minerals throughout the production process. The process involved the collaboration of a number of institutions at the regional, national and international levels, with an important role played by the Inter-American Development Bank and the Multilateral Investment Fund, ensuring synergies with ARM's global strategy.

In 2015, the five pioneering ASM mining organizations comprising 64 miners became Fairmined-certified, and another ten enterprises are continuing to work towards this aim. This success generated new enthusiasm both with other members of the cooperative and with the institutions, hopefully leading to a move towards responsible, dignified and certified small-scale mining in the mountainous region of Nariño.



Principal results of the Fairmined Certification project		
Issue	Situation before the project	Results of the project
<b>Fairmined Certification</b>	<ul style="list-style-type: none"> <li>• Low awareness of responsible mining practices.</li> <li>• Lack of incentives to go through the certification process.</li> </ul>	<ul style="list-style-type: none"> <li>• 5 ASM enterprises produce ecological certified gold (neither mercury nor cyanide are used in the process).</li> <li>• 10 new entrepreneurs are working towards certification.</li> <li>• Certified enterprises are guaranteed a fair price (4–5% higher than on the local market) and a premium of up to US\$ 6 000 per kilogram of gold.</li> </ul>
<b>Organizational development</b>	<ul style="list-style-type: none"> <li>• Limited business capacities and lack of innovation.</li> <li>• Incomplete or inexistent registers and documentation.</li> <li>• 2 of 5 project mines not registered as formal enterprises.</li> </ul>	<ul style="list-style-type: none"> <li>• Enterprise owners recognize their role as entrepreneurs and responsible employers.</li> <li>• 100% of certified enterprises comply with fiscal obligations, are formally registered, have an internal control system.</li> </ul>
<b>Environmental, health and safety management</b>	<ul style="list-style-type: none"> <li>• Low awareness of health and safety requirements, little understanding of environmental management plans.</li> <li>• Limited access to explosives.</li> </ul>	<ul style="list-style-type: none"> <li>• 100% of certified miners have access to explosives, use security equipment and have safe work places. All ASM enterprises follow an individual environmental plan.</li> <li>• Health and safety in other mines has been reported to have improved [4].</li> </ul>
<b>Labour formalization</b>	<ul style="list-style-type: none"> <li>• Low recognition of the positive impact of formal contracts and social security on the well-being of the workers. 15 workers in the project group had neither contracts nor social security.</li> </ul>	<ul style="list-style-type: none"> <li>• All certified ASM workers and their families have health care coverage, occupational risks insurance and a pension scheme, paid by their employers.</li> <li>• Certified ASM workers have formal employment contracts.</li> <li>• In two of the certified organizations, the workers obtain higher salaries than before.</li> </ul>
<b>Access to international markets</b>	<ul style="list-style-type: none"> <li>• Miners of the cooperative are subject to local gold-buying conditions.</li> <li>• Lack of understanding of international gold market supply chain.</li> </ul>	<ul style="list-style-type: none"> <li>• The first small-scale mining cooperative in Colombia to export its gold. The average gold price obtained is 4–5% higher than on the local market.</li> <li>• Export process further developed.</li> </ul>
<b>Supportive environment</b>	<ul style="list-style-type: none"> <li>• Scarce involvement of institutions in formalization processes of small-scale miners.</li> </ul>	<ul style="list-style-type: none"> <li>• 11 institutions and organizations were linked to the project, providing their statutory services to the miners.</li> </ul>

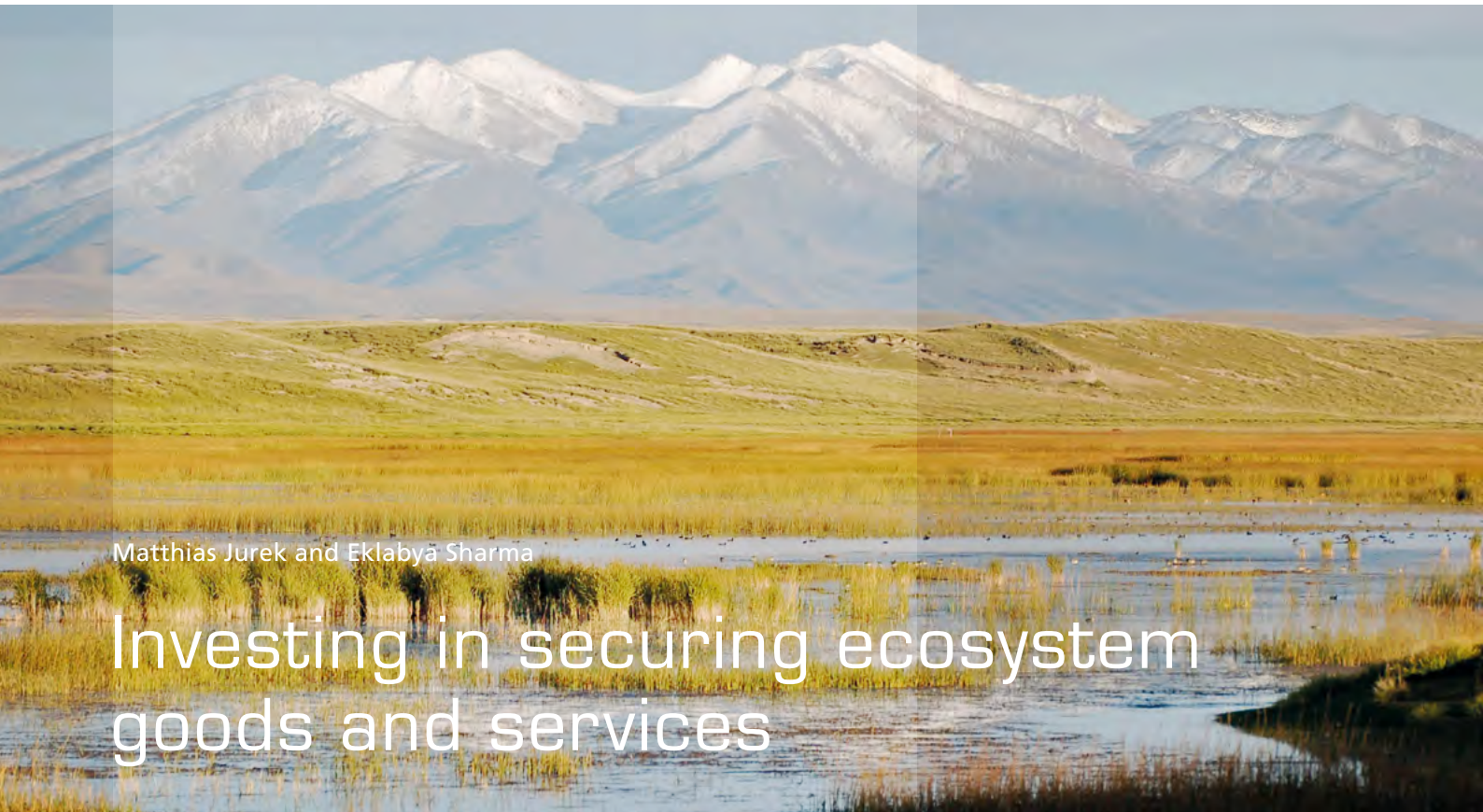




4

# Safeguarding mountain ecosystems





Matthias Jurek and Eklabya Sharma

# Investing in securing ecosystem goods and services

Mountain wetlands such as the Qinghai Lake Wetland in China are at the heart of global water systems  
(© M. Foggin)

Investing in the conservation and protection of mountain ecosystems offers great prospects for socio-economic development. Intact ecosystems are crucial for fostering resilient mountain livelihoods, as well as for securing critical ecosystem services for people and economies in the lowlands. Recognizing the value of these goods and services is crucial for attracting investments, which often take the form of compensation schemes that benefit people both in the mountains and in the lowlands.

## Opportunities and challenges

Mountains offer a wealth of ecosystem goods and services for both mountain and lowland communities. Mountain ecosystems provide water to over half of humankind for drinking; irrigation, and hence global food security; and hydropower generation. They offer rich biodiversity including the genetic resources of major global staples such as maize and potatoes, and medicinal plants. Mountain forests help mitigate climate change by acting as carbon sinks, and prevent natural hazards such as landslides and avalanches. Mountains are also a place for recreation. All these valuable and irreplaceable ecosystem services can become great opportunities for investments to spur economic activities for people living both in and outside mountain areas. Not surprisingly, the significance of intact mountain ecosystems is emphasized in two Sustainable Development Goals (SDGs) – SDG 6 (sustainable water management) and SDG 15 (sustainable terrestrial ecosystems) [1].

Today, the continued supply of mountain ecosystem services is threatened by climate change; changing land use; depletion of biodiversity; overuse of forests, croplands and grazing lands; and natural hazards. These threats also put at risk mountain natural habitats as well as people's livelihoods in mountains and low-

lands. Reversing environmental degradation in mountain landscapes is challenging, and requires arduous and permanent work. It also requires long-term investment, often upfront and with long pay-back periods. But the benefits from efforts devoted to sound resource management by mountain people are far-reaching, often felt at least equally – if not more – by people living outside mountains.

### Compensation mechanisms are a way forward

These challenges offer opportunities for lowland beneficiaries to help fund investments that would secure the flow of mountain ecosystem goods and services. Investments may take the form of compensation mechanisms, of which a variety have been developed in the past two decades, to reward mountain people for their efforts in securing ecosystem goods and services for downstream beneficiaries. Many of the schemes relate to the supply and quality of fresh water. These investment mechanisms are particularly beneficial where traditional financial schemes are lacking or not sufficient.

Compensation mechanisms have a real chance of becoming lasting and effective solutions for safeguarding mountain ecosystems as well as improving mountain livelihoods, if

- the value of ecosystems is assessed comprehensively;
- the mechanisms factor in savings made in the lowlands thanks to mountain services (e.g. flood control, which would otherwise demand a huge investment to protect land and infrastructure in lowland areas);
- the mechanisms are established in a participatory way and meet the needs of those who ensure the ecosystem service, and also provide economic rewards for those who pay compensation;
- the mechanism assures fair and transparent benefit sharing in the receiving communities;
- transparent standards relating to the desired services are established, and effective monitoring of their fulfilment takes place.

As case studies in this section show, funds that are jointly fed by donors and local people not only increase the financial means available, but also the commitment of the parties involved, and lead to positive impacts on natural resources (J. Junghardt and M. Tharin, pp. 50–51). Depending on the mountain region, cash-based schemes are less well accepted than in-kind, labour-based reward measures, not least because these are less exposed to corruption and more adapted to the traditional culture of the stakeholders, who do not perceive ecosystem services as marketable commodities (S. Charré, pp. 52–53).

In our globalized and increasingly urbanized world, even people living far from mountains are increasingly aware of the value of mountain ecosystem services for their livelihoods and well-being, and are willing to pay for the uninterrupted flow of these services. Investors in compensation schemes thus include a wide range of actors such as international development agencies, international and national conservation non-governmental organizations, the private sector, philanthropic institutions and private individuals. If compensation and conservation schemes are linked with business opportunities for local people, including access to international markets where feasible, they also promote the regional economy (K. H. Fitzgerald, pp. 56–57; B. Hora and C. Marchant, pp. 58–59; M. Jurek pp. 60–61). International compensation schemes such as climate funds offer an opportunity to regenerate degraded lands (B. Habermann et al., pp. 54–55), benefiting in the longer term not only the global but also the local community, thanks to the multiple services provided by these areas.



Farmer using the traditional *chaquitacla* in Pttumarca, Peruvian Andes. (S.-L. Mathez-Stiefel)

# Participatory funding for watershed management



**Jana Junghardt and Margaux Tharin**

By strengthening local governance processes, integrated watershed management (IWSM) aims at sustainably reducing disaster risks while improving livelihoods. An IWSM project in Muminabad, Tajikistan, has shown that inclusive decision-making is key to moving from overexploitation to sustainable natural resource management. The governance mechanisms established give communities access to a project trust fund, which encourages them to engage in sustainable land management.

Members of a pasture users union presenting their pasture management plan, Muminabad, Tajikistan (M. Tharin)

People in Muminabad are worried about their future. Degraded soils, productivity decreases and natural hazards threaten their assets, infrastructure and livelihoods. Their vulnerability is partly due to ineffective land management, overgrazing, deforestation and mono-cropping. Moreover, there is little public money available for disaster risk reduction (DRR) or environmental protection, and enforcement of environmental regulations is weak.



The Integrated Watershed Management (IWSM) project has been under way in Muminabad since 2011, funded by the Swiss Agency for Development and Co-operation and implemented by Caritas Switzerland. The project encourages the sustainable development of Obishur and Chukurak watersheds, raising awareness within communities of the causes and effects of natural disasters, supporting the implementation of sustainable land management (SLM) practices, and involving governmental institutions to sustain the process.

Local governance processes are key to ownership and sustainability of the IWSM approach. For this reason, IWSM involves all stakeholder groups in the negotiation of resource management strategies and planning of interventions. In particular, it supports the creation of inclusive, accountable and transparent institutions such as pasture users unions, civil society committees or the IWSM Steering Committee. These play a decisive role in coordinating activities of upstream and downstream users, with the aim of enhancing land productivity in the watershed's middle zone while reducing risks in the lower zone. Watershed action plans (WAPs) were developed to this end, in a participatory process involving actors from village, district and sub-district levels.

## Lessons learned

About 60 percent of the project's activity budget is used for capacity building and technical support; 40 percent (annually US\$ 110 000) is used for start-up funding of DRR and SLM activities through a project trust fund (PTF). Aimed at promoting sustainable land use and risk mitigation practices, the PTF is managed by the project team and specifically allocated to the most promising activity proposals submitted by community members. Twice a year, an open bidding process is launched for proposals in the fields of pasture management, conservation agriculture, agroforestry, energy efficiency and mitigation infrastructure. All proposals are reviewed based on criteria defined by the IWSM Steering Committee and include: impact on land degradation; beneficiary vulnerability; gender, conflict-sensitive and environmental considerations; cost-benefit ratio; technical feasibility; and sustainability and community contribution (at least 20 percent of the total implementation costs, in the form of labour, material, machinery and/or cash).

The PTF is an incentive mechanism for communities who are ready to invest in profitable DRR and SLM activities, but are not able to do so without initial financial and technical support. The fact that proposals include beneficiary contributions of up to 50 percent – far beyond the required minimum – is a valuable indicator showing that the approach meets people's demand. Currently, about 40 percent of both watersheds are under improved management, of which almost 10 percent (mostly pasture land) is regularly set aside for regeneration.

By determining tasks and responsibilities of stakeholders in a participatory way, WAPs and PTF play an important role as governance tools. The results of the implemented WAPs create awareness of the benefits of IWSM among stakeholders, and eventually provide the evidence needed to advocate governmental budget allocation for risk reduction and environmental protection.

- Inclusive institutions and governance processes are key to sustainable resource management. Long-term sustainability depends on commitment and sharing of financial responsibilities by civil society and governmental institutions.
- To be successful and sustainable, efforts to reduce disaster risks must be linked with creating profitable activities, improving living conditions and reducing livelihood vulnerability.
- Project resources invested through the project trust fund trigger the contribution of local communities, and hence increase the amount and impact of investments in the watersheds.

Investments in sustainable land management and outputs achieved between October 2014 and July 2015 (start of 2 <sup>nd</sup> phase of the project till today)					
Investment directed to	Total investment (in US\$)	Contribution project trust fund (%)	Monetary value of beneficiary contribution (%)	Stakeholder groups involved	Outputs
<b>Pasture management</b>	27 459	64	36	<ul style="list-style-type: none"> <li>• Livestock keepers</li> <li>• Village-level pasture users unions (PUU)</li> <li>• Civil society committees</li> <li>• Governmental institutions at district<sup>i</sup> and sub-district levels</li> </ul>	<ul style="list-style-type: none"> <li>• 15 PUUs created</li> <li>• 3 868 ha under improved pasture management</li> <li>• 500 ha under regeneration (2 years)</li> <li>• 60 ha fodder crops planted</li> <li>• 7 water points created</li> </ul>
<b>Conservation agriculture</b>	20 128	46	54	<ul style="list-style-type: none"> <li>• Farmers</li> <li>• Tractor drivers</li> <li>• Civil society committees</li> <li>• Local farmer seed associations</li> <li>• Governmental institutions at district<sup>ii</sup> and sub-district levels</li> </ul>	<ul style="list-style-type: none"> <li>• 200 farmers (= 1/3) in middle zone adopted conservation agriculture principles</li> <li>• 500 ha planted with perennial crops</li> <li>• 153 ha cropland under improved management</li> </ul>
<b>Tree planting</b>	95 988	39	61	<ul style="list-style-type: none"> <li>• Farmers</li> <li>• Civil society committees</li> </ul>	<ul style="list-style-type: none"> <li>• 149 ha planted with fruit trees and fuelwood species</li> <li>• &gt; 1 000 m gullies rehabilitated by tree planting</li> <li>• 15 ha converted to agroforestry</li> </ul>
<b>Agroforestry</b>	20 296	59	41	<ul style="list-style-type: none"> <li>• Governmental institutions at district<sup>iii</sup> and sub-district levels</li> </ul>	
<b>Risk mitigation</b>	33 546	83	17	<ul style="list-style-type: none"> <li>• Civil society committees</li> <li>• Community-based organizations</li> <li>• Governmental institutions at district<sup>iv</sup> and sub-district levels</li> </ul>	<ul style="list-style-type: none"> <li>• 400 m river-draining dam constructed</li> <li>• Road bridge reinforced, culvert constructed</li> <li>• Active involvement of local population in assessment, mitigation design and maintenance</li> </ul>
<b>Energy efficiency</b>	Investment foreseen for 2016; so far only pre-financing of activities	–	–	<ul style="list-style-type: none"> <li>• Households</li> <li>• Civil society committees</li> <li>• Schools</li> <li>• Women's organizations at village level</li> <li>• Committees of women's affairs at sub-district level</li> </ul>	<ul style="list-style-type: none"> <li>• Participatory development of energy-efficient stoves</li> <li>• Local blacksmith started production based on local demand</li> <li>• Extension of forest area from 750 ha (2011) to 900 ha (2015)</li> </ul>
<b>TOTAL (US\$)</b>	<b>197 417</b>	<b>58</b>	<b>42</b>		

<sup>i</sup> Agriculture, Ecology and Land Use Departments; <sup>ii</sup> Agriculture, Ecology and Land Use Departments; <sup>iii</sup> Agriculture, Ecology, Forestry and Land Use Departments; <sup>iv</sup> Water & Irrigation Department

# In-kind rewards for ecosystem services



Simon Charre

The ongoing degradation of upstream ecosystems in the Chon-Aksuu watershed in the Kyrgyz Republic and its effects on water sedimentation increasingly impact on farmers downstream, causing high irrigation infrastructure cleaning costs. An in-kind reward mechanism fosters the development of conservation activities and promotes multistakeholder dialogue at the watershed level.

Mushroom pickers and water users involved in reforestation activities organized through the reward mechanism, Kyrgyz Republic (S. Charre)

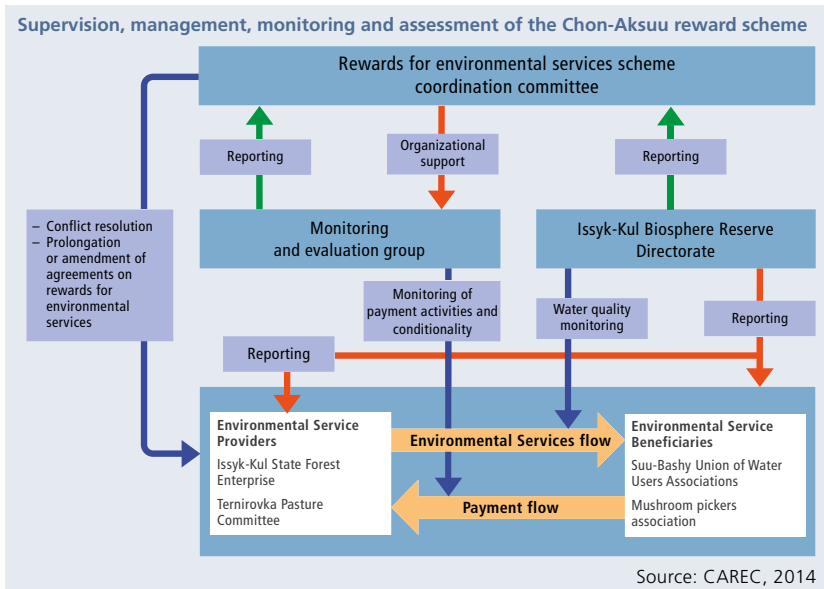
The Chon-Aksuu watershed in the Issyk-Kul province spans an altitude of 1 600 to 4 000 metres, hosting a rich variety of ecosystems. Downstream populations are dependent on the Chon-Aksuu River, which provides irrigation water for the potatoes, wheat and alfalfa they produce. There is a local water users association, which comprises 1 500 households and is in charge of maintaining irrigation infrastructure. However, the association is facing ever-higher cleaning costs due to sedimentation in channels and irrigation ponds, which, depending on the weather, can be exacerbated by degraded upstream ecosystems. It is forced to use most of its money for cleaning, and is therefore unable to invest in repairing and reconstructing the irrigation network, which would be key to limiting water losses.



Upstream, forests are state-owned and tree felling is prohibited. However, illegal logging, forest grazing and an intense use of non-timber products, mostly mushrooms, is steadily degrading forest resources, preventing regeneration and increasing soil erosion. While local herders' associations exist to develop annual pasture management plans and ensure sustainable use of the wide rangeland areas located upstream, the plans are often poorly designed due to a lack of capacity, resulting in overgrazing and further erosion.

There are therefore significant linkages between mountain ecosystem degradation upstream and the impact this has on water sedimentation and the challenges farmers face downstream. Against this background, a cooperation mechanism aimed at enabling sustainable management of upstream ecosystems had to be developed. This was the goal of the project "Integrating Payment for Ecosystem Services and a Forest Carbon Mechanism". The project, financed by SwissRe Foundation and implemented from 2011 to 2014 by the Regional Environmental Centre for Central Asia (CAREC), had an overall budget of US\$ 150 000. Four

## Lessons learned



- The design of compensation or reward mechanisms for the provision of ecosystem services has to consider that most land users do not perceive ecosystem services as marketable commodities. Thus, compensation mechanisms do not necessarily have to include financial schemes.
- Low leadership turnover in non-governmental and governmental partners is a key enabling factor in developing and sustaining the reward mechanism.
- Project outcomes in terms of improved ecosystem services are not immediately visible and should be underpinned by a robust long-term monitoring mechanism.

main stakeholders were involved: the State Forest Enterprise, the local water users association, the association of non-timber forest product users, and the local pasture committee. Individual and multistakeholder discussions were held to define the best cooperation options, which were expected to take the form of a financial mechanism rewarding upstream land users for sustainable ecosystem management (i.e. payment for ecosystem services, PES). However, local stakeholders strongly opposed a cash-based scheme for reasons rooted in the economic and cultural context: first, the lack of cash at household level, and second, widespread corruption. Instead, they proposed an in-kind, labour-based compensation or reward mechanism where beneficiaries of ecosystem services allocate a defined amount of working time to ecosystem restoration activities.



The amount of these rewards was tailored to the readiness of involved stakeholders. No cash transfer is involved in the mechanism, and transaction costs are low. To maintain trust and engagement, two levels of monitoring are in place. First, the Issyk-Kul Biosphere Reserve monitors water quality and assesses the sediment load in the long term. Second, a multistakeholder monitoring group was set up to control the implementation of conservation activities included in the agreements. A coordination committee consisting of local, provincial, national state and non-state representatives supervises the mechanism and plays a key role in its sustainability: it is able to modify the reward scheme according to monitoring results. This gives a wide range of opportunities to adapt the reward mechanism to changing natural or socio-economic conditions.

### Reward scheme: Bilateral agreements were negotiated as follows:

- The water users association rewards 10 man-days per year to the local unit of the State Forest Enterprise for forest protection and restoration activities (e.g. reforestation, creation of fenced plots to enhance natural regeneration);
- The water users association rewards 20 man-days per year to the Pasture Committee for pasture improvement activities (e.g. repairing mountain roads and bridges to access remote pastures and destock degraded pastures situated close to the settlements);
- The association of non-timber forest product users rewards 30 man-days per year to the local unit of the State Forest Enterprise for forest protection and restoration activities.

# Benefits of community-based carbon offsetting

Birgit Habermann, Florian Peloschek, Dominik Schmitz, Yonas Worku, Selamawit Damtew, Abraham Abiyu, Georg Gratzer

Sustainable carbon offsetting is about more than how best to move money from carbon consumers to carbon sentinels. To a large extent, it is about respect for people's rights and choices. For two villages in northern Ethiopia, the answer to one major question determined whether or not to agree on the establishment of 30 hectares of exclosures for the next 30 years: whose decision counts?

Pits being prepared for planting trees in North Gondar Zone, Ethiopia (Y. Worku)

In 2012, the University of Natural Resources and Life Sciences, Vienna (BOKU) launched a carbon-offset system (BOKU-COS) to compensate the CO<sub>2</sub> emitted through air travel by its students and staff. Participants in this system now increasingly include public institutions, private companies and NGOs. To date, € 120 000 have been collected for the compensation fund, and it is expected that about € 40 000 annually will follow during the next five years.

A first sequestration project started in 2013, in two villages comprising 260 households in the North Gondar Zone of Ethiopia. The area is strongly affected by deforestation, and land use and property rights are often unclear. The project's aim is to reforest parts of the area and develop a sustainable grazing scheme that in the long term benefits the local people as well as the local and global environment. In an 18-month, multi-staged participatory planning process facilitated by BOKU's Centre for Development Research, the local community designated 30 hectares of land to be excluded from grazing and other uses. To manage these exclosures, they agreed on by-laws regulating access and use rights; assignment of a guard; penalties for encroachment; illegal logging and grazing; and the use of the community fund provided by the project as a compensation for the exclosure. A forest committee is in charge of implementing the by-laws. In July 2015, the first trees were planted in the newly established exclosures. This will be repeated annually depending on demand jointly defined by the local forest committee and researchers from the Gondar Agricultural Research Centre (GARC). Carbon inventories will be carried out at five to ten-year intervals to assess tree growth and removal of wood. The activities and use of the community fund will be monitored by GARC in collaboration with local government agents.

The project initiated the offsetting scheme in three years and with a budget of € 25 000, which covered the costs for facilitating the participatory process and support provided by different partners. From year 4 to year 30, the project will receive



*“What we like most about working with you is that you accept what we decide. There was a moment when the researchers questioned the boundaries of the exclosure as we had decided it, and we were very disappointed. But finally we could convince them, and our decision counted.”*

Woyanye, meeting with the forest committee in January 2015



Farmers in Woglo planted about 10 000 seedlings in July 2015 (Y. Worku)

€ 4 000 annually. Moreover, BOKU-COS has set aside a € 20 000 back-up for the community fund, in case there are insufficient compensation payments to feed it in future. Ten percent of the total income from the sale of carbon is retained as a risk buffer in the event of unexpected forest fires, drought, termites or forest clearance. It is expected that the project will store approximately 6 700 tonnes of CO<sub>2</sub> in the coming 30 years at a price of € 25 per tonne. This corresponds to the actual project costs of € 167 500 (Table). In addition, 20 percent of the project funds are contributed in-kind by BOKU staff time, including advice on reforestation activities, calculations for carbon compensation and senior project supervision (Figure).

Local people will benefit in various ways: empowerment and improved ownership (from year 2); access to micro-credits from the community fund, improved micro-climate and scenic value, increased wildlife and biodiversity as well as income generated through beekeeping and nursery establishment (from years 3–4); and harvesting branches and foliage as livestock fodder (after year 5).

In Austria, customers appreciate the innovative character of this research-supported CO<sub>2</sub> mitigation project and that there is evidence to demonstrate the social and environmental benefits. As a result, they are willing to pay higher prices per CO<sub>2</sub> certificate than on the open market.

Budget allocation for the project duration (30 years)		
Project year	Budget	Activities
1	€ 12 500	• Participatory process • Tree planting
2	€ 8 500	• Community fund • Administration • Guards • Training for forest committee members on management issues
3	€ 4 000	• Tree planting • Monitoring • Establishment of community fund • Guards
4–30	€ 4 000 annually	• Community fund: additional tree planting, guards, micro-credits, administrative costs in community • Monitoring (after year 3 only max. 2% of project budget)
	€ 20 000	Risk buffer for lower carbon payments
	€ 14 500	Risk buffer for human interference and natural hazards
<b>Total costs over 30 years</b>	<b>€ 167 500</b>	<b>Corresponds to income from carbon sequestration (6 700 t CO<sub>2</sub> at € 25)</b>

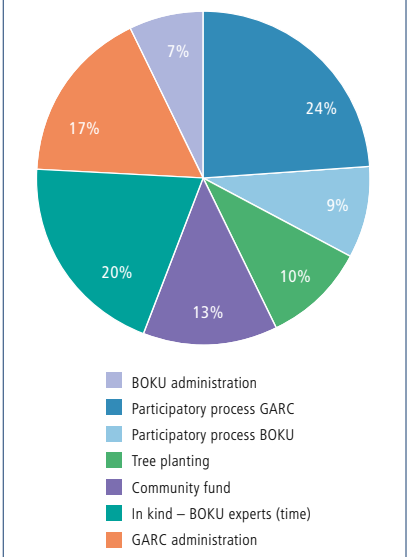
## Lessons learned

- Securing continued voluntary payments by clients for carbon offsetting is essential and requires transparent information and trust building, especially during the inception phase, when immediate successes are not yet visible.
- Long-term carbon sequestration through protection and regeneration of local environments to mitigate climate change at the global level needs to provide benefits and a sense of ownership to local people.
- The involvement of a university in a carbon-offsetting scheme results in low transaction costs as well as evidence-based project implementation based on the results from master's theses and doctoral dissertations.



An enclosure site established in 2010 is developing well, as shown in this photo taken in January 2015. (B. Habermann)

Specification of costs (cash and in kind) during the initiation phase (year 1–2)





# Reconciling nature conservation and agricultural production



Kathleen H. Fitzgerald

In the southern highlands of Tanzania, a local variety of avocado has long been grown, but only sold locally and at low prices. A loan from African Wildlife Capital, which is tied to strong conservation covenants, facilitated local farmers' access to international markets by grafting local varieties with the high-value Hass variety, thus improving local livelihoods and securing forest protection.

Rungwe Avocado Company collecting avocados from small-scale outgrower farmers, Tanzania (© Schmidt)

Ninety percent of the world's demand for avocado is for the durable Hass variety. Rungwe Avocado Company (RAC), a commercial avocado growing, processing, packing and exporting business founded in 2009, embraced agricultural innovation, grafting the high-value Hass variety onto existing local variety avocado root stocks. The company benefits from bringing its Hass avocado to market during a three-month supply gap, when other global suppliers are unable to meet demand.



RAC is located in the montane conservation complex made up of Mount Rungwe Nature Reserve and Kitulo Plateau National Park. The forest reserve includes a wide diversity of habitats, leading to exceptionally high biological diversity with more than 120 endemic species, and is home to threatened animals. The Kitulo Plateau is referred to by locals as Bustani ya Mungu – the Garden of God. The forested catchments feed Lake Nyasa (also known as Lake Malawi) and numerous villages and towns. Lake Nyasa hosts the richest freshwater fauna in the world, 99 percent of which are endemic. Approximately 2 million people depend directly on Lake Nyasa for their livelihoods; thus, the protection of the watershed is a priority for securing regional environmental and economic well-being. The forests of the region are threatened by degradation and deforestation driven by poorly diversified livelihoods, population growth, demand for land and agricultural expansion, demand for timber, non-timber forest products, fuelwood and charcoal.

African Wildlife Capital (AWC) was established in 2011 by the African Wildlife Foundation, as Africa's first investment vehicle for conservation enterprise. AWC harnesses the positive power of private-sector capital to support small and medium

## Lessons learned

enterprises that demonstrate the potential for sustainable economic growth while leveraging conservation outcomes.

Recognizing the ecological significance of the Rungwe landscape, and the opportunity to engage small farmers in Rungwe Avocado Company as a means to foster livelihood diversification and alleviate the drivers of forest degradation and deforestation, AWC provided a US\$ 950 000, seven-year loan to RAC in June 2011 to help them expand their production and to engage outgrowers.

AWC loan agreements are not like any other. In addition to the financial requirements and covenants, AWC includes a broad array of conservation covenants on-site and off-site, covering forest, wildlife, soil and water conservation. They require specific conservation and socio-economic measures that a company must fulfil. Any non-compliance is a breach of contract.

RAC is using an outgrower model to source avocados for the export market, thus supplying access to a high-value market to local farmers. RAC is currently engaged with 4 000 outgrowers in villages in the surroundings of Mount Rungwe Nature Reserve. Each of these farmers signs a conservation agreement with the company that binds them to conservation performance. In the long term, RAC is expected to result in an increase in income to communities, the adoption of improved on-farm conservation and sustainability practices, and increased incentives to support the conservation of remaining forests – and ultimately, in a decreasing need to expand production and resource extraction in the forest. As the number of community members involved in the project increases, other spin-off enterprises compatible with the ecosystem will be introduced. One example is beekeeping, to produce and market honey, and to increase the yield of avocado orchards by enhancing pollination.

- Linking conservation covenants to loans for private business development facilitates reconciling nature conservation with economic development.
- Linking local communities to markets and a profitable export business can help ensure long-term mutual benefits for people and the environment.
- Win-win partnerships between conservation agencies, business companies and local communities are feasible and successful.



Rungwe avocados from Tanzania are sold at Marks & Spencer's in the UK (C. Schmidt)

The AWC–RAC loan agreement has over 75 conservation covenants that bind the borrower, the borrower's employees and the outgrowers. The following are a selection of the covenants:

- 1. Broad-Based Conservation Covenants:** outline restrictions, practices and ethics to ensure the conservation of the greater landscape and ecological integrity of the region. Examples include:
  - optimize community engagement, employment and earned income as a means of providing an alternative to unsustainable natural resource extraction from the natural ecosystem;
  - not engage in poaching of wildlife or illegal or unsustainable natural resource extraction; and
  - deploy meaningful ways of educating the borrower's employees and outgrowers on the ecological values of the larger landscape.
- 2. On-Site Conservation Management:** includes land use restrictions and prescriptions to ensure conservation practices in farmed areas. The loan agreement requires a baseline audit and annual monitoring of flora and fauna across the farm operations, and the development of a conservation plan. Specific covenants include:
  - ensure that litter and waste are routinely collected and responsibly disposed of;
  - ensure that uncultivated areas are converted to conservation areas for the protection of natural flora and fauna and to prevent the introduction of exotic and/or invasive species; and
  - increase tree cover for biodiversity, carbon sequestration, food production and/or wood use.
- 3. Environmental Covenants:** include restrictions and use prescriptions in the following areas: water conservation; energy use; soil conservation; use of chemicals, fertilizers and pesticides; integrated pest management; water management.

# When a private park supports the local economy

Benedikt Hora and Carla Marchant

The last two decades in Chile have seen the spread of private protected areas (PPAs) – conservation initiatives developed through private capital. Many of these projects were made possible through environmental philanthropy, complementing government schemes aiming to conserve biodiversity. The case of Oncol Park shows that such initiatives can boost the economy of rural areas through tourism.

View of Valdivia and the Cruces River from the top of Oncol hill, Chile (Authors)

Oncol Park is located in the Chilean Coastal Range, in the Los Ríos region. The park is located within the Valdivian temperate rain forest, which is a biodiversity hotspot and one of the few remaining endemic forests in the area. In the last few decades, the forest has suffered from substantial environmental deterioration, due to land use change in the form of commercial plantations of exotic species such as Eucalyptus and *Pinus radiata*. Oncol Park is an attractive tourist destination and an example of how environmental conservation has played a role in enhancing local economies. Given that parks are predominantly run by individuals, NGOs, conservation communities and foundations, this PPA is a truly unique case.

Oncol Park is owned and operated by the Chilean company Forestal Valdivia. In 1985 Forestal Valdivia acquired a 3 400-hectare plot of land with predominantly native forests, which it intended to develop into plantations. To compensate for its activities, in 1989 the company began to develop a further 754 hectares for conservation and protection of flora and fauna – this was the start of the Oncol project.

Park facilities were implemented with an estimated initial investment of US\$ 5.3 million. Revenues in 2014 amounted to a total of US\$ 42 000. However, only 20 percent of the running costs (mainly personnel and maintenance of infrastructure) are recouped by revenue generated within the park; Forestal Valdivia must subsidize the remaining 80 percent.



## Lessons learned

Oncol Park has helped create jobs in the local community (15 people are employed full-time), through the provision of maintenance and other value-added services such as horse riding and guided tours. There is a cafeteria and sports facilities (the canopy is leased out to local entrepreneurs), potentially allowing further tourism-related activities to develop.

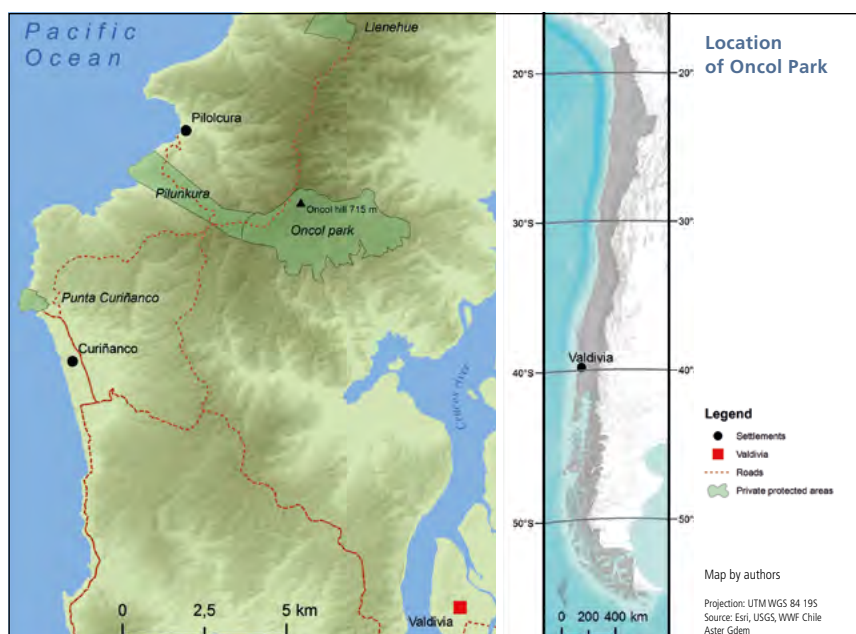
The large number of tourists means that the park has a big impact on regional dynamics and the local economy. In the past decade, the flow of visitors has quadrupled, from 3 102 in 2004 to 12 200 in 2014. This has largely been possible through advertising support by the Chilean Government and privately funded initiatives. Tourism has been declared one pillar of the development of the Los Ríos region, and through the support of institutions such as the Productive Development Corporation (CORFO) and regulation by the Regional Government through the Regional Tourism Policy, the lush landscapes characteristic of the area have been preserved and enhanced. An example is the development of a protected areas guide of the Los Ríos region by the World Wildlife Fund, which includes Oncol Park.

An initiative such as Oncol Park, in a mountainous area highly susceptible to erosion and affected by land use change, plays a fundamental role in safeguarding endemic ecosystems. It also acts to diversify the local economy. In the project's future, the main challenge will be maintaining the ecological restoration plan developed for this last remnant patch of undegraded native forest of the Chilean Coastal Range, which will result in substantial maintenance costs. In addition, PPAs in Chile are not currently regulated by a legal framework. This means that tax benefits and economic incentives have not yet been developed, despite the importance of the PPAs' work for the sustainability of these mountain areas.

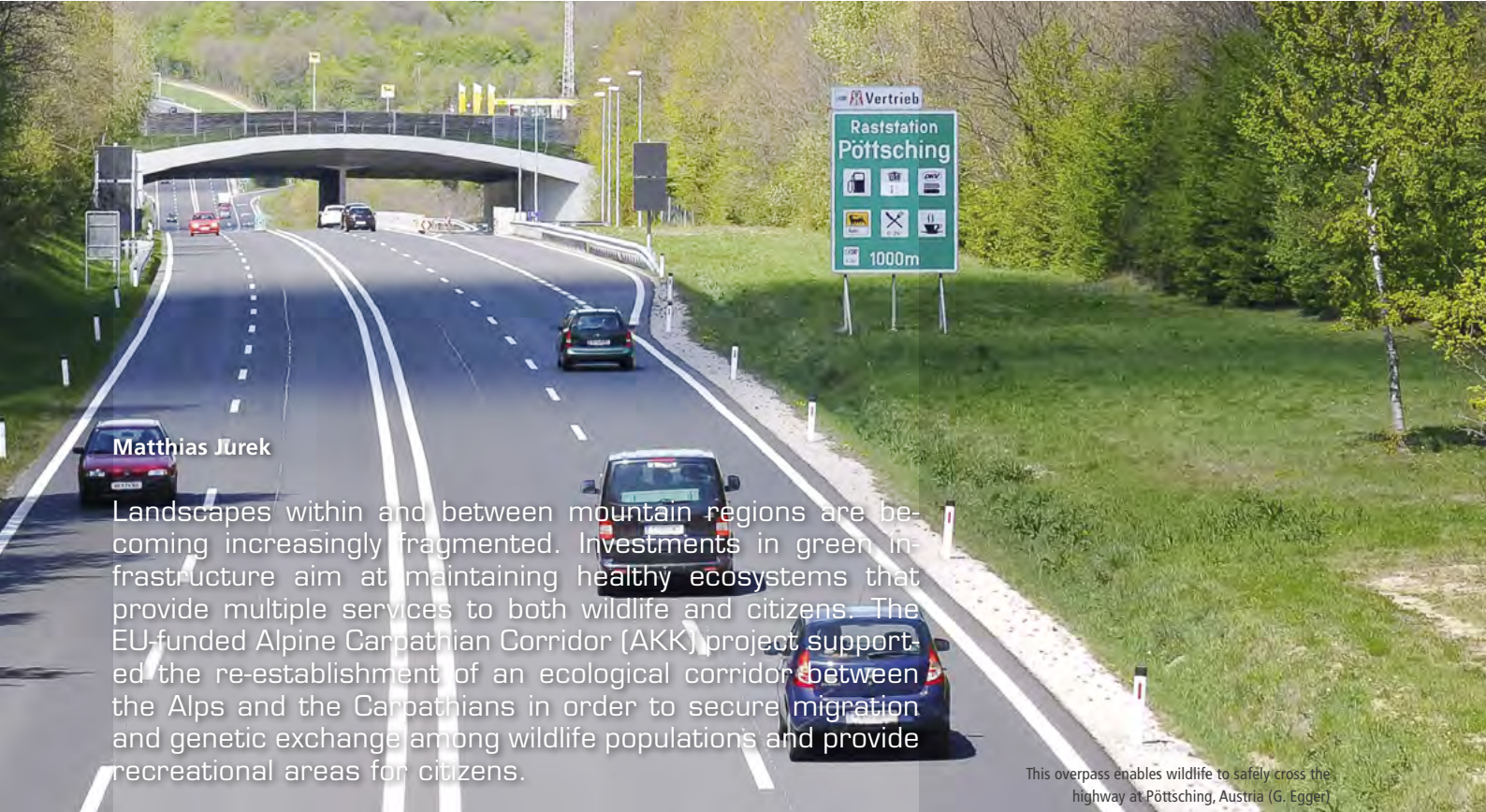
- Compensation projects such as PPAs are an innovative, little-explored and little-monitored method for private-sector companies to develop concrete actions of social corporate responsibility.
- PPAs can have a positive impact on the local economy by opening up a range of income-generating opportunities, if they are easily accessible and have a good connection to local and regional centres.
- PPAs can play an important role in biodiversity conservation if they are more than isolated islands of native ecosystems surrounded by degraded ecosystems. An enabling framework is needed to encourage and legally secure such initiatives.



Latué Cafeteria near the entrance of Oncol Park (Authors)



# Green infrastructure benefits wildlife and citizens



Matthias Jurek

Landscapes within and between mountain regions are becoming increasingly fragmented. Investments in green infrastructure aim at maintaining healthy ecosystems that provide multiple services to both wildlife and citizens. The EU-funded Alpine Carpathian Corridor (AKK) project supported the re-establishment of an ecological corridor between the Alps and the Carpathians in order to secure migration and genetic exchange among wildlife populations and provide recreational areas for citizens.

This overpass enables wildlife to safely cross the highway at Pötsching, Austria (G. Egger)

The majestic Alps and the wild Carpathians: both offer a habitat to large wildlife species, such as deer, lynxes, wolves and bears. But the two mountain ranges are separated by an economically highly dynamic lowland area including the two major capitals of Vienna and Bratislava. The vibrant development of human settlements, industrial activities and road infrastructure in this area is increasingly fragmenting the landscape and risks endangering the habitat of these and other wildlife species in the long term.



The growing loss of wildlife habitat and the need for reconnecting the two mountain ranges via an ecological corridor gained broad recognition in the mid-2000s. A feasibility study carried out in 2007/08 led to the launch of the Alpine Carpathian Corridor (AKK) project under the lead of the Provincial Government of Lower Austria in 2009. This transboundary project involved various partners from Austria and Slovakia, including the DAPHNE Centre for Applied Ecology, WWF, the United Nations Environment Programme (UNEP) Vienna Office, the University of Natural Resources and Life Sciences, Vienna (BOKU) and the national highway companies. It was funded through the Cross-Border Cooperation Programme Slovakia–Austria (2007–2013), with grants totalling about € 1.9 million from 2009 to 2014. The project's main objective was to safeguard and support the re-establishment of an ecological corridor between the Alps and the Carpathians. A particular aim was to strengthen conservation management in the protected areas along the Alpine Carpathian Corridor and in neighbouring habitats.

Based on sound research about how habitat fragmentation affects wildlife, the project developed different GIS-based models to find out where to best place the

## Lessons learned

### What is green infrastructure?

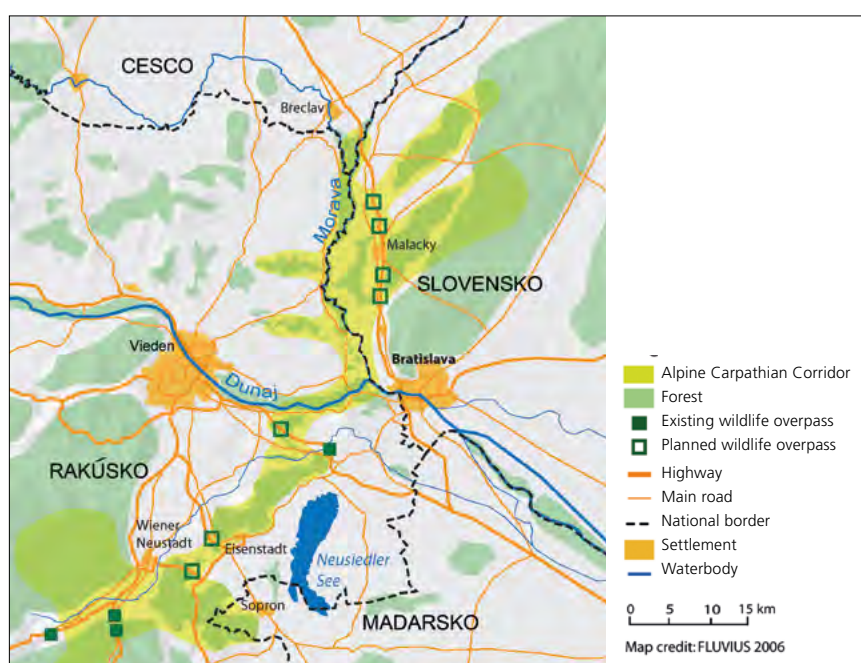
The European Commission defines “green infrastructure” as “a strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystem services and protect biodiversity in both rural and urban settings”. [1]

corridor. Measures to advance its further implementation included the provision of technical support for building wildlife overpasses across highways; assistance in integrating the corridor into spatial planning instruments; capacity building and training; and tourism development activities, such as establishing an educational bike trail alongside the corridor. In a process facilitated by UNEP, all relevant stakeholders, including the national and regional authorities as well as the national highway companies, signed a joint memorandum of understanding. Followed up with an action plan, the memorandum ensured the long-term political commitment of the parties involved and the sustainability of the actions undertaken.

The work and achievements of the AKK project prepared the ground for several follow-up activities. Additional investments have been solicited to secure and further develop the corridor. For example, a contract was signed in 2015 to build a wildlife overpass in Moravský Svätý Ján across the D2 highway linking Bratislava and Brno. The D2 presents one of the major barriers to the Alpine Carpathian Corridor: a brown bear was hit by a vehicle at the planned wildlife overpass site in September 2012. The new overpass will help avoid such accidents in the future, and wild animals will once again be able to follow their migration routes between the Alps and the Carpathians.

The significance of the AKK project and its achievements has been acknowledged at various levels. It serves as a flagship project of the EU Strategy for the Danube Region and as a model case for consultation processes in the context of an EU-wide green infrastructure strategy. Ecological networks like the Alpine Carpathian Corridor help sustain viable populations of wildlife species that are important to the mountain regions the networks connect. And at the same time such networks help sustain a healthy and attractive environment for recreation and tourism in the vicinity of economically dynamic areas.

- The European Union’s initial cross-boundary investment was crucial to generating follow-up activities and investments, including by private actors at the national level.
- A multi-stakeholder dialogue and a memorandum of understanding secure the two countries’ political commitment and their partnership at various levels. This is key to ensuring that actions are sustainable.
- Today, the AKK project serves as a model case: its successful investment and implementation approach is considered worth replicating in the wider Carpathian region and beyond.







5

# Opportunities, resources and benefits





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# Key messages for policy-making

The cases presented in this publication demonstrate that investments in mountain regions can be profitable and rewarding – in financial and in other terms. For maximum benefit to all sides, investors should take into account the specific context of mountain regions, including potentials and risks, and adopt a long-term perspective.

Successful investments consider all dimensions of sustainability – economic, social and environmental. The investments range from helping small enterprises get off the ground, to empowering disabled people to earn their own livelihoods, results-based support of vocational training by private firms, early warning of natural hazards, responsible mining, and road construction. They also take the form of meaningful and profitable use of remittances, compensation for nature conservation and the supply of clean water to lowland areas, and performance-based financing of urban development.

All the cases convey a commitment and the strong belief that mountain regions and their people have a future, and that investment will help spur development, which currently lags behind that of the lowlands. In doing so, investments would reduce the high level of poverty that characterizes many mountain areas, especially in developing countries.

Cuzco, the ancient Inca capital in the Peruvian Andes, is booming thanks to tourism and mining (S.-L. Mathez-Stiefel)

Investments in sustainable development call for efforts by a wide range of actors – public as well as private – as also outlined in the Addis Ababa Action Agenda 2015 [1]. Often, these actors pool their funds and work together. The roles and responsibilities they can assume in investing in mountain development are outlined below.

### Roles of actors and funding schemes

**Domestic public investors:** National, regional and local governments are the key players for addressing specific mountain development challenges. Investment should be based on adequate policies, plans and a vision for good governance. Key government tasks are to ensure public investments in basic infrastructure and services such as roads, communication, education and vocational training, health facilities and disaster risk management. The specific environmental and socio-economic situation of mountains calls for decentralization, also regarding fiscal matters. Strong local government institutions will strengthen the public sector and help guarantee long-term maintenance of these investments.

All these efforts may need financial support from international development actors (see below). But domestic investments, often upfront, are an important means of triggering other forms of investment, also private, in the longer term.

**Domestic and international private business sector:** Private investment including foreign direct investment can make an important contribution to employment, income generation and enhanced well-being in mountains. This is especially so where such investment integrates local enterprises, promotes innovation and capacity development offering professional perspectives especially for the younger generation, and adheres to social and environmental sustainability standards.

**International development cooperation:** International public finance is a crucial complement to national investment, particularly for poverty alleviation, basic infrastructure, education, advancing sustainable resource management, and farming systems. It is also necessary for disaster risk reduction and other domains where mountain-specific challenges make it difficult to attract private investment in the first place.

**NGOs and philanthropic organizations:** Non-governmental organizations and large philanthropic institutions often make groundbreaking financial and non-financial investments in mountains that leverage other sources of funding. Such investments should be a complement to investment efforts made by mountain communities themselves, be it in cash or in kind. Where necessary, local communities should be enabled to access such organizations as well as other potential investor groups for investment that relates to their specific needs.

**International funding for climate change adaptation:** Mountains do little to cause climate change, but are among the regions to bear the brunt of its effects. This externality should be compensated by earmarking a portion of funds for adaptation activities in mountains, for example within the Green Climate Fund. Justification for such a fund can be derived from the crucial ecosystem goods and services that mountain regions provide for humankind and global sustainable development. The donor base should include all countries able to provide support.





Investment in education can make a difference for the future of mountain regions, Nepal (M.A. Zanella)

**Compensation and benefit-sharing:** Many mountain countries strongly rely on exploitation and export of natural resources from mountains such as minerals, timber, biodiversity or hydropower. Mountain communities should receive their fair share of the proceeds of such exploitation. They should also be compensated for sustainable resource management practices that secure the supply of mountain ecosystem services, be they provisioning, supporting, regulating or cultural. Excessive financial incentives offered by public authorities to exploiting operations should be abolished.

**The mountain diaspora:** Mountain areas have some of the highest migration rates worldwide. It is no surprise then that remittances from migrant workers have become an increasingly important source of income and investment in many mountain areas. Ways should be developed to make remittance flows available for funding mechanisms in support of local mountain development. This could be achieved by creating local development funds fed by remittances, which could then be matched by funds from other funding sources, both national and international. Care must be taken to include members of the community, often the poorer segments, who do not benefit from remittances. Mountain countries should also join forces to protect their migrant labour in the countries where they work, to ensure adherence to the international labour standards set forth by the International Labour Organization.

## Key factors to encourage investments

- An **enabling national environment**. This includes a national policy for mountain regions, linked to overall national development policy, that can help encourage and coordinate public investment. Such a policy can prompt investments by private business, civil society and international development cooperation.
- **Security is a precondition for investment**. This relates to political stability and peace, as well as trusted leadership, rule of law, and secure access to resources such as land, credit, savings and insurance, for local as well as national and international investors. In mountain areas, security from natural hazards is also a precondition for investment – at the same time, investment in preventing such hazards increases security in mountains.
- **Investment** should preferably **be decentralized**, with a focus on small and medium enterprises. Reasons are the dispersed settlement, dissected topography and low population density in many mountains as compared to lowlands. Small and medium-sized towns present opportunities for implementing these investment principles.
- **Political and fiscal decentralization** is important to take account of the great diversity, often at short distances, in environment, society and culture. It entails devolving power, competence and funding to subnational and local bodies. Countries are called upon to develop the necessary governance framework, including local participation and the capacity building required to make this participation effective.
- **Transboundary collaboration** creates opportunities for investment as mountain regions often straddle national boundaries. Investing in transit infrastructure, transboundary water management, disaster risk reduction, and tourism and recreation may help overcome conflicts that often exist in mountainous border regions.
- **Knowledge and research** is essential for just, effective and sustainable investment. Local and scientific knowledge and capacity development are important for tailoring investments to the specific natural and cultural conditions of a region. Increasing the capacity of local actors, both public and community, is also crucial for correcting power imbalances that may exist between them and investors, and thus for negotiating just investment deals. Monitoring the outcomes of investments is important for illustrating their benefits for mountain communities and ecosystems as well as for investors, and thus for attracting more investments in sustainable mountain development in future.

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# References and further reading

Note: URLs were last checked on 26 November 2015.

## 1 Investing in sustainable mountain development

### Sustainable global development needs investment in mountains

- [1] FAO. 2015. *Mapping the vulnerability of mountain peoples to food insecurity*, by R. Romeo, A. Vita, R. Testolin & T. Hofer. Rome, Italy, Food and Agriculture Organization of the United Nations.
  - [2] UNEP World Conservation Monitoring Centre. 2002. *Mountain watch*. Cambridge, UK, UNEP WCMC. <https://archive.org/details/mountainwatchenv02blyt>.
  - [3] Grover, V.I., Borsdorf, A., Breuste, J., Tiwari, P.C. & Witkowski Frangetto, F., eds. 2015. *Impact of global changes on mountains: Responses and adaptation*. Boca Raton, FL, USA, CRC press.
  - [4] UN. 2015. *Transforming our world: The 2030 agenda for sustainable development. A/RES/70/1*. New York, NY, USA, United Nations. <https://sustainabledevelopment.un.org/post2015/transformingourworld/publication>.
  - [5] Byers, A.C., Price, L.W. & Price, M.F. 2013. Introduction to mountains. In M.F. Price, A.C. Byers, D.A. Friend, T. Kohler & L.W. Price, eds. *Mountain geography: Physical and human dimensions*, pp. 1–10. Berkeley, CA, USA, University of California Press.
  - [6] Borrini-Feyerabend, G., Pimbert, M., Taghi Farvar, M., Kothari, A. & Renard, Y. 2007. *Sharing power: A global guide to collaborative management of natural resources*. Abingdon, UK, Earthscan.
  - [7] UN. 2015. *Addis Ababa action agenda of the Third International Conference on Financing for Development (Addis Ababa action agenda)*. New York, NY, USA, United Nations. [http://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA\\_Outcome.pdf](http://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA_Outcome.pdf).
- FAO. 2011. *Why invest in sustainable mountain development?* Rome, Italy, Food and Agriculture Organization of the United Nations. <http://www.fao.org/docrep/015/i2370e/i2370e.pdf>.
- Kapos, V., Rhind, J., Edwards, M., Price, M.F. & Ravilious, C. 2000. Developing a map of the world's forests. In M.F. Price & N. Butt, eds. *Forests in sustainable mountain development: A state of knowledge report for 2000*, pp. 4–9. Wallingford, UK, CAB International.
- OECD. 2015. The new development finance landscape: Developing countries' perspective. WORKING DRAFT presented at the OECD workshop on development finance on 25 June 2014. Paris, France, Organisation for Economic Co-operation and Development. [http://www.oecd.org/dac/aid-architecture/The%20New%20Development%20Finance%20Landscape\\_19%20June%202014.pdf](http://www.oecd.org/dac/aid-architecture/The%20New%20Development%20Finance%20Landscape_19%20June%202014.pdf).
- Price, M.F. 2015. *Mountains: A very short introduction*. Oxford, UK, Oxford University Press.
- UN. 2003. *Financing for development: Monterrey consensus of the International Conference on Financing for Development*. New York, NY, USA, United Nations Department of Public Information. <http://www.un.org/esa/ffd/monterrey/MonterreyConsensus.pdf>.
- UN. 2014. *The road to dignity by 2030: Ending poverty, transforming all lives and protecting the planet. Synthesis Report of the Secretary-General on the Post-2015 Agenda*. New York, NY, USA, United Nations. [http://www.un.org/disabilities/documents/reports/SG\\_Synthesis\\_Report\\_Road\\_to\\_Dignity\\_by\\_2030.pdf](http://www.un.org/disabilities/documents/reports/SG_Synthesis_Report_Road_to_Dignity_by_2030.pdf).

## 2 Enhancing regional economies

### A golden future for the steppes

Sustainable Artisanal Mining Project, [www.sam.mn/index\\_en.php](http://www.sam.mn/index_en.php). (Project website)

- SDC. 2006. *SDC's human rights policy: Towards a life in dignity. Realising rights for poor people*. Bern, Switzerland, Swiss Agency for Development and Cooperation. [https://www.eda.admin.ch/content/dam/deza/en/documents/publikationen/Diverses/25225-menschenrechtspolitik\\_EN.pdf](https://www.eda.admin.ch/content/dam/deza/en/documents/publikationen/Diverses/25225-menschenrechtspolitik_EN.pdf).
- SDC. 2011. *SDC experiences with formalization and responsible environmental practices in artisanal and small-scale gold mining in Latin America and Asia (Mongolia)*. Ulaanbaatar, Mongolia and Bern, Switzerland, Swiss Agency for Development and Cooperation. <https://www.eda.admin.ch/publikationen/en/deza/diverse-publikationen/artisanal-gold-mining.html>.
- SDC in Mongolia. 2015. *Annual report 2014*. Ulaanbaatar, Mongolia, Swiss Agency for Development and Cooperation in Mongolia. [https://www.eda.admin.ch/content/dam/countries/countries-content/mongolia/en/SDC-AR-2014\\_EN.pdf](https://www.eda.admin.ch/content/dam/countries/countries-content/mongolia/en/SDC-AR-2014_EN.pdf).

### Looking beyond individual hydropower projects

- [1] The World Bank. 2011. Lao PDR development report 2010. *Natural resource management for sustainable development: Hydropower and mining*. Washington, DC, USA, The World Bank. [http://siteresources.worldbank.org/LAOPRDEXTN/Resources/293683-1301084874098/LDR2010\\_Full\\_Report.pdf](http://siteresources.worldbank.org/LAOPRDEXTN/Resources/293683-1301084874098/LDR2010_Full_Report.pdf).
- [2] Geheb, K., West, N. & Matthews, N. 2015. The invisible dam: Hydropower and its narration in the Lao Democratic Republic. In N. Matthews & K. Geheb, eds. *Hydropower development in the Mekong Region: Political, socio-economic and environmental perspectives*, pp. 101–126. London, UK, Earthscan.
- [3] International Centre for Environmental Management (ICEM). 2010. *Strategic environmental assessment of hydropower on the Mekong mainstream*. Final report prepared for the Mekong River Commission (MRC). Hanoi, Vietnam, Mekong River Commission. <http://www.mrcmekong.org/assets/Publications/Consultations/SEA-Hydropower/SEA-Main-Final-Report.pdf>.
- [4] Grumbine, R.E. & Xu, J.C. 2011. Environment and development: Mekong hydropower development. *Science*, 332(6026): 178–179. <http://dx.doi.org/10.1126/science.1200990>.
- [5] Hecht, J. & Lacombe, G. 2014. *The effects of hydropower dams on the hydrology of the Mekong Basin*. State of Knowledge Series 5. Vientiane, Laos, CGIAR Research Program on Water, Land and Ecosystems. <https://wle-mekong.cgiar.org/download/state-of-knowledge>.
- [6] Ziv, G., Baran, E., Nam, S., Rodriguez-Iturbe, I. & Levin, S.A. 2012. Trading-off fish biodiversity, food security, and hydropower in the Mekong River Basin. *Proc. Natl. Acad. Sci.*, 109(15): 5609–5614. <http://dx.doi.org/10.1073/pnas.1201423109>.



- [7] Fenton, N., Lindelow, M., Heinemann, A. & Thomas, I. 2011. *The socio-geography of mining and hydro in Lao PDR: Analysis combining GIS information with socioeconomic data*. Technical note, Lao PDR Development Report 2010. Washington, DC, USA, The World Bank. [http://siteresources.worldbank.org/LAOPRDEXTN/Resources/293683-1301084874098/LDR2010\\_Mapping.pdf](http://siteresources.worldbank.org/LAOPRDEXTN/Resources/293683-1301084874098/LDR2010_Mapping.pdf).
- [8] Epprecht, M., Minot, N., Messerli, P. & Heinemann, A. 2008. *The geography of poverty and inequality in the Lao PDR*. Bern, Switzerland, Geographica Bernensia, Swiss National Centre of Competence in Research (NCCR) North-South, International Food Policy Research Institute (IFPRI).

#### Mountain access brings benefits, but at a cost

- [1] IT Transport Limited. 2008. *Ethiopian Rural Travel and Transport Programme: Assessment of the pilot project*. Croydon, UK, WSP IMC.
- [2] Lebo, J. & Schelling, D. 2001. *Design and appraisal of rural transport infrastructure: Ensuring basic access for rural communities*. Washington, DC, USA, The World Bank. <http://documents.worldbank.org/curated/en/2001/04/1121146/design-appraisal-rural-transport-infrastructure-ensuring-basic-access-rural-communities>.
- [3] NPC/DFID. 2013. *Long term impact of development interventions – Koshi Hills, Nepal*. Kathmandu, Nepal, National Planning Commission Secretariat, Government of Nepal. <http://r4d.dfid.gov.uk/Output/194107/>.
- [4] Ethiopian Roads Authority. 2012. *Universal rural road access program*. Addis Ababa, Ethiopia, Ethiopian Roads Authority. <http://www.era.gov.et/portals/0/universal%20rural%20road%20access%20program.pdf>.
- [5] The World Bank. 2009. India: New all-weather roads boost rural incomes. *IDA at work*. <http://go.worldbank.org/JRKRCROH50>. (Web page)
- [6] Katare, P.K. 2010. *Prime Minister's rural roads programme India and its socio-economic impact*. New Delhi, India, National Rural Roads Development Agency, Ministry of Rural Development. <http://www.gtkp.com/userfiles/file/India%20Rural%20Roads.pdf>. (Slide show presented at IRF Second International Convention on Rural Roads, Jinan, China, 27 October 2010)

#### Results-based financing for sustainable urban development

The World Bank. 2015. Results-based National Urban Development Program – Northern Mountains. *IBRD/IDA Projects & operations*. <http://www.worldbank.org/projects/P143596?lang=en>. (Project pages on The World Bank website)

#### Improving the value of rangeland services

- Joshi, L., Shrestha, M.S., Jasra, W.J., Joshi, S., Gilani, H. & Ismail, M. 2012. *Rangeland ecosystem services in the Hindu Kush Himalayan region*. Kathmandu, Nepal, International Centre for Integrated Mountain Development (ICIMOD).
- Yi, S. & Ismail, M. 2011. From pastoral economy to rangeland economy: Capturing the multi-functionalities of rangeland resources. In H. Kreuzmann, Y. Yang & J. Richter, eds. *Pastoralism and rangeland management on the Tibetan plateau in the context of climate and global change*, pp. 66–86. Bonn, Germany, GIZ.
- Xie, G.D., Lu, C.X., Neng, Y.F., Zheng, D. & Li, S.C. 2003. Ecological assets valuation of the Tibetan Plateau. *J. Nat. Resour.*, 18(2): 50–55. <http://dx.doi.org/10.11849/zrzyxb.2003.02.010>. (In Chinese, with English abstract)

#### Artisans of the Andes: an economic and social success

- [1] Comisión de Promoción del Perú para la Exportación y el Turismo (PromPerú). 2014. Mueble madera: empresas exportadoras. *SIICEX – Sistema Integrado de Información de Comercio Exterior*. [http://www.siicex.gob.pe/siicex/portal5ES.asp?\\_page\\_=160.00000](http://www.siicex.gob.pe/siicex/portal5ES.asp?_page_=160.00000). (Database, search for “mueble madera” and click “empresas exportadoras”)
- [2] Comisión de Promoción del Perú para la Exportación y el Turismo (PromPerú). 2012. Ancash. [http://www.mincetur.gob.pe/pecex/avance\\_regiones/Ancash/Ficha\\_ANCASH.pdf](http://www.mincetur.gob.pe/pecex/avance_regiones/Ancash/Ficha_ANCASH.pdf).
- [3] INEI [Instituto Nacional de Estadística e Informática]. 2008. Cuadro N° 5.1.6 Perú: establecimientos censados por año de inicio de operaciones, según ámbito político administrativo y actividad económica, 2008. *IV Censo Nacional Económico 2008: Sistema de consulta de resultados censales, cuadros estadísticos*. <http://censos.inei.gob.pe/cenec2008/tabulados/#>. (Database, search in “Establecimientos Censados / Año de inicio”)
- [4] UNDP Peru. 2013. Índice de Desarrollo Humano. *Informe sobre Desarrollo Humano Perú 2013. Cambio climático y territorio: Desafíos y respuestas para un futuro sostenible*. <http://www.pe.undp.org/content/peru/es/home/library/poverty/Informesobredesarrollohumano2013/DHPeru2013.html>. (Download XLSX file)
- Artisanos Don Bosco, [www.artisanosdonbosco.com](http://www.artisanosdonbosco.com). (Organization's website)
- CAB, ed. 2006. *Somos Patrimonio 5: 361 experiencias de apropiación social del patrimonio cultural y natural*. Bogotá, Colombia, Convenio Andrés Bello.
- Macchiavelli, A. & Gotti, M. 2011. Skills and tourism facilities in a poverty context: The role of a NGO in the Peruvian Andes. In P. Keller & T. Bieger, eds. *Tourism development after the crises: Global imbalances – poverty alleviation*, pp. 91–102. Berlin, Germany, Erich Schmidt Verlag.
- Zavaleta Alegre, J. 2013. Chacas, entre el cielo y la tierra. *Cambio*, 16(2150): 32–35.

#### Innovation and technology to diversify the regional economy

- [1] The Ark Foundation. 2014. A few figures. *Technological Valais*. <http://www.theark.ch/en/page/quelques-chiffres-1814>. (Web page)
- [2] The Ark Foundation. 2015. Interactive map: All the technology of Valais on one map. *Technological Valais*. <http://www.theark.ch/en/carte-interactive>. (Web page)
- [3] Swiss Start-up Monitor. 2013. *The start-up landscape of Switzerland: First insights from the Swiss Start-up Monitor*. St. Gallen, Switzerland, University of St. Gallen. [https://startupmonitor.ch/wp-content/uploads/reports/ssm\\_report.pdf](https://startupmonitor.ch/wp-content/uploads/reports/ssm_report.pdf).

The Ark, Foundation for Innovation in Valais, [www.theark.ch/en](http://www.theark.ch/en). (Organization's website)

### 3 Fostering social development

#### Building on mountain communities' strength

- [1] FAO. 2015. *Mapping the vulnerability of mountain peoples to food insecurity*, by R. Romeo, A. Vita, R. Testolin & T. Hofer. Rome, Italy, Food and Agriculture Organization of the United Nations.

#### Private-sector training for gainful employment

- [1] Employment Fund Secretariat. 2015. *Annual report 2014*. Kathmandu, Nepal, Helvetas Swiss Intercooperation. [http://www.employmentfund.org.np/wp-content/uploads/2015/07/Annual-Report\\_2014-final\\_24032015.pdf](http://www.employmentfund.org.np/wp-content/uploads/2015/07/Annual-Report_2014-final_24032015.pdf).

Employment Fund, [www.employmentfund.org.np](http://www.employmentfund.org.np). (Organization's website)

Employment Fund Secretariat. 2015. *Results-based financing in technical and vocational training: A step-by-step implementation guide*. Kathmandu, Nepal, Helvetas Swiss Intercooperation. [http://www.employmentfund.org.np/wp-content/uploads/2015/05/Results-based-Financing\\_Implementation-Guide.pdf](http://www.employmentfund.org.np/wp-content/uploads/2015/05/Results-based-Financing_Implementation-Guide.pdf).

Employment Fund Secretariat. 2015. *Women's view on trainings and strategies for employment in non-traditional trades*. Learning Series. Kathmandu, Nepal, Helvetas Swiss Intercooperation. <http://www.employmentfund.org.np/wp-content/uploads/2015/05/Womens-views-on-training-and-strategies-for-employment-in-non-traditional-trades.pdf>

#### The power of translocal networks and remittances

- [1] AKRSP. 2007. *An assessment of socio-economic trends in the Northern Areas and Chitral, Pakistan (1991–2005)*. Gilgit, Pakistan: Aga Khan Rural Support Programme.

Benz, A. 2014. Mobility, multilocality and translocal development: Changing livelihoods in the Karakoram. *Geogr. Helv.*, 69(4): 259–270. <http://dx.doi.org/10.5194/gh-69-259-2014>.

Kreutzmann, H. 2012. After the flood: Mobility as an adaptation strategy in high mountain oases. The case of Pasu in Gojal, Hunza Valley, Karakoram. *Die Erde*, 143(1–2): 49–73.

#### Inclusion and empowerment of people with disabilities

- [1] WHO. 2011. *World report on disability*. Geneva, Switzerland, World Health Organization. [http://www.who.int/disabilities/world\\_report/2011/en](http://www.who.int/disabilities/world_report/2011/en).

Bruijn, P., Regeer, B., Cornielje, H., Wolting, R., van Veen, S. & Maharaj, N. 2012. *Count me in: Include people with disabilities in development projects. A practical guide for organisations in North and South*. Veenendaal, The Netherlands, LIGHT FOR THE WORLD. <http://www.lightfortheworld.nl/en/news/news-detail/2012/11/30/count-me-in---a-practical-guide-towards-inclusion>.

CHIP. 2011. *Research report on empowerment of people with disabilities as a result of engagement in economic activities, Gilgit/Baltistan and Punjab Province, Pakistan*. Islamabad, Pakistan, Civil Society Human and Institutional Development Programme. <http://www.chip-pk.org/wp-content/uploads/2015/02/11.-Research-Livelihood-Helps-Empowerment-of-PWDs.June-2011.pdf>.

CHIP. 2014. *Situation analysis of persons with disabilities & types & range of initiatives for rehabilitation & inclusion of people with disabilities*. Research report. Islamabad, Pakistan, Civil Society Human and Institutional Development Programme. <http://www.chip-pk.org/wp-content/uploads/2015/02/Situation-Analysis-of-PWD-in-Gilgit-Baltistan-2014.pdf>.

Civil Society Human and Institutional Development Programme (CHIP). Undated. Disability mainstreaming. *Programmes*. <http://www.chip-pk.org/programmes/disability-mainstreaming/>. (Web page)

WHO. 2010. *Community-based rehabilitation: CBR guidelines*. Geneva, Switzerland, World Health Organization. <http://www.who.int/disabilities/cbr/guidelines/en/>.

#### Reducing risk through early warning

HYCOS Regional Flood Information System, [www.icimod.org/hycosrfis](http://www.icimod.org/hycosrfis). (Project pages on ICIMOD website)

IPCC. 2012. Summary for policymakers. In C.B. Field, C.B. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor & P.M. Midgley, eds. *Managing the risks of extreme events and disasters to advance climate change adaptation: A special report of Working Groups I and II of the Intergovernmental Panel on Climate Change*, pp. 3–21. Cambridge, UK, Cambridge University Press.

Shrestha, M.S., Grabs, W.E. & Khadgi, V.R. 2015. Establishment of a regional flood information system in the Hindu Kush Himalayas: Challenges and opportunities. *Int. J. Water Resour. Dev.*, 31(2): 238–252. <http://dx.doi.org/10.1080/07900627.2015.1023891>.

Shrestha, M.S., Kafle, S., Gurung, M., Nibanupudi, H.K., Khadgi, V.R. & Rajkarnikar, G. 2014. *Flood early warning systems in Nepal: A gendered perspective*. ICIMOD Working Paper 2014/4. Kathmandu, Nepal, International Centre for Integrated Mountain Development.

UNFCCC. 2014. Community-based flood early-warning system. *UNFCCC Secretariat: Momentum for change*. [http://unfccc.int/secretariat/momentum\\_for\\_change/items/8688.php](http://unfccc.int/secretariat/momentum_for_change/items/8688.php). (Web page)

#### Gold to be proud of: Fairmined Certification

[1] The World Bank. 2013. Artisanal and small-scale mining: Brief. *Extractive industries*. <http://www.worldbank.org/en/topic/extractiveindustries/brief/artisanal-and-small-scale-mining>. (Web page)

[2] Municipio de La Llanada. 2012. *Plan de desarrollo municipal: unidos por la mejor propuesta 2012–2015*. La Llanada, Colombia, República de Colombia, Departamento de Nariño, Municipio de La Llanada. [http://www.lallanada-narino.gov.co/Nuestros\\_planes.shtml?apc-gbxx-1-&x=1945515](http://www.lallanada-narino.gov.co/Nuestros_planes.shtml?apc-gbxx-1-&x=1945515). (See parte 1, pp. 36–37)

[3] DANE. 2012. *Proyecciones nacionales y departamentales de población 2005–2020*. Estudios Postcensales N° 7. Bogotá, Colombia, Departamento Administrativo Nacional de Estadística. [http://www.dane.gov.co/files/investigaciones/poblacion/proyepobla06\\_20/7Proyecciones\\_poblacion.pdf](http://www.dane.gov.co/files/investigaciones/poblacion/proyepobla06_20/7Proyecciones_poblacion.pdf).

[4] Herb, E. 2015. *Social impact study and rapid baseline assessment of cooperative, La Llanada-Colombia*. La Llanada, Colombia, Alliance for Responsible Mining. (Internal report)

Alliance for Responsible Mining, [www.responsiblemines.org/en/](http://www.responsiblemines.org/en/). (Organization's website)

Alliance for Responsible Mining. 2015. ARM Globally. <http://www.responsiblemines.org/ProyectoARM/mapa?lang=en>. (Interactive map)

ARM. 2013. *Fairmined Standard for gold from artisanal and small-scale mining, including associated precious metals: Version 2.0 – April 2014*. Envigado, Colombia, Alliance for Responsible Mining Foundation. [http://www.responsiblemines.org/images/sampled/EstandarFairmined/Fairmined%20Std%20%20\\_2014\\_.pdf](http://www.responsiblemines.org/images/sampled/EstandarFairmined/Fairmined%20Std%20%20_2014_.pdf).

## 4 Safeguarding mountain ecosystems

### Investing in securing ecosystem goods and services

[1] United Nations Department of Economic and Social Affairs. 2015. Sustainable development goals / Sustainable development topics. *Sustainable Development: Knowledge Platform*. <https://sustainabledevelopment.un.org/topics>. (Web page)

### Participatory funding for watershed management

FAO. 2007. *Why invest in watershed management?* Rome, Italy, Food and Agriculture Organization of the United Nations. <http://www.fao.org/docrep/010/a1295e/a1295e00.HTM>.

Wolfgramm, B., ed. 2015. *Pathways to effective integrated watershed management*. IWSM policy brief No. 2. Bern, Switzerland, Centre for Development and Environment (CDE). <http://boris.unibe.ch/69861/>.

Wolfgramm, B., Liniger, H., Nazarmavloev, F. 2014. *Integrated watershed management in Tajikistan*. IWSM policy brief No. 1. Bern, Switzerland, Centre for Development and Environment (CDE). <http://boris.unibe.ch/63804/>.

### In-kind rewards for ecosystem services

CAREC. 2014. *Integrating payment for ecosystem services (PES) and afforestation/reforestation activities for carbon sequestration in the Kyrgyz Republic*. Technical report. Bishkek, Kyrgyz Republic, Regional Environmental Centre for Central Asia.

Forest Trends, The Katoomba Group & UNEP. 2008. *Payments for ecosystem services: Getting started. A primer*. Nairobi, Kenya, Forest Trends, The Katoomba Group, United Nations Environment Programme. [http://www.unep.org/pdf/PaymentsForEcosystemServices\\_en.pdf](http://www.unep.org/pdf/PaymentsForEcosystemServices_en.pdf).

Kosoy, N. & Corbera, E. 2009. Payments for ecosystem services as commodity fetishism. *Ecol. Econ.*, 69(6): 1228–1236. <http://dx.doi.org/10.1016/j.ecolecon.2009.11.002>.

### Benefits of community-based carbon offsetting

Abiyu Hailu, A. 2012. *The role of seed dispersal, exclosures, nurse shrubs and trees around churches and farms for restoration of ecosystem diversity and productivity in the Ethiopian Highlands*. Vienna, Austria, Institute of Forest Ecology, University of Natural Resources and Life Sciences, Vienna. (PhD dissertation)

BOKU Carbon Offset System, <http://www.boku.ac.at/en/wissenschaftliche-initiativen/zentrum-fuer-globalen-wandel-nachhaltigkeit/themen/nachhaltigkeit/co2-kompensation/>. (Project pages on BOKU website)

Cornwall, A. 2008. Unpacking “participation”: Models, meanings and practices. *Community Dev. J.*, 43(3): 269–283. <http://dx.doi.org/10.1093/cdj/bsn010>.

Reynolds, T.W. 2011. Institutional determinants of success among forestry-based carbon sequestration projects in sub-Saharan Africa. *World Dev.*, 40(3): 542–554. <http://dx.doi.org/10.1016/j.worlddev.2011.09.001>.

### Reconciling nature conservation and agricultural production

African Wildlife Capital, <http://www.africanwildlifecapital.com/>. (Organization's website)

African Wildlife Foundation. Undated. Rungwe Avocado Company: Environmentally sustainable agriculture in Tanzania. *Projects*. <http://www.awf.org/projects/rungwe-avocado-company>. (Web page)

### When a private park supports the local economy

Holmes, G. 2015. Markets, nature, neoliberalism, and conservation through private protected areas in southern Chile. *Environ. and Plan. A*, 47(4): 850–866. <http://dx.doi.org/10.1068/a140194p>.

Parque Oncol, [www.parqueoncol.cl](http://www.parqueoncol.cl). (Organization's website)

Tacón, A., Morey, F.J. & Sepúlveda, C. 2012. *Guía de Áreas Protegidas de la Región de Los Ríos*. Valdivia, Chile, WWF-Chile. <http://www.parques-selvaldiviana.cl/>.

### Green infrastructure benefits wildlife and citizens

[1] European Commission. 2013. *Building a Green Infrastructure for Europe*. Luxembourg, Luxembourg, Publications Office of the European Union. [http://ec.europa.eu/environment/nature/ecosystems/docs/green\\_infrastructure\\_broc.pdf](http://ec.europa.eu/environment/nature/ecosystems/docs/green_infrastructure_broc.pdf).

Alpen-Karpaten-Korridor, [www.alpenkarpatenkorridor.at](http://www.alpenkarpatenkorridor.at). (Project website)

European Commission. Green Infrastructure. Environment: Nature and biodiversity. <http://ec.europa.eu/environment/nature/ecosystems/>. (Web page)

## 5 Opportunities, resources and benefits

### Key messages for policy-making

[1] UN. 2015. *Addis Ababa action agenda of the Third International Conference on Financing for Development (Addis Ababa action agenda)*. New York, NY, USA, United Nations. [http://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA\\_Outcome.pdf](http://www.un.org/esa/ffd/wp-content/uploads/2015/08/AAAA_Outcome.pdf).

Achieving the ambitious goals formulated in the 2030 Agenda for Sustainable Development calls for future investments in mountain regions. Mountains support the livelihoods of millions of people who live in them as well as in the lowlands. But in many mountain regions, development lags behind and poverty rates are high. Without investment, prospects for improvement are scant, as national and international development policies still pay little attention to the specific challenges faced by mountain inhabitants. And yet, mountain ecosystem goods and services and the diverse assets of mountain communities offer significant opportunities for investments fostering sustainable development.

This publication looks at investments from the perspective of sustainable development. It presents 19 case studies from mountain regions around the world, covering efforts by diverse public and private actors, and ranging from classic examples of development investments to innovative financing mechanisms specifically tailored to the local context and conditions. The publication concludes with specific messages on mountain development, addressed to policy-makers.

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