



# Cooperating for Success

## Benefits of Research Partnerships with Developing Countries

Swiss Commission for Research Partnerships  
with Developing Countries (KFPE)

sc | nat 

**Science and Policy**

Platform of the Swiss Academy of Sciences

KFPE – Commission for Research Partnerships  
with Developing Countries

### **SCNAT – [www.scnat.ch](http://www.scnat.ch)**

The Swiss Academy of Sciences (SCNAT) supports and connects the natural sciences at the regional, national and international level. Owing to its broad support of science, SCNAT is a representative and important partner in policy-making within Switzerland. In so doing, it relies on a network of over 35,000 scientists working within and at the interface of many different disciplines. SCNAT is devoted to making the future of scientific culture and research a priority and building a basis for dialogue between science and society.

### **KFPE – [www.kfpe.ch](http://www.kfpe.ch)**

KFPE is dedicated to promoting research partnerships with developing and transition countries. In this way, it wishes to contribute to sustainable and effective development and help find solutions to global problems.

KFPE is engaged in Swiss scientific policies and is committed to promoting the interests of researchers and their affiliated institutions on both a national and international level. It furthers innovative and development-oriented research and designs concepts for research strategies. In this context, KFPE ensures that partnership principles are followed, the quality of research is assured and the interests of all partners are respected. KFPE is a commission of the Swiss Academy of Sciences (SCNAT).

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In the 19<sup>th</sup> and early 20<sup>th</sup> centuries, motivated by a thirst for knowledge, members of the Swiss Academy of Sciences (SCNAT) carried out sometimes dangerous expeditions to Africa, the Middle East, Oceania, South America and Asia, in countries that were not yet developed or only barely. Their goal was primarily to discover new species of plants and animals, and to meet and learn about indigenous populations living in a world entirely at the mercy of the elements. This type of research enabled these passionate scientists to work under conditions that required little in the way of financial planning.

Over the course of decades, the context has altered. Countries that formerly constituted uncharted territory are now developing. Scientific interests have diversified and expanded. Moreover, they increasingly have a socio-cultural component. Planning North-South research entails a transdisciplinary approach to evaluating problems, which in turn demands painstaking financial coordination to set up an effective and productive scientific partnerships.

Critics of these efforts find them difficult or impossible to justify. A much better use of funds, the argument goes, would be to support projects focused purely on problems linked to our own society.

This publication of the KFPE – the Swiss Commission for Research Partnerships with Developing Countries – proves otherwise. It shows convincingly how monitoring projects that a priori may not seem very important and hardly worthwhile spending money on can be a boon to all partners involved, from the North and from the South.

Consider just a few of the multilateral successful projects presented:

1) The design, technical development and construction of reactors capable of disinfecting and depolluting water using solar energy and affordable catalysts.

2) The development of tests to identify timber species in Ghana which are nearly as hardy as concrete, and demonstration of the benefits of impregnating them with organic extracts of plants and other wood species known to resist parasites.

3) The advantages of simultaneously immunising animals and people against diseases such as anthrax, brucellosis, tuberculosis and rabies.

This brief list alone shows that the results of long-term projects not only have important implications for indigenous populations but also for countries such as Switzerland, where civilisation is considered to be more sophisticated.

In addition to their relevance, the fascinating studies described in this publication have a significant common denominator. They supply critical training to local technicians, engineers, scientists and doctors who appreciate the important impact of their activity, which allows their own country to develop in a sustainable way, both economically and scientifically.

SCNAT is proud to always have been able to promote scientific partnerships with developing countries. We celebrate their success and hope that the tireless efforts of all the institutions involved, including those of the Swiss Academies of Art and Sciences and of the KFPE, will continue to be supported so that the future can bring us more of the surprising discoveries presented here.

*Denis Monard*  
President SCNAT

Switzerland has a long tradition of successful scientific cooperation with developing and emerging countries as demonstrated, for example, by the Centre Suisse de Recherches Scientifiques in Côte d'Ivoire and the Ifakara Health Institute (formerly the Ifakara Health Research and Development Centre) in Tanzania. The establishment of these two centres more than 50 years ago, their development and later their integration into partnering country institutions benefited from the support of Switzerland, which has maintained close research and management ties with the centres. These examples and others show clearly that contributing to research capacity building in poor countries is only possible through long-term partnerships.

Roughly 85 per cent of global resources devoted to research and development are invested in OECD countries. Another 10 per cent goes to India, China and to the industrialised countries of East Asia. Developing countries thus receive only 5 per cent of all the funds dedicated to research. Given the enormous challenges these countries face – for example, AIDS, tuberculosis and malaria in Africa, or food security – the support is far too little. Moreover, these problems will continue to grow with climate change, which affects developing countries disproportionately. But they also bear some of the responsibility. That makes it even more important that they be involved as research partners in creating solutions.

The Earth Summit in Rio in 1992 showed that research plays a key role in building concepts of sustainable development. Indeed, long aware that translating research results into practical application is best done locally, Switzerland has been at the forefront in establishing research partnerships. In addition, bilateral partnerships in developing and emerging countries represent an effective way of supporting research focused on the needs of humans. A worldwide network of

research institutions is a prerequisite for solving global challenges in a sustainable way.

A characteristic feature of the Swiss idea of collaborative research focused on development is close cooperation with research agencies – for example, the Swiss National Science Foundation and the State Secretariat for Education and Research – as well as development organisations – the Swiss Agency for Development and Cooperation and the State Secretariat for Economic Affairs. This cooperation ensures that the scientific partnerships stay focused on both practical applications and high-quality research. Relevant projects within the SNSF programmes and the National Centre of Competence in Research (NCCR) North-South (Research Partnership for Mitigating Syndromes of Global Change) are particularly well respected internationally.

The results of scientific partnerships with developing and emerging countries are still not widely known, however, which is why the KFPE decided to publish this document. It summarises successful projects in different research domains and countries, and shows how the results of that work have been translated into practice and how they help to shape policy. Development and emerging countries are not the only ones to benefit from this global approach: many of the findings are just as important for Switzerland.

A major survey at the national level gave the KFPE a chance to gather together more than 40 «success stories». Twelve of the projects are presented here. The others can be found online ([http://www.kfpe.ch/projects/success\\_stories/electronic\\_appendix/](http://www.kfpe.ch/projects/success_stories/electronic_appendix/)). We hope you enjoy reading the stories. We welcome your feedback and suggestions.

*Jon-Andri Lys, Claudia Binder, Evelyne Glättli  
and Ursula Gugger Suter*

# Building trust

*Jennifer Duyne Barenstein*

**Supporting people through financial and technical assistance to rebuild their own homes after a natural disaster is more cost-effective and sustainable than building houses through contractors. This finding from the work of researchers from southern Switzerland and India has changed the way international humanitarian agencies operate.**

One of the most visible and dramatic consequences of natural disasters is the destruction of homes. Aid organisations have different approaches to reconstruction. In particular, they differ on how much responsibility to give to affected people in reconstructing their own houses.

As a result of climate change, natural disasters such as floods are occurring more frequently. And because vulnerable areas are now more densely populated than in the past, the consequences of natural hazards such as earthquakes tend to be more devastating. For this reason, it is important for governments and humanitarian organisations to be able to compare their knowledge and experiences in rebuilding damaged houses on the basis of independent scientific research. The World Habitat Research Centre (WHRC) of the University of Applied Sciences and Arts of Southern Switzerland (SUPSI) together with Ecosmart India and the NGO (nongovernmental organisation) Arid Communities and Technologies conducted a research project aimed at analysing the advantages and disadvantages of different approaches to housing reconstruction. The project was financed by the Swiss Agency for Development and Cooperation (SDC) and Swiss Solidarity.

## Partner institutions

The project was initiated by the World Habitat Research Centre (WHRC, [www.worldhabitat.supsi.ch](http://www.worldhabitat.supsi.ch)), at the University of Applied Sciences and Arts of Southern Switzerland (SUPSI) together with Ecosmart India ([www.ilfsecosmart.com](http://www.ilfsecosmart.com)). In addition, the local NGO Arid Communities and Technologies ([www.actindia.org](http://www.actindia.org)) took part in the research work in Gujarat.

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## One million houses destroyed

The study showed that the government of Gujarat's owner-driven reconstruction policy was the most successful. Under this approach, the rebuilding of the houses proceeded relatively quickly and at lower cost than with other approaches. In addition, the residents were very happy with their new homes – especially with regard to size, the quality of the building materials and the construction. The findings showed just as clearly that the less the residents were involved in the rebuilding process at the outset, the higher the costs, the lower the quality of the houses and the more dissatisfied the residents. The experience of Gujarat thus confirmed that victims of natural disasters are more than capable of rebuilding their homes themselves, according to their needs, provided they have the required financial and technical support.

Houses built by a construction company under contract to a large international organisation.





A house whose rebuilding was overseen by the owners themselves. (Bild: D. Pittet)

By the same token, the study highlighted the risks and disadvantages that arise when reconstruction is delegated to construction companies. These are often inflexible in their approach and adapt poorly to local housing cultures – as, for example, when residents wished to place the kitchen outside the house for religious reasons. In addition, construction companies tend to use building technologies that are ill suited to the local climatic conditions. For instance, in hot, dry areas, flat concrete roofs make houses unnecessarily warm.

Based on the results of this research, the International Red Cross and the American Red Cross decided to allow homeowners to direct the rebuilding of houses following the tsunami of December 2004. The World Bank strongly endorsed the same approach following the earthquake in Pakistan in 2005. In India, our research partnership contributed to motivate the Indian Disaster Management Authority in partnership with various NGOs and national experts to work together to develop a national policy for owner-driven reconstruction in the wake of natural disasters. In the meanwhile, the project has inspired further research partnerships and follow-up projects.

#### Key findings

- The project enabled the participating partners to showcase their research capacity and to distinguish themselves as a competence and knowledge centre.
- Relatively modest financial contributions from the SDC made it possible to achieve goals that influenced the practices of governments and international humanitarian organisations.
- Our research partnerships with development organisations in India created synergies between applied research and the evaluation of development programmes, especially regarding scientific accuracy and independence.

# Clean water from the sun

*Janeth Sanabria, Norberto Benitez, Machuca Fiderman and Cesar Pulgarin*

**Reactors constructed as part of a Swiss-Colombian research partnership use solar energy and inexpensive catalysts to disinfect and purify water. The reactors offer a means of preventing water-borne illnesses, which are a serious health problem.**

In Latin America, 2 million people, mainly children under 5, die each year from illnesses caused by poor-quality water. On this continent, according to the Pan American Health Organization, 90 per cent of towns of less than 10,000 inhabitants have no disinfection system for producing drinkable water. Not only is this vital liquid contaminated by pathogenic agents, it is also polluted by toxic substances. The sugar cane and paper industries, which are a major source of water pollution, are the principal productive activities of the region of the Cauca Valley in Colombia. Pesticides are also widely used in this country, in which agriculture counts for 30 per cent of GDP.

## The Biosolar-Detox project

Developing water-treatment technologies that are effective, inexpensive and adapted to local conditions is thus of critical importance. This is the goal

### Partner institutions

The Swiss Federal Institute of Technology Lausanne is regularly ranked among the 20 best schools of technology research and teaching in the world ([www.epfl.ch](http://www.epfl.ch)).

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Universidad del Valle (Univalle) in Cali, Colombia, was established in 1954. It is especially strong in health and the environment ([www.univalle.edu.co](http://www.univalle.edu.co), [biosolar.univalle.edu.co](http://biosolar.univalle.edu.co)).

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of the Biosolar-Detox project, a joint partnership of the Swiss Federal Institute of Technology Lausanne (EPFL) and the Universidad del Valle (Univalle) in Cali, Colombia. The project has studied solar photocatalysis as a means of disinfecting and purifying water: in the presence of catalysts such as ferrous salt and titanium dioxide, reaction with sunlight causes water to generate chemical species (called oxidant radicals) capable of breaking down the constitutive molecules of polluting



Solar reactor for bleaching wastewater from an industrial paper mill

substances and germs. The Biosolar-Detox project is financed by Swiss institutions – the EPFL-SDC (Swiss Agency for Development and Cooperation) Scientific Cooperation Fund – and Colombian institutions (Univalle; Colciencias, a Colombian science support organisation; industrial partners). Note that the Colombian partners have provided a substantial portion of the personnel and needed resources.

### Recycling industrial water: a reality

In producing paper, the Carvajal company in the Cauca Valley uses water containing a number of colourants with varying toxicities. Together with this company, the EPFL-Univalle partnership has built a reactor based on solar photocatalysis. Polluted water is decontaminated by being passed through a serpentine tube containing the catalyst and exposed to the sun. This device also makes it possible to reduce the coloration of the wastewater and to reuse it in production.

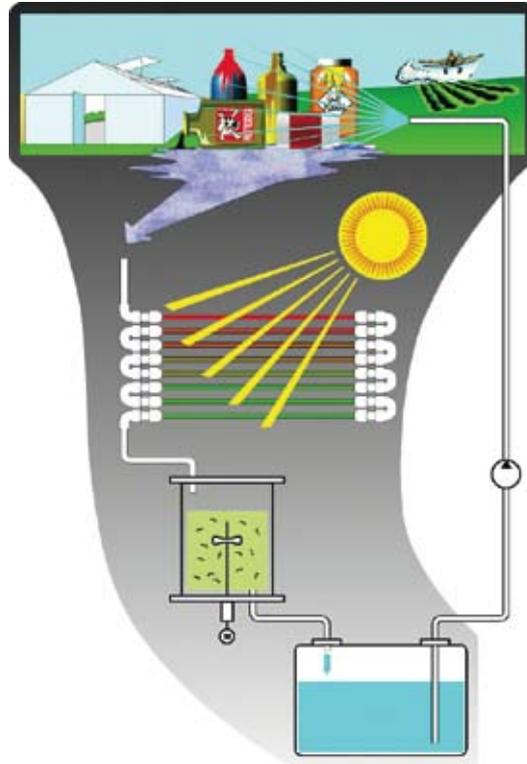
Biosolar-Detox has also improved the biological treatment of drainage water containing pesticides: the contaminated water is pretreated in a solar reactor like the one described above, where the photocatalytic process breaks down molecules that resist biodegradation; then they pass through the biological reactor, where bacteria attack the pollutants. The first pilot system of this type implemented in Latin America eliminated 98 per cent of toxins, 90 per cent of pollutants and treated a thousand litres of water per day.

### Producing drinking water

The project also showed the effectiveness of a solar reactor in inactivating different bacteria (*Escherichia coli*, *Salmonella typhimurium* and *Shigella sonnei*) as well as the bacteriophage virus  $\Phi$ X174. Consequently, the technology may eventually be used to purify 50 to 100 litres of water per square metre of solar reactor per day – which could make it suitable for small communities living in sunny areas.

### A training project

Five PhDs and 23 students were trained in the context of Biosolar-Detox, which also strengthened the collaboration between the academic and commercial sectors of the Cauca Valley and opened the way to other projects with the Univalle-EPFL partnership. Some 20 national and international publications helped to disseminate the knowledge gained by the different participants in the project.



The principle of a coupled solar-biological reactor. The polluted water first flows through the serpentine tube, where the combined action of the sun and a catalyst break down the molecules of the most recalcitrant pollutants. Purification is done by bacteria in the biological reactor.

### Key findings

- The Biosolar-Detox project developed and tested to the pilot stage an inexpensive, efficient water disinfection and purification system that is well adapted to rural regions of South American countries, such as Colombia.
- The project provides a way of dealing with one of the most serious health problems on the South American continent: diseases due to poor-quality water.
- The project played a major educational role, reinforced cooperation between research and the regional economy, and opened the way to new partnership projects.

# One medicine for people and animals

*Esther Schelling, Jakob Zinsstag and Bassirou Bonfoh*

**Anthrax and brucellosis, diseases that are transmitted from animals to humans, are increasing worldwide. Poor countries are especially hard hit. In Chad, Swiss and African researchers are working on a new strategy to combat these diseases: they treat cattle owners and their animals at the same time.**

A nomad is constantly on the road. In dry areas like the Sahel, this way of life is advantageous for pastoralists, who frequently traverse remote areas where natural resources are limited. An example is pastures, which can only be used once a year. On the other hand, the nomadic way of life complicates access to social services, especially health care and education. This has consequences: In the countries of the Sahel, mobile pastoralists have one of the highest maternal mortality rates. And they are often excluded from the political process.

Since 1998, the Swiss Tropical Institute has been working with various research institutes and agencies to improve health services for nomads in Chad. Similar partnerships have also been formed in Mauritania, Mali and Kyrgyzstan. The central idea behind these projects is that pastoralists are well when their cattle are well. Healthy cattle, goats and sheep produce more milk and meat. If the animals are ill, however, there is a risk that an infectious illness such as anthrax or brucellosis (Bang's disease) will be transmitted to humans. When that happens, it is referred to as zoonosis.

## Vaccinated animals but unvaccinated children

Epidemiological studies in Chad have shown that to protect their animals from illness, nomads have most of their animals vaccinated. But children are rarely vaccinated. For this reason, we began to look for ways to combine animal and human medicine. Thereafter, doctors and veterinarians worked together. They offered basic medical care for both humans and animals. This con-

## Partner institutions

The Swiss Tropical Institute promotes international and national health through research, teaching and providing services ([www.sti.ch](http://www.sti.ch)).

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The Centre Suisse de Recherches Scientifiques is involved in North-South research partnerships in West African countries ([www.csr.ch](http://www.csr.ch)).

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The Centre de Support en Santé Internationale in Chad supports health systems in countries south of the Sahara to improve public health, research and health personnel training.

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The Institut du Sahel advocates better exchange between research institutions in the areas of agriculture and population development in West Africa ([www.insah.org](http://www.insah.org)).

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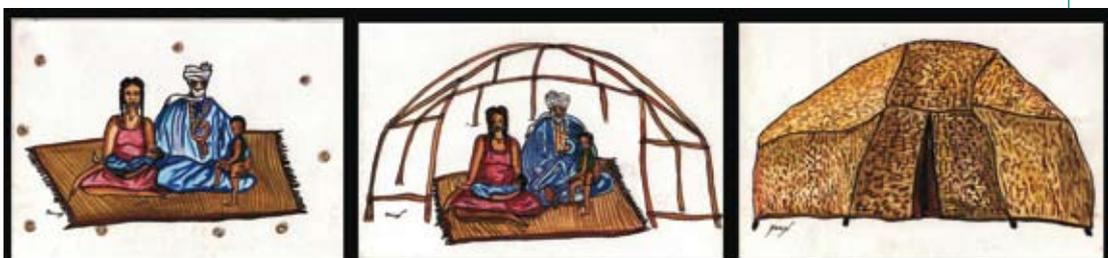
The Institut National de Recherches en Santé Publique in Mauritania is the Mauritanian national research institute for public health.

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The Institute for Islamic and Middle Eastern Studies at the University of Bern explores the political and social aspects of the Islamic world ([www.islamwissenschaft.unibe.ch](http://www.islamwissenschaft.unibe.ch)).

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An information campaign tailored to the nomadic way of life. The sequence of images shows that children are protected against polio, whooping cough, tetanus and diphtheria after only three vaccination shots.



cept of «one health» also provided a model that spurred scientists worldwide to conduct cost-benefit analyses. In Chad, we focused on joint vaccination campaigns because this approach best represented local health concepts. The vaccinations were carried out by public health and veterinary services.

Many women and children in mobile households were vaccinated for the first time. Moreover, the cost was lower than for traditional vaccination campaigns because it was possible to split certain expenses – for example, for transporting materials and personnel – between doctors and veterinarians. Surveys showed that people valued the joint health services very highly. This approach is especially promising for impoverished and remote areas where money and personnel for health care are in short supply.

### Global relevance

Cooperation between the health and agricultural sectors thus makes the fight against zoonoses through vaccination more cost-effective. That is important for developing countries, where culling entire herds in the case of disease outbreak is more problematic than it is in the industrialised world – especially when it comes to compensating farmers for lost animals.

Part of the research in Chad involved setting up the first tuberculosis laboratory as well as establishing methods for diagnosing rabies and other zoonoses. Under the direction of the ministry for planning, several ministries contributed to a document laying out an integrated health service for nomads in Chad. The Swiss Agency for Development and Cooperation (SDC) and the Vétérinaires sans Frontières have used this approach in northern Mali to enhance vaccination services for women and children. Finally, the International Committee of the Red Cross (ICRC) and other international organisations have consulted our research group to improve their own programmes for mobile pastoralists.

Because humans are continually exploiting new habitats that contain unknown pathogens, zoonoses now occur more frequently. In addition, the increasing mobility of people and the associated transport of goods lead to the faster spread of these diseases. Our research is helping to understand this process, to fight against zoonoses and to provide adequate health care to previously neglected populations.



Stakeholders – authorities, population and researchers – talk during a meeting at Lake Chad in 2005.

### Key findings

- Research at the interface between humans and veterinary medicine suggests new avenues to low-cost methods of combating disease. Expenditures are shared between both sectors according to their control benefits.
- Research that includes interest groups in the decision-making process has the potential to improve health services in resource-poor areas. And it can aid in mediating between the people and the authorities.
- North-South research partnerships must be transparent. They train academic and technical personnel and help to make better use of existing infrastructure. In this way, they strengthen research institutions in Africa.

# Soils for grain and the climate

*Hans Hurni, Berhanu Debele and Gete Zeleke*

**Traditional modes of agriculture in the Ethiopian Highlands accelerates erosion and land degradation. A research project is helping farmers to develop innovative soil and water conservation methods, such as gradual terrace development designed to reduce overland flow and hold back soil particles. As these measures also help store carbon in the soil, they not only improve soil fertility but also benefit the global climate.**

Often called the cradle of mankind, Ethiopia was one of the earliest centres of agriculture. The region was renowned in ancient Egypt, and later in Greece and Rome, for its fertile agriculture and sophisticated crop technologies. Yet today Ethiopia is one of the poorest countries in the world. More than 80 per cent of the country's rapidly growing depends on agriculture for a livelihood.

Soil, which has been damaged over centuries in the highlands, continues to be worked with ploughs and hoes on small farms. Hence, forests and pastures have markedly diminished or almost disappeared in many areas, and the agricultural sector is characterised by ever lower productivity. Apart from agriculture, heavy rainfall during the rainy season and the country's mountainous topography have also helped to accelerate soil erosion.

## Partner institutions

The Centre for Development and the Environment (CDE) at the University of Bern is the leading Swiss research institute for sustainable development in development cooperation. It also manages the National Centre of Competence in Research (NCCR) North-South ([www.northsouth.unibe.ch](http://www.northsouth.unibe.ch) and [www.cde.unibe.ch](http://www.cde.unibe.ch)).

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The regional office of the NCCR North-South in Addis Ababa coordinates the research partnerships and student training. The Ministry of Agriculture puts the research results into practice. The Ethiopian agricultural research centres ARARI and SARI are responsible for the field stations where sustainable land use is investigated in small catchment areas. The universities of Addis Ababa, Mekelle, Bahr Dar, Gondar, Dilla and Haramaya, together with the Swiss researchers, provide courses on soil and water protection.

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Farmers are aware of soil erosion, but as they were always able to move to new fields, many of them perceive no long-term threat to their liveli-



Population pressure is forcing farmers to plough steep slopes, where the danger of erosion is particularly acute. (Photo: M. Moll)

hood. Moreover, farmers have had few incentives to protect the soil; as the government grants ownership of land only on a lease basis, farmers cannot be sure of keeping their land in the longer term.

### Environmentally sustainable methods

In the 1970s, the University of Bern began to study the problems of land degradation in Ethiopia. This long-term research partnership was coupled with practical soil conservation projects that supported the efforts of the Ethiopian authorities as well as those of local organisations in close cooperation. In 2001, when the University of Bern's Centre for Development and the Environment (CDE) initiated the NCCR North-South programme funded by the Swiss National Science Foundation (SNSF) and the Swiss Agency for Development and Cooperation (SDC), a further long-term research partnership with Ethiopian institutions was established. This provided the context for a series of in-depth Master's and PhD-level studies to analyse not just erosion processes but also the biophysical, socio-political and economic factors that cause them. Most important, the studies were designed to develop solutions.

The primary aim of soil protection is to reduce the dependency of the Ethiopian population on food aid and to ensure food security. Research has shown that sustainable land management in Ethiopia can be significantly improved by involving farming families not just in the work but also in planning appropriate measures. For example, until a few years ago, terracing was rarely used in agriculture, even though terraces are easily built by banking up earth walls over the years. Today, around 18 per cent of Ethiopia's agricultural land area is cultivated using this environmentally sustainable method. The objective is to increase this to about 50 per cent of the arable land, which amounts to around 70,000 square kilometres, or about 23 times the arable area in Switzerland. If this is achieved, it would allow long-term productive use of the soil and eventually an increase in grain yields.

### Not just good for Ethiopia

The fact that soil conservation not only improves soil fertility but also stores carbon in the ground by increasing humus content is of major interest in the ongoing debate on climate change. Thus, soil conservation by Ethiopian farmers would also be of interest to the world community. As

soon as this hypothesis is backed by sound research, soil conservation may find support under the global carbon trading component of the United Nations Framework Convention on Climate Change.

To help put soil conservation measures into practice in Ethiopia, the programmes, in addition to their research and capacity development, produced illustrated schoolbooks, training reports, and a practical handbook for soil and water conservation (among others). To date, some 15,000 copies of the handbook have been distributed to trained agricultural advisers in both the English and Amharic languages. A new edition of around 12,000 copies is currently in preparation.



Within just a few years, earthen walls have given rise to agricultural terraces, which reduce erosion. (Photo: S. Erni)

### Key findings

- Finding solutions to the problem of soil erosion in the Ethiopian Highlands requires research on the underlying biophysical processes and knowledge of the socio-political and economic causes that cause them.
- Heaping up earth walls created agricultural terraces within 10 to 15 years, effectively reducing erosion and preserving the amount of humus in the soil. This improves the food security of the local population and at the same time reduces the global carbon dioxide content of the atmosphere by storing carbon in the ground.
- The long-term presence of the researchers is essential for building mutual trust between them and the farmers. Only this way can the solutions created be tailored to individual needs.

# Qualified migrants: an opportunity for the South

Gabriela Tejada

**The job market in industrialised countries absorbs many qualified migrants from the South. A North-South study has concluded that this «brain drain» also has positive effects for the country of origin, and could even result in «brain gain».**

In recent years, there has been an increase in international migration by qualified personnel, and surveys indicate that this trend will continue. One of the causes is easy access to cross-border information and job markets. However, this development is equally due to the lack of qualified jobs in the home countries. The ongoing debate on migration and development underscores the risks this export of human capital poses to developing countries, but it also shows that there are clear opportunities. The Cooperation@EPFL unit of the Swiss Federal Institute of Technology (EPFL) has collaborated with other academic and institutional partners and international organisations to study the positive impacts of migration by qualified personnel. There are various mechanisms that play a part in ensuring that the country of origin benefits from this migration, including the transfer and dissemination of knowledge, the promotion of investments in research and development (R&D) back home, and the creation of diaspora networks.

## Two stages, two perspectives

During the first stage, the research examined the situation from the perspective of the destination country. This phase of the project was funded by

### Partner institutions

In Switzerland:

Cooperation@epfl, the Swiss Federal Institute of Technology (EPFL); the MIGRANT programme of the International Labour Organization; the Swiss Forum for Migration and Population Studies; the University of Geneva; the University of Lausanne; the NGO DePapaya.org.

In developing countries:

Institute of Development Studies, Calcutta, India; Instituto de Estudios Políticos y Relaciones Internacionales, National University, Colombia; Forced Migration Studies Programme (Center for African Migration and Society), University of Witwatersrand, South Africa.

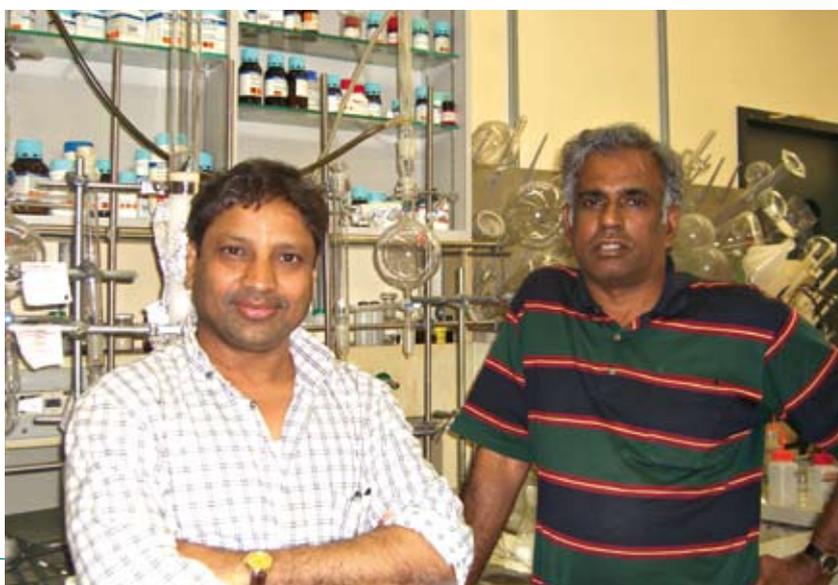
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the Geneva International Academic Network (GIAN). The investigators carried out some 70 in-depth interviews with qualified migrants from Colombia, India and South Africa who had chosen Switzerland as their destination country.

Empirical analysis of this material led to a better understanding of the migration paths and living conditions of these migrants. It also revealed the links they maintain with their country of origin. Finally, the study revealed the practices and public policy that support skilled migrants as partners in development.



Indian scientists  
at the EPFL.



Project partners with members of the scientific diaspora.

Three mechanisms were considered at the outset as advantageous to the country of origin: transfer of knowledge via the networks and associations of scientific diasporas; investment strategies in R&D; and North-South cooperation programmes. The research identified other transnational practices that benefit the home country, in particular social exchanges, outsourcing activities, and business or investment links.

The second stage of the research will focus on analysing the perspective of the countries of the South as part of a scientific partnership between three teams of researchers in India, Colombia and South Africa. Among other things, it will study return migration by skilled workers to developing countries. It will also examine the mechanisms of scientific collaboration practised in Switzerland to promote the circulation of knowledge.

The study has identified three factors that enable qualified migrants to have a positive impact in their country of origin: motivation, ability to mobilise and a supportive environment. These factors also stimulate positive scientific cooperation for both the country of origin and the destination country, as well as for the migrants themselves.

### Creating a diaspora network

Two workshops organised as part of the project contributed to the policy dialogue on migration and development, as well as on scientific cooperation. There were also a number of exchanges at international conferences with the same objective. In addition, a toolkit to evaluate good prac-

tices was created and plans were made to establish a Swiss network of scientific diasporas.

One major task during the second stage will be to develop recommendations and guidelines for countries in the North and the South as a basis for policies that promote the positive aspects of qualified migration from the South to the North. Clearly, this satisfies the needs of the job market in the destination countries. However, it is also necessary to identify good practices to ensure that such migration does not have negative effects on development efforts in the countries of origin. It is essential that this succeeds in order to turn the brain drain into a brain gain.

### Key findings

- Research into scientific diasporas must be encouraged and the results widely disseminated, with the aim of maximising their potential benefit.
- Countries of origin and destination countries must play a proactive role in establishing relationships with scientific diasporas and in encouraging them to become genuine partners in development.
- Countries of origin must possess adequate conditions and infrastructure to enable the activities of the scientific diasporas to crystallise into concrete projects that have an impact on socio-economic development.

# Clean solutions to dirty problems

Chris Zurbrugg, Antoine Morel and  
Thammarat Koottatep

**Growing cities and intense agriculture contaminate the surface waters of South-East Asia. Together with their partners from Thailand and Vietnam, water researchers from Switzerland have come up with a simple remedy: improved septic tanks and natural wastewater treatment systems.**

Worldwide, 2.6 billion people still lack access to adequate basic sanitation. In other words, in most cases faeces and wastewater are discharged untreated and consequently pollute ground and surface waters. In 2000, a fish kill in the Tha Chin River in Thailand affected nearly the entire water body. Investigations revealed that the high levels of nutrients and the associated lack of oxygen were especially worrying. This alarming finding helped to spur the Swiss Federal Institute of Aquatic Science and Technology (Eawag) and its partners to instigate several research projects. The goal was to develop technical and planning approaches for optimising water pollution control in developing countries.

In South-East Asia, less than 10 per cent of households are connected to a sewer system. On the other hand, nearly every urban household has access to a conventional septic tank. This acts as a sedimentation tank where the solids are separated from the liquids as sludge. Thus, the wastewater is marginally treated before it discharges into the nearest surface water. However, the sludge which

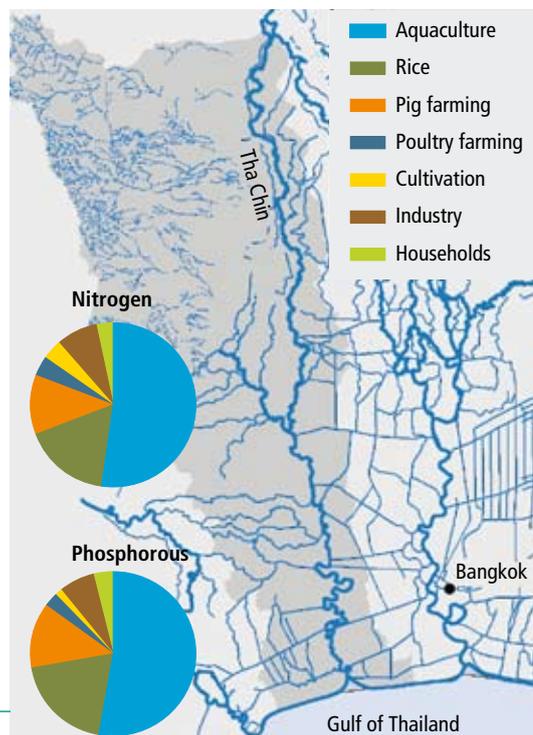
remains and accumulates in the septic tanks is collected and then generally deposited untreated on fields, or dumped in landfills or rivers. Such methods of sanitation and their negligent operation can lead to massive pollution of the environment.

## Cheap and effective

The project conducted by the Sandec department of Eawag together with its partners in Thailand (SERD/AID) and Vietnam (CEETIA) ran between 2002 and 2008. It was funded by the Swiss Agency for Development and Cooperation and the National Centre of Competence in Research (NCCR) North-South as well as by local funding sources. Its main objective was to investigate possible adaptations to the construction of septic tanks to improve their efficiency. Furthermore, the technology option of using constructed wetlands for wastewater and septage treatment had to be further developed and adapted to the local conditions. Finally, one aspect to further consider was how to develop a technique for analysing material flows. Here, the intention was to assess and quantify the major sources of pollution in a river basin. This part of the study was carried out in the Tha Chin River basin, as the Thai pollution control authorities and local residents were already actively developing an action plan to improve water quality in this area.

Laboratory and field experiments showed that treatment performance of conventional septic tanks could easily be improved with simple changes in construction. «Baffles» divide a septic tank into several compartments. By placing openings in the baffles, increased contact between accumulated sludge and wastewater can be achieved, which enhances biological treatment. The adaptations also achieve good results even under situations of varying hydraulic and pollution loads. Furthermore, the adaptations are cost-effective and easy to operate.

However, the developed technology is not particularly effective at removing nutrients and pathogenic organisms from the wastewater. This is where a constructed wetland can unfold its potential by acting as a planted filter for wastewater. In such a treatment plant – which most often consists of different layers of sand and gravel which are planted with reeds – the wastewater is treated by both filtration and by microbial processes in the filter bed and situated close to the roots of the reeds. The research project at the School of Environment, Resources and Development (SERD) at the Asian Institute of Technology (AIT) in Bangkok contributed significant-



The cultivation of rice and fish is the major source of nitrogen and phosphorous in the Tha Chin River basin. (Source: EAWAG)



Constructed wetlands on Phi Phi Island, Thailand, which are used for treating wastewater from hotels and restaurants. (Photo: A. Morel)

ly to the further development of this natural treatment process, which is also financially competitive.

Finally, the comprehensive material flow analysis conducted in the Tha Chin River in Thailand revealed that a majority of the nutrients in the river originate from intensive fish farming (aquaculture) and the cultivation of rice. Such findings can help to propose measures for reducing pollution directly at the source.

### Success in policy and practice

Based on the successful research results, the improved septic tank and the constructed wetlands

are being recommended as standard sanitation solutions by the environmental authorities in both Vietnam and Thailand. This was possible because policy-makers and authorities at the local and national level were involved in each phase of the research work. Moreover, the results of the research projects have now been integrated into continuing education courses and university curricula. Papers and reports containing the new findings were published in local languages as well as academic journals. More than 30 facilities are now in operation, and design and construction directly derive from the research project presented here.

In workshops, participants discussed scenarios and options on how to reduce the nutrient load discharged into the Tha Chin River. Suggested approaches include optimising rice fertilisation; optimal feeding of fish during breeding periods; and/or recycling of sediments from the aquaculture ponds. The technique of material flow analysis, as well as the approach of shared decision-making, has sparked great interest among the Thai environmental authorities. Both methods will now be used in other projects.

#### Partner institutions

The Center for Environmental Engineering of Towns and Industrial Areas (CEETA) at Hanoi University of Civil Engineering (HUCE) in Vietnam is particularly active in the area of decentralised wastewater treatment and management ([www.vietdesa.net](http://www.vietdesa.net), [www.vnu.edu.vn](http://www.vnu.edu.vn)).  
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Together with Eawag/Sandec, the School of Environment, Resources and Development (SERD) at the Asian Institute of Technology (AIT) in Bangkok, Thailand, has been researching technologies for treating wastewater and faecal sludge for more than a decade ([www.ait.ac.th](http://www.ait.ac.th)).  
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Eawag is the Swiss Federal Institute of Aquatic Science and Technology. The Sandec department has been developing appropriate and sustainable water and sanitation concepts and technologies adapted to conditions in developing countries for more than 20 years ([www.eawag.ch](http://www.eawag.ch); [www.sandec.ch](http://www.sandec.ch)).  
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#### Key findings

- North-South research can have a major impact as long as scientists and local decision-makers develop research questions and interpret the results together.
- Research partners in developing countries play a central role in the local implementation of knowledge.
- New technologies are only effective if they are accepted and their operation and maintenance is sustainable.

# Planning the future on top of the world

*Thomas Breu*

**The collapse of the Soviet Union brought the people of the Pamir Mountains in Tajikistan to the edge of a humanitarian catastrophe. A research project produced valuable knowledge about the condition of this region. That knowledge in turn made it possible to work out a development plan that showed a way to the future for the Pamir region.**

Until the breakdown of the former Soviet Union in 1991, the Pamir Mountains in Tajikistan had a clear geostrategic role. Located at the border of China, Afghanistan and Pakistan, the «roof of the world» served a political function as a buffer between the neighbouring states. Its boundaries had to be secured. Therefore, the Soviets carried out an aggressive settlement policy which led to a fourfold increase in the population between 1926 and 2000, to around 220,000 people.

This turn of events far exceeded the capacity of the mountains to cope. Here, small parcels of arable land are to be found only on the alluvial fans of rivers. Precipitation falls so sparsely on the extremely dry mountain region that irrigation is required for cultivation. And because the high-lying pasturelands extend over long distances, yaks and sheep must be transported there by truck. Small wonder that the Pamiris quickly came to depend on food and fuel supplies from Moscow.

After 1991, the flow of supplies stopped abruptly. When a civil war broke out a year later, the situation worsened. Only the help of development organisations managed to avert famine. Today, the Pamir mountain area has developed small-scale economic systems. The dominant agriculture is geared toward self-sufficiency. But the area still cannot survive without external help.

## Self-sufficiency by 2025

The fragile ecosystem is also suffering under the continuing economic crisis. Intensive hunting has diminished the wildlife stock of animals such as the Siberian ibex and Marco Polo sheep. Overuse has degraded cultivation and grazing lands. And because coal and diesel are no longer subsidised, the forests are under heavy pressure to provide wood for fuel.

Given these difficult circumstances, it is important to determine which are the most serious problems hindering development in the Pamir region, and where the potential is greatest for turning things around. These are the questions that researchers from the Centre for Development and the Environment (CDE) at the University of Bern tackled from 2001 to 2006, together with Tajik institutions. They carried out a comprehensive analysis of ecological, socio-economic and socio-cultural features of the area. For sustainable



Intensive collection of teresken bushes promotes erosion. (Photo: T. Höck)

development is possible only by simultaneously achieving progress in all three dimensions.

A workshop was the starting point for crafting a development strategy for the Tajik Pamir – officially known as Gorno Badakhshan. The four-day meeting took place in October 2002. It brought together over 80 participants from the region, the country and from international organisations. The key problems of this region were discussed. And the participants defined the sectors that were relevant for developing the region: from supply of energy to agriculture, and from tourism to protection of biodiversity.

The result was an overarching vision of development. The goal is to bring Gorno Badakhshan to the point where it can supply its own resources by 2025. In the negotiations it became clear that the area of greatest need for action is energy supply. For example, the use of local tree species for heating and cooking causes erosion and destroys the fragile soil.

### A model for Switzerland

The development strategy for Gorno Badakhshan is probably one of the first on former Soviet territory that does not have a central government to



Pamir region.

draw on. Additional workshops in the various districts of the Pamir Mountains served to adapt the strategy to local conditions. In this sense, the entire process will also encourage democracy in decision-making for the common good.

The methods successfully tested in Pamir for negotiating a development strategy are now available to other state authorities and development organisations in other regions. In modified form, this approach was used to formulate management plans for the Unesco Jungfrau-Aletsch-Bietschhorn World Heritage site. In Gorno Badakhshan, the findings from our project are building the foundation for introducing a long-term programme to improve the environment and the income situation. The project amounts to CHF 18 million and will be financed by the Global Environment Facility (GEF) – the «green arm» of the World Bank.

#### Partner institutions

The Centre for Development and the Environment (CDE) of the University of Bern is the leading Swiss research institute in the Research Partnerships for Sustainable Development. It also manages the National Centre of Competence in Research (NCCR) North-South ([www.north-south.unibe.ch](http://www.north-south.unibe.ch) and [www.cde.unibe.ch](http://www.cde.unibe.ch)).

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The regional office of the NCCR North-South in Bishkek (Kyrgyzstan) coordinates research partnerships as well as student training at several levels ([www.nccrcentralasia.org](http://www.nccrcentralasia.org)).

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In Tajikistan, the following agencies were involved in the project, among others: the administration of the Gorno Badakhshan Autonomous Oblast (GBAO), the Academy of Sciences, the Pamir Biological Institute, the State Directorate on Protected Areas, the Aga Khan Development Network and the Mountain Societies Development Support Programme.

#### Key findings

- Development efforts presuppose that sufficient knowledge of existing problems and possibilities is available.
- Sustainable development requires the cooperation of various scientific disciplines as well as knowledge of the local society.
- Development strategies are most successful when the goals and projects of the various actors from civil society, politics, development organisations and science are negotiated jointly.

# Outracing death

*François Chappuis*

**In Nepal, research projects led jointly by Swiss and Indian scientists are making it possible to deal more effectively with visceral leishmaniasis, a serious infection, and to dramatically decrease the number of deaths due to snakebites.**

Visceral leishmaniasis (VL) is a serious parasitic infection transmitted by a gnat. Diagnosis, treatment and prevention of this disease are the subject of a research project led by scientists at the Hôpitaux Universitaires de Genève and the B. P. Koirala Institute of Health Sciences, situated in Dharan in the southwest of Nepal. Here, the number of cases of VL is estimated at several thousands per year. Hospital statistics also mention frequent bites by snakes such as cobras and kraits, which are often fatal. These findings motivated a second project with the same two institutions, which are linked by an educational and research partnership that dates back to 1998.

## Battle on three fronts

If left untreated, VL is always deadly. Hence the importance of early diagnosis, which unfortunately is problematic in rural areas because the clinical picture of VL is nonspecific and invasive procedures (bone marrow or spleen puncture) are not feasible. Several validation studies have been conducted in collaboration with the World Health Organization and the Institut de Médecine Tropicale d'Anvers (ITMA). The second-generation «rK39 dipstick» test proved to be most effective in allowing a simple and reliable diagnosis at the patient's bedside: one drop of blood taken by pricking the tip of the finger is deposited on nitrocellulose paper, and a reagent is added. If the patient is infected, an easily visible line appears in a matter of minutes.



Educational health lecture on snakebites.

## Partner institutions

B. P. Koirala Institute of Health Sciences (BPKIHS), Dharan, Nepal: created in 1993 to respond to the health needs of the eastern region of Nepal; university hospital since 1998 and a school for nursing and paramedical professions ([www.bpkis.edu](http://www.bpkis.edu)).

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Hôpitaux Universitaires de Genève (HUG): cover the health needs of the population, postgraduate teaching and training, clinical research ([www.hug-ge.ch](http://www.hug-ge.ch)).

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At the therapeutic level, the project examined the effectiveness of sodium stibogluconate (SSG), a first-line treatment for VL in Nepal for several decades. This had never been done, even though most patients no longer responded to the medication in the neighbouring province of Bihar in India. Of 110 patients, the overall failure rate of SSG was 10 per cent, and the rate increased to 24 per cent in the districts bordering Bihar. Alternative treatments based on a revised version of the national protocol for Nepal are amphotericin B, which is routinely given in the district hospitals (14 days, intravenous injection) and miltefosine (28 days, given orally) in the peripheral health centres.

Finally, in terms of prevention, insecticide-impregnated bednets are currently being tested by the members of the partnership in the context of the Kalanet project coordinated by ITMA.

## Transporting victims by motorbike

A retrospective study conducted in five villages totalling 10,550 inhabitants made it possible to determine the actual impact of snakebites in the population. The results are impressive: each year, snakebites account for 1 death out of every 100 and are fatal in 10.5 per cent of cases. One important cause of this high mortality is that victims are not transported quickly enough to a treatment centre where an antidote is available. The intervention implemented in the context of the project combines community education and immediate transport of victims of snakebite by volunteers on motorbikes. A pilot study of four villages totalling 60,000 inhabitants showed that this strategy significantly lowered mortality (from 10.5 to 0.5 per cent) in snakebite victims.



The rK39 dipstick provides a simple and reliable means of diagnosing visceral leishmaniasis at the patient's bedside.

### Practical impact

The principal practical results of the VL project are official recognition of the rK39 dipstick for diagnosing the disease in Nepal, routine use of the test in the field and contributing to changing the first-line treatment for VL in Nepal. The findings from the Kalanet study will determine the role of bednets in the ongoing regional VL elimination programme. The second project led to extension of the snakebite mortality prevention programme coordinated by the Nepalese Red Cross (current coverage, 300,000 villagers). In addition, a clinical trial comparing two doses of antivenom serum is in preparation.

The projects have benefited the researchers from the two institutions both professionally and personally in terms of the friendships forged over time. By «spicing up» daily routines and achieving recognition at the national and international level, these projects have contributed to the partners' loyalty to their institutions, an important issue in Nepal, which suffers from a dramatic loss of qualified personnel to the private sector and abroad. Moreover, the success of these ten years of collaboration have encouraged other

partners from the institutions to initiate research projects in the area of chronic diseases such as prevention of chronic renal insufficiency and cirrhosis of the liver.

### Key findings

- Research projects led by BPKIHS and HUG help to cement partnerships at their institutions.
- The choice of research problems (neglected tropical diseases, chronic diseases) is primarily dictated by their importance to public health in the region.
- Diagnostic, therapeutic and preventive tools were evaluated from the perspective of performance, reliability and cost, with the goal of implementing them effectively in the health system.

# Getting more from tropical potatoes

Lucien Diby and Emmanuel Fossard

**The yam is an important food resource in West Africa. But cultivation of this plant gives only mediocre yield. Results obtained from a partnership between Swiss and African scientists enable breeders to generate more productive varieties.**

The yam is the «potato» of the tropics. Its nutritional profile makes it a staple for millions of inhabitants of the equatorial belt. This plant plays an important role in food security especially in West Africa, where it is also associated with traditions and customs, socio-cultural manifestations of what is sometimes called the «yam civilisation». However, it is less well known scientifically, which has negative implications for agriculture. A research partnership that began in 2001 between the Swiss Federal Institute of Technology in Zurich (ETH Zurich) and the Centre Suisse de Recherches Scientifiques (CSRS) in Côte d'Ivoire has begun to fill this gap.

## Research on factors affecting yield

Globalisation and modernism have failed to consign the yam to the vestiges of the past. On the contrary, in recent decades, demand for the vegetable has been very strong. Although cultivation has increased accordingly, yield has gone up very little. Moreover, population pressure means that the amount of available land is becoming more

## Partner institutions

The plant nutrition group at the Swiss Federal Institute of Technology in Zurich (ETH Zurich): research and teaching regarding nutrient cycling in agro ecosystems and the use of these nutrients by crops ([www.pe.ipw.agrl.ethz.ch](http://www.pe.ipw.agrl.ethz.ch)).

The Centre Suisse de Recherches Scientifiques (CSRS) trains young investigators in the context of research in North-South or South-South partnerships ([www.csr.ch](http://www.csr.ch)).

The University of Cocody, in Abidjan, Côte d'Ivoire: a higher-education institution.

The Ecole Supérieure d'Agronomie at Yamoussoukro, Côte d'Ivoire: training of agronomists and research of national interest.

International Institute of Tropical Agriculture (IITA), Nigeria: a member of the Consultative Group for International Agricultural Research, IITA leads the global mandate for research on the yam.

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limited, especially given that the yam cannot be grown anywhere: it requires very fertile soil. It is

Measuring gas exchange (water vapour) through the stomata (leaf pores) of *D. alata*. The plant's yield depends on the amount of this exchange.





Visiting yam trials at the CSRS experimental station at Bringakro.

traditionally sown after clearing an area left under fallow for a very long time. But even in this case, yields in rural areas remain five to six times lower than is possible in principle. The challenge is to develop systems of cultivation that permit a consistently high level of productivity. Unfortunately, we know very little about the factors and processes affecting yield.

The partnership between the ETH Zurich and the CSRS has begun to shed light on these questions for two species of yam through two PhD thesis projects financed by the Swiss Agency for Development and Cooperation under the Research Fellowship Partnership Programme of the ETH Zurich's North-South Centre. Several African institutions have been associated with the work reported in these theses.

### Different reactions to stress

This work has made it possible to characterise, for the first time, behavioural differences between these two species when they are subjected to environmental stress (poor-quality soil and drought). For example, *Dioscorea alata* is able to alter its growth to more efficiently use available resources (water, minerals and light). But the allocation of its biomass is not optimal: this species produces too few leaves. The other species, *Dioscorea cayenensis-rotundata*, has a harder time adjusting to variations in its environment: its growth phases are more or less fixed.

### Global reach

These results will enable breeders to develop better-adapted varieties, for example, a *D. alata* that produces fewer leaves and more tubers, or a *D.*

*cayenensis-rotundata* with a higher overall yield. The findings will also allow agronomists to establish integrated management of soils for crop systems based on yams. Over the long term, these measures will facilitate sedentary production and increase yields.

The ETH Zurich and CSRS partnership will also have a lasting effect through capacity building. Two Côte d'Ivoire PhDs have been completed under the project. And ten students – six Swiss and five from Côte d'Ivoire – have obtained diplomas while working on the thesis projects.

Finally, this partnership gave rise to the first international workshop on the ecophysiology of the yam. Held at the ETH Zurich, the workshop attracted participants from Africa, the Caribbean, Asia and Oceania. Japanese public television even came to report on the yam. As an output of the workshop, the participants agreed to publish a review on the crop physiology of yams, and to promote better coordination of the research activities of the participants in this field.

### Key findings

- The partnership made it possible to train young researchers from both Switzerland and Côte d'Ivoire who in turn will keep the partnership going over the long term.
- The project increased understanding of yam cultivation in the field; the results are not directly applicable by the farmers, but rather intended for breeders and agronomists in the hope of increasing yam crop yields.

# Hidden treasure in tree paradise

Maurice Brunner and Ernst Zürcher

**There are hundreds of wood species in Ghana with unknown technical properties. Swiss and African researchers have investigated some of them and discovered woods that are superbly suited for building bridges.**

Ghana is a paradise for trees. No fewer than 680 different species of wood grow in this West African land. Yet only around 50 of them are used in wood construction. The reason? The technical properties of most of the wood species are quite simply unknown.

Researchers from the Bern University of Applied Sciences – Architecture, Wood and Civil Engineering (BUAS-AWC) and the Kwame Nkrumah University of Science and Technology (KNUST) in Ghana's second largest city, Kumasi, were convinced that within this abundance of wood species there had to be some that would be especially suitable for outdoor construction. Discovering them was the goal of a research partnership. The project ran from 2005 to 2008 and was financed by the Swiss Agency for Development and Cooperation and the Swiss National Science Foundation.

The most important undertaking of the project was to investigate the durability and strength of selected lesser-known wood species, with the idea of finding applications and bringing them to woodworkers and to market. It was hoped that as

a by-product of the work, managing and sustainably exploiting the new species would help reduce the pressure on noble woods such as mahogany and iroko, which are targeted by timber companies in the forests.

## The «graveyard» experiment

In Ghana, even experts do not know precisely which woods are good for lumber and which are quickly eaten by insects or attacked by rot. For this reason, as a first step the African and Swiss researchers standardised sticks from ten selected wood species for damage resistance in a «graveyard» experiment. In this test, the wooden sample pickets were implanted half their length in an open field which had previously been cleared of all vegetation, including roots. Under these conditions, the sticks were not only vulnerable to naturally occurring termites and fungi but also exposed to the weather.

After three months, the researchers observed how much mass the samples had lost in the interim. From these data, they obtained important information on the durability of the different wood species. Four of the ten woods investigated exhibited very good durability, that is, tests showed that they had largely maintained their weight. The clear winners were *Petersianthus macropus*, *Sterculia rhinopetala*, *Amphimas pterocarpoides* and *Albizia ferruginea*.



The bridge over the Wiwi River on the campus of Kwame Nkrumah University of Science and Technology.

In a second step, the scientists tackled methods for improving the damage resistance of less robust wood species. Instead of treatment with synthetic chemicals that could be damaging to the environment, the researchers used impregnation with organic extracts. Here, too, there was a clear winner: bark extract of potrodom (*Erythrophleum suaveolens*) achieved the best protection for the otherwise not very hardy wood of *Antiaris toxicaria*.

Finally, the researchers resorted to full-fledged testing in the wood laboratory. In bending experiments, they placed beams of the various species on two metal supports. Then they applied a strong force in the middle and measured the displacement until the beam cracked. This test, too, yielded very promising results. Several Ghanaian tree species showed bending strengths higher than, for example, the European spruce. Their strength was similar to that of concrete, which is around 40 to 50 Newtons per square millimetre.

### Bridge over the Wiwi

Success in basic research is one thing. What is crucial, however, is that not only scientists but also students from Ghana and Switzerland were involved in investigating new species of wood and their use in construction. The students carried out valuable research and implementation as part of their Bachelor's or Master's thesis. In this way, they helped to ensure that the project was more than just a series of tests.

In Kumasi, two wooden bridges were built using the species studied – in particular Wawabima (*Sterculia rhinopetala*). Today, one of these bridges is used by students to cross the Wiwi River on the campus of KNUST. The second bridge, finished in August 2009, is in the artisans' quarter of the city, where already carpenters and joiners are experi-

menting with some of the new wood species in building furniture and roofs. In September 2008, two workshops were held in Ghana both to inform agencies and building professionals about the research and to show how it translates into practice. Even wood specialists from outside Ghana are beginning to show interest.



Bending test in the timber laboratory.

### Key findings

- The collaboration between researchers from Ghana and Switzerland produced new scientific results for timber construction that are relevant to the partners from both countries.
- Including students from both countries proved to be extremely valuable in the sense that it was possible to realise a concrete project and to use the results for their studies.
- Cooperation with partners from Ghana requires time and patience. Local traditions and hierarchies must be respected. Leaders tend to dislike delegating power because they fear it may be misinterpreted as a sign of weak leadership. For the Swiss partners, this required comprehensive but flexible planning and monitoring of the project.

#### Partner institutions

The BUAS-AWC, with branches in Burgdorf and Biel, is among the leading Swiss educational institutions in construction and engineering ([www.ahb.bfh.ch](http://www.ahb.bfh.ch)).

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KNUST in Kumasi is Ghana's primary teaching institute for science and technology – one of the best in Africa ([www.knust.edu.gh](http://www.knust.edu.gh)).

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# Bednets save thousands of lives

*Christian Lengeler, Salim Abdulla, Hassan Mshinda and Marcel Tanner*

**A partnership between Swiss and Tanzanian researchers has developed new interventions against malaria. Insecticide-treated bednets prevent more than 20,000 deaths per year. And a new antimalaria vaccine has attained a previously unprecedented level of protection.**

Malaria is one of the major global pandemics. In sub-Saharan Africa, it poses a problem of a magnitude equal to AIDS. Malaria is not only a public health challenge but also a huge problem for development: in endemic countries, economic losses due to the disease equal the total of their public assistance for development.

Given malaria's importance, research on the disease is a major component of a successful collaboration between the Ifakara Health Institute (IHI, formerly the Swiss Tropical Institute Field Laboratory), Tanzania, and the Swiss Tropical Institute (STI) in Basel. The collaboration dates back to 1957.

## From research to a national program

Insecticide-treated bednets (ITNs) currently represent the best strategy for prevention of malaria. From 1996 to 2000, a joint IHI-STI project showed that results obtained in the context of trials carried out between 1989 and 1996 under rigorous conditions could be reproduced in the field in realistic settings.

With the support of the Swiss Agency for Development and Cooperation, the Kilombero Net Project (KINET) has enabled the distribution of

## Partner institutions

The IHI is a Tanzanian nongovernmental organisation whose mission is to develop and support a decentralised programme of research and to generate new knowledge that is crucial for implementing public health programmes ([www.ihl.or.tz](http://www.ihl.or.tz)).  
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The Swiss Tropical Institute (STI) is a private institute affiliated with the University of Basel whose goal is to contribute to bettering the health of populations at the national and international level through training, research and providing services. STI is currently the reference centre in Switzerland for international health and enjoys an excellent reputation at the global level ([www.sti.ch](http://www.sti.ch)).

Contacts:

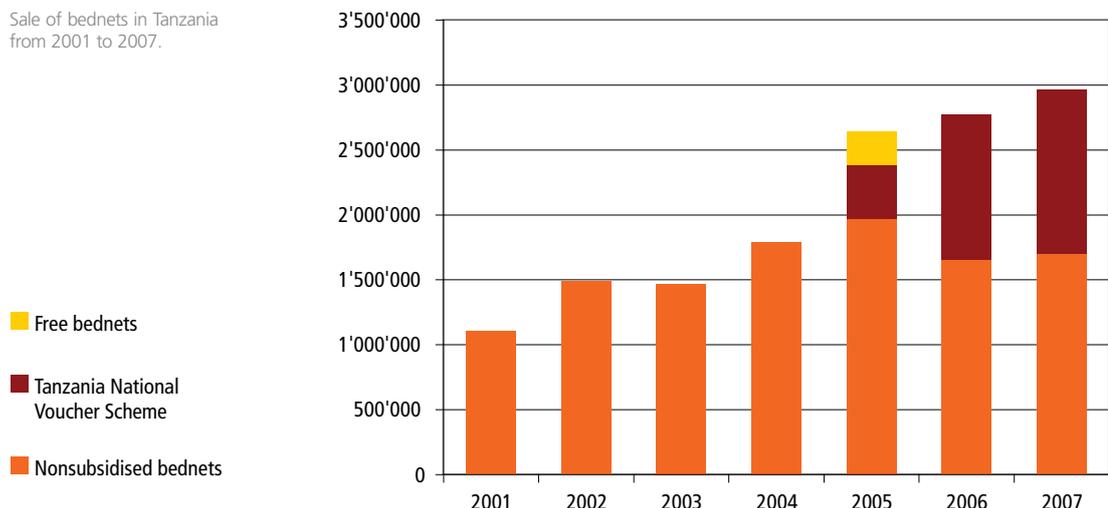
Marcel Tanner, [Marcel.Tanner@unibas.ch](mailto:Marcel.Tanner@unibas.ch) (vaccines)

Christian Lengeler, [Christian.Lengeler@unibas.ch](mailto:Christian.Lengeler@unibas.ch) (bednets)

over 65,000 ITNs. KINET showed that use of these nets reduced child mortality by 27 per cent and infant anaemia by 60 per cent. A demographic surveillance system established under this project made it possible to accurately measure mortality in children. This highly sophisticated system remains a fundamental tool for IHI community-based research in the field.

The experience gained by KINET was used to launch a national programme that led to the distribution of more than 10 million ITNs. Their use

Sale of bednets in Tanzania from 2001 to 2007.





A Tanzanian family benefits from the protection offered by a bednet treated with insecticide.  
(Photo: VOICES/P.Skov/Vertergaard-Frandsen)

has prevented 20,000 deaths a year among Tanzanian children. The findings from KINET have also sparked enormous interest around world and have formed the basis for financing national programmes in many endemic countries.

### A promising vaccine

Developing a vaccine against malaria proved very difficult. Many times, the hope generated by positive experiments in the laboratory could not be confirmed in the field. The new vaccine RTS,S/AS, developed by GlaxoSmithKline and a large international consortium, constitutes a very promising step that has been tested within the framework of the IHI-STI collaboration at Bagamoyo, in Tanzania.

RTS,S/AS is safe and does not interfere with the co-administration of other childhood vaccines. Protected infants have shown 65 per cent fewer episodes of malaria than infants in the control group. This represents the best result to date for an antimalaria vaccine, and it is a sufficient level of protection for widespread use.

The work in Bagamoyo contributed to the launching of a major multicentre study aiming to confirm the value of this prophylaxis on a large scale. In addition, an effective platform for carrying out clinical assays has been put in place.

### Key findings

- Successful cooperation is based on a long-term collaboration at many levels (development of human capacity, institutional support, scientific collaboration).
- Successful cooperation does not end with research but also extends to the implementation of results within the framework of a national control programme.
- Participating in a common research project has given young Tanzanian scientists very solid academic skills that have been crucial to the development of the IHI.

# Trust restores trees

*Urs Geiser and Babar Shahbaz*

**The forests in northwestern Pakistan are being threatened. They will survive only if the population and the local authorities can manage to work together constructively to solve problems. A research project shows how the difficult relationship between them can be improved.**

Pakistan's forests are under enormous pressure from use and increasingly are disappearing. For years, now, the international community has sought ways to halt this development. Consequently, it has supported the Forest Department of the North-West Frontier Province (where most forests are located) in searching solutions, for instance, by improving training in forestry. Great hopes were pinned on pilot projects whose goal was to set up Joint Forest Management Committees (JFMCs). These committees consist of representatives of forest authorities and members of the public (forest owners, non-owner users, non-governmental organisations etc.). Together they manage the forests and work for their protection. But success is elusive: very few of the JFMCs really function, and Pakistan's forests continue to be degraded.

The JFMC approach has proven itself many times over, for example, in India. The central question of our research project was to understand why it is so difficult to implement this type of sustainable forest management practice in Pakistan. To find out, the North-South network funded by the Swiss National Science Foundation supported a research partnership between the Development Study Group (DSGZ) of the Department of Geography of the University of Zurich, the Sustainable Development Policy Institute (SDPI) in Islamabad, and the Agricultural University of Faisalabad, Pakistan.

## Wary of the state

Our research became an exciting voyage deep into the social reality of north-western Pakistan. Layer



Pakistan's forests are under pressure not least from the illegal activities of wood smugglers.

## Partner institutions

The Development Study Group (DSGZ) comprises members of the Department of Geography of the University of Zurich, who deal with development issues. Research focuses on the social, institutional and political processes of change, as well as the question of how people secure their livelihood in adverse circumstances ([www.geo.uzh.ch/en/units/hgg](http://www.geo.uzh.ch/en/units/hgg)).

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The Sustainable Development Policy Institute (SDPI) in Islamabad, Pakistan, is a nongovernmental research institute concerned with questions of sustainable development. In addition to its own research, the SDPI gives high priority to the policy dialogue between civil society and state actors ([www.sdpi.org](http://www.sdpi.org)).

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by layer, we had to revise our assumptions about how the population was organised and the role it played in the use of the forests. The seemingly unquestioned legitimacy of the forest authorities hid tensions. Ultimately, our principal finding was that many Pakistanis perceived the state – in the context of forestry – as an alien presence not to be trusted.

The explanation for this mistrust is the post-colonial history of the country. The state of Pakistan was formed in 1947. Large portions of north-western Pakistan – where many forests are situated – only formally became part of the country in 1969. Up until then, the ownership and use of the forests was governed by common and rigid law based on heterogeneous tribal structures. When the region was brought into the Pakistan nation, the relationship changed overnight. Pakistan extended the forestry legislation to the area, declaring forests as the property of the state, with greatly restricted local use rights. Even today, many people in the region consider the state regulations on forest use to be an imposition and perceive themselves as «genuine» custodians of the forests.

This explains in large measure why the JFMCs are having so little success. The contested forest legislation provides the legal basis for the JFMCs. When the villagers join these committees, they must accept the situation. Consequently, in Pakistan, «joint forest management» does not necessarily mean that the locally important and deep-rooted traditional regulations of access to forests are respected. In fact, many people per-



Members of a village group in north-western Pakistan discuss forest issues.

ceive the JFMCs to be state-dominated organisations. Because the international development partnership remains focused on supporting state agencies – often with good reason – many locals also see the development organisations as «biased».

### Understanding and freedom

Our Pakistani partners are interested in applying findings from research to daily life. Because cooperation between state officials and the local population is often complicated by the lack of trust explained above, they proposed the concept of independent mediators. Through a pilot project, they made contact with selected villages and with the responsible authorities. After a few months of mediation, they had gained the confidence of both sides, and organised round tables. In this way, villagers were able to articulate their needs, and the officials of the state at the local level granted them greater freedom in using the forests. But this was only a first, small step on the long road to really working together. When the forest officials were transferred, the villagers had to fight for their interests all over again. They managed to do that by joining forces with an action group. Now they are planning a workshop in the provincial capital with the aim of involving higher-up officials in the process as well. What will happen next is open.

### Key findings

- Regulations on the use of forests often reflect deeper-lying social tensions. Addressing these issues requires research that takes a critical look at the balance of power.
- State agencies play an important role in the development process, but they are frequently not neutral. Consequently, many people question the legitimacy of authorities. Donor organisations that work together with state agencies must be aware of this political reality.
- Too often, development organisations believe that their approach is neutral and unpolitical. However, our research shows that development is part of a profoundly political process that North-supported projects can unwittingly be drawn into.
- Within the state agencies, the conception of «change» (as for example supported by development donors) often does not trickle down to the lower staff who are the actual implementers on the ground.



## Scientific partnerships: investing in our future

We do not live in the first, second or third world, but in one world. Nations are linked not only by telecommunications and the swooshing of money around the globe, but also by environmental and social problems.

In Brazil, forests are felled to grow soybeans for our farmers to feed to their cows. This provides employment and income for indigenous people, but it promotes soil erosion and is hence damaging to the environment. Over the long term, we in Europe will also feel the negative effects of this strategy. If the rainforests disappear, the content of carbon dioxide in the atmosphere will increase, and our planet's climate will grow even warmer. Problems of developing countries are thus our problems, too, and vice versa. We must seek solutions together.

Reconstruction following natural disasters in India and soil erosion in Ethiopia: such examples, presented in this publication, clearly show that it is impossible to devise solutions that apply everywhere – social, cultural, economic and political conditions are too different. In committing itself to development and global stability, a country cannot hope to ask critical questions and find the right answers alone.

If our research is to help in clarifying current, ongoing problems, our scientists must be among the best in the world. And they need partners in regions where these problems are rooted. Scientific partnerships must have global reach, and they must include countries with poor resources. The cooperative partnerships exemplified here show strikingly what can be achieved by learning and implementing together. In all countries, rich and poor, knowledge and its targeted application are the key to development and growth.

Switzerland has a fundamental interest in understanding how, for example, epidemics such as avian or swine flu spread. That takes collaboration with scientists in locations where the infections are likely to arise. If scientific cooperation can thwart epidemics at the local level, Switzerland also benefits. These questions that we all share and their study are becoming increasingly urgent with globalisation.

Scientific partnerships with developing and emerging countries contribute to the reputation of Switzerland in the world. And they do not only benefit the scientific establishment, but also the Swiss economy. These collaborations and their results can lead to economic cooperation and open new markets.

In its Dispatch on the Promotion of Education, Research and Innovation for 2008 to 2011, the Swiss Federal Council has, for the first time, made funds available for scientific partnerships outside the OECD. This dispatch refers specifically to China, India, Russia and South Africa, but also Côte d'Ivoire and Tanzania, where centres of research were established 50 years ago with Swiss support. The encouragement of these partnerships is justified primarily by the importance of emerging market access to knowledge in international competition.

But nowhere does the dispatch mention that such cooperation would also address global problems. Owing to their sprawling populations and their economic situation, many countries in the South and the East are struggling with issues that especially touch the environment, health, migration and food security. At the same time, the diversity of their experience is a huge potential resource that could be tapped to find solutions to such problems around the world.

Our 12 examples of successful research partnerships with countries of the South show how high-quality local and global scientific knowledge can be created and translated into development action. This in turn reinforces Switzerland as a scientific centre and increases its disciplinary and technical know-how.

In summary, we feel that future research budgets must also explicitly take into account the global and transdisciplinary dimension of research and give substantially more weight to the need for scientific cooperation. Through scientific partnerships, Switzerland can address the grand challenges faced by developing and industrialised countries, and put scientific results to work for society and the economy, creating a substantial advantage for all partners involved.

*Marcel Tanner and Bruno Stöckli,  
Co-Chairs of the KFPE*

## Funding programmes

The following are the main programmes in Switzerland supporting research in partnership with developing and emerging countries:

### The NCCR North-South

This programme is one of the 20 National Centres of Competence in Research (NCCRs) established by the Swiss National Science Foundation (SNSF). It is jointly funded by the SNSF, the Swiss Agency for Development and Cooperation (SDC) and six Swiss universities. The transdisciplinary research activities of the roughly 400 scientists who participate in this programme are carried out in partnership with Swiss research organisations and more than 150 institutions in Africa, Asia, Latin America and Europe. Among the long-term goals of the NCCR North-South are strengthening research infrastructure, both in Switzerland and the partner regions, supporting training in the countries of the South and implementing the results of research.

[www.north-south.unibe.ch](http://www.north-south.unibe.ch)

### Research Partnerships with Developing Countries

This programme is supported jointly by the SNSF and the SDC and funds research partnership projects between Swiss universities and research institutions in the South. This programme encourages the development of North-South scientific interactions. In this way, it contributes to capacity building and scientific performance in the South and helps these countries to integrate into the international scientific community. The scientific partnerships are part of the general programme of support for research by the SNSF and as such are open to all disciplines. In judging the proposals, special emphasis is given to scientific quality and prospects for development that is relevant to the local setting.

[www.snf.ch/E/international/abroad/developingcountries](http://www.snf.ch/E/international/abroad/developingcountries)

### Funds for Scientific Cooperation EPFL-SDC

In this programme, research projects conducted in partnership between a research unit at the Swiss Federal Institute of Technology Lausanne (EPFL) and a scientific institution of the South are financed by the SDC and the EPFL. This programme is open to all disciplines at the EPFL. Its primary objective is to promote interdisciplinary scientific cooperation that offers solutions to important problems in developing and emerging countries and contributes to research capacity building in the partner countries.

[cooperation.epfl.ch](http://cooperation.epfl.ch)

### Research Fellow Partnership Programme (RFPP)

This SDC programme supports PhDs and postdoctoral fellows in agriculture and forestry or areas relating to the use of natural resources. It is suited to scientific partnerships between international centres of agricultural research of the CGIAR (Consultative Group on International Agricultural Research and associated centres) with the aim of promoting scientific competence and generating knowledge that is critical for development.

[www.rfpp.ethz.ch](http://www.rfpp.ethz.ch)

### University Exchange Programme

The goal of this SDC programme is to support exchanges between Swiss scientific institutions and developing countries to support mutual, shared learning and the development of joint projects.

[www.kfpe.ch/projects/echangesuniv](http://www.kfpe.ch/projects/echangesuniv)

### Young Scientists

This SDC programme finances work in the field for PhD candidates or postdoctoral students. The grant recipients are enrolled in a Swiss university; the project must include a local partner institution.

[www.kfpe.ch/projects/jeuneschercheurs](http://www.kfpe.ch/projects/jeuneschercheurs)

**Swiss Universities of Applied Science**

This SDC programme supports initiatives by Swiss Universities of Applied Science whose objective is to promote applied research and development in partnership with developing or transition countries.

*[www.kfh.ch/dc](http://www.kfh.ch/dc)*

**SCOPES, Scientific Cooperation between Eastern Europe and Switzerland**

This programme is cofinanced by the SNSF and the SDC. It encourages scientific cooperation between research groups in Switzerland and Eastern Europe, the western Balkans and Central Asia, and supports institutional partnerships. The goal of SCOPES is the production and exchange of knowledge and the training of qualified scientists.

*<http://www.snf.ch/E/international/abroad/scopes/>*

# Projects available in the electronic appendix

([http://www.kfpe.ch/projects/success\\_stories/electronic\\_appendix/](http://www.kfpe.ch/projects/success_stories/electronic_appendix/))

## Afrika

Paysages forestiers du Menabe, Madagascar

Lanto Herilala Andriambelo, Clémence Dirac Ramohavelo, Jean-Pierre Sorg, ETH Zurich

Matériaux locaux de construction au Burkina Faso

Christian Deschenaux, University of Applied Sciences Fribourg

Advocating Ethnic Minorities with Maps on Ancestral Territories (Kenya)

Albrecht Ehrensperger, NCCR North-South – University of Bern

A Local Urban Observatory for Nakuru (Kenya)

Albrecht Ehrensperger, NCCR North-South – University of Bern

Malaria in Abidjan

Andrea Grolimund, Stefanie Granado, Barbara Matthys, NCCR North-South – Swiss Tropical Institute, Basel

Understanding Water Conflicts and Cooperation – Action Research in the Nile Basin

Simon J.A. Mason, NCCR North-South – University of Zurich

Patrimoine culturel à Lalibela (Ethiopie)

Rafael Mattos-Wasem, University of Applied Sciences Western Switzerland

## Asien

Hepatitis in Saigon – Vietnam

José M Bengoa, University Hospital of Geneva

Ochers in Rajasthan

Giovanni Cavallo, SUPSI University of Applied Sciences and Arts of Southern Switzerland

Socioeconomic Atlases for Vietnam and Laos

Andreas Heinimann, Michael Epprecht, Peter Messerli, NCCR North-South – University of Bern

Sensor Networks for Agriculture in South India

Jacques Panchar, EPF Lausanne

Umsetzungsgrenzen von Waldforschungsergebnissen in Kirgistan

Maik Rehnus, ETH Zurich

Création de valeur dans les filières agricoles en Mongolie

Sophie Réviron, ETH Zurich

Wasser pumpen mit der Kraft der Sonne: Micro Solar Water Pump

Cédric Simonin, Stefan Schori, Andrea Vezzini, Bern University of Applied Sciences

Entscheidungen verstehen: Warum wenden Kleinbauern in Sri Lanka nachhaltige Produktionsverfahren an?

Martijn Sonneveld, ETH Zurich

Kompetenzzentrum für Kleinwasserkraft in Indonesien

Charlotte Spörndli, Swiss Interdepartmental Platform for Renewable Energy Promotion in International Co-operation

Migration als Beitrag zur Entwicklung des Südens

Susanne Thieme, NCCR North-South – University of Zurich

## Lateinamerika

Verbesserte Milcherzeugung in den Peruanischen Hochanden

Katrin Bartl, ETH Zurich

Etude de la qualité de l'air à Bogota

Alain Clappier, EPF Lausanne

Paper-Tiger Eaten up by Sustainable Development

Transformations of the National Park Tunari through transdisciplinary research

Stephan Rist, NCCR North-South – University of Bern

Windkarte für Nicaragua

Charlotte Spörndli, Swiss Interdepartmental Platform for Renewable Energy Promotion in International Co-operation

## Osteuropa

Indications géographiques en Serbie

Paus Marguerite, ETH Zurich

## Netzwerke

Strategien nachhaltiger Landnutzung

World Overview of Conservation Approaches and Technologies – WOCAT

Gudrun Schwilch, University of Bern

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