Rewards for, Use of, and Shared Investment in,
Pro-poor Environmental Services project, phase 2

Research sites in Asia 2008–2012

RUPES

REWARDS FOR, USE OF AND SHARED INVESTMENT IN PRO-POOR ENVIRONMENTAL SERVICES

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A project by the World Agroforestry Centre and the International Fund for Agricultural Development

Research sites in Asia 2008–2012

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RUPES project

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Cover photos (from top left): Grassland area with grazing activity on the Tibetan Plateau (ICRAF/ Xu Jianchu); Rubber tapping in Bungo (ICRAF/Asep Ayat); Community focus group discussion a River Care Program in Sumberjaya (ICRAF/Rachman Pasha).

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Content

Foreword

I am greatly honoured to be invited to introduce this important book.

The 'Rewards for, use of, and shared investment in pro-poor environmental services' (RUPES) project has contributed significant research results throughout its nearly ten years of operation in Asia. This book details some of that work at the sites where it took place and as such serves as a public record that can be drawn on to better understand the range of challenges and solutions involved with environmental services' schemes.

The World Agroforestry Centre's Southeast Asia Program was the host of the project and we were able to support, and share, its struggles and achievements. By its nature, any research project has challenges to face, questions to ask, methods to develop and results to analyze. None of this is necessarily easy to realize; it takes a lot of thought, discussion and negotiation, particularly for a project such as RUPES, which operated in six countries in often-difficult terrain and amidst complex social systems, even occasionally on the fringe of conflicts.

The World Agroforestry Centre had scientists and support staff in each of the areas that RUPES worked, providing design, facilitation and technical skills that allowed the project to quickly identify sites and issues in each country and then operate as smoothly as possible, thanks to the well-established relationships that the Centre has with governments, non-governmental organizations and local communities. Such relationships are built on mutual

respect, partly because of the Centre's commitment to evidence-based negotiating systems: using scientific methods we provide information to all people involved with a particular problem in a landscape to help them work out the social, environmental and economic costs and benefits of various courses of action. This approach was particularly apt for the complex situations that RUPES worked in.

Without the strong leadership of Dr Beria Leimona, the project coordinator, and Dr Meine van Noordwijk, chief science adviser, and, earlier, that of Ms Fiona Chandler and Dr Marian delos Angeles, along with the equally strong and committed work of the other scientists and support staff who contributed to RUPES, the project would not have achieved as much as it did in so many places.

We greatly appreciate our partnership with the International Fund for Agricultural Development (IFAD) in this work. IFAD is to be commended for their remarkable foresight in recognizing well in advance of many others in the world the importance of environmental services and their relationship to improving agriculture, agroforestry, forestry, poor smallholders' livelihoods and overall wellbeing.

I am now looking forward to seeing the wider impact of RUPES' research on policy and programs over the next few years as more and more countries adopt RUPES' recommendations. In so doing, we hope that they will transform the rural landscape for the better.

Dr Ujjwal Pradhan
Regional Coordinator
World Agroforestry Centre Southeast Asia Regional Program

RUPES at a glance

RUPES has become a well-known name, a trusted source of information about the complexity of rewards for environmental services (RES) schemes. RUPES started in 2002 under the coordination of the World Agroforestry Centre Southeast Asia Program through a funding partnership with the International Fund for Agricultural Development.

During its first phase (2002–2007), RUPES phase 1 (Rewarding upland poor for the environmental services they provide) worked in six action research sites in three countries: Bungo, Singkarak and Sumberjaya in Indonesia; Bakun and Kalahan in the Philippines; Kulekhani in Nepal. Designed to follow-up to and expand on the lessons learnt in phase 1, RUPES phase 2 (Rewards for, use of, and shared investment in pro-poor environmental services) (2008–2012) expanded its work to 10 more action research sites in six countries: Songhuaba, Tibetan Plateau and Xishuangbanna in China; Lake Loktak in India; Cidanau, Citarum and Kuningan in Indonesia; Shivapuri in Nepal; Lantapan in the Philippines; and Bac Kan in Viet Nam. In addition, RUPES also continued collaboration with other organizations and projects at six learning sites across Asia.

RUPES has encouraged adoption of improved forest, land and watershed management practices through environmental services compensation and rewards' schemes by promoting a set of principles: realistic, conditional, voluntary and pro-poor[1]. RUPES supported rewards' mechanisms that provided cash payments to farmers who conducted reforestation and conservation activities, such as the Sloping Farmland Conversion Program and Grassland Conservation Rewards Program in China, a voluntary carbon scheme in Singkarak, and a reforestation scheme on farmers' private land in Cidanau.

Specifically to reduce soil sedimentation flows to a river, RUPES encouraged farmers in Sumberjaya to conserve soil on their coffee farms through a River Care program that involved a hydropower company as the beneficiary of the environmental services, and facilitated farmers in two villages in Citarum to receive cash payment from a drinking water company through converting their monoculture agricultural system to a coffee agroforestry system.

In Bakun and Bungo, RUPES helped local stakeholders reduce pressure for converting land to more commercial uses (vegetables in Bakun and oil palm plantations in Bungo), averting deterioration of the Bakun watershed and loss of biodiversity in Bungo. In Kulekhani, the district development authority of Makwanpur paid upland communities as part of hydropower royalties obtained from the central government. The upland communities

[1] Van Noordwijk M, Leimona B. 2010. *Principles for fairness and efficiency in enhancing environmental services in Asia: payments, compensation, or co-investment?* Ecology and Society 15(4): 17. Available from http://www.ecologyandsociety.org/vol15/iss4/art17.

were empowered through development forums to manage the royalties as well as the watershed.

At Lake Loktak, RUPES focused on an incentive system to promote sustainable water management for ecological restoration and sustaining livelihoods. Specifically, RUPES supported development of a water allocation policy for Lake Loktak, balancing human needs with ecological requirements. In Viet Nam, RUPES developed an excellent working relationship with the Pro-poor Partnership for Agroforestry Development (3PAD) project—funded by IFAD—through facilitating the development of a community contract between Ba Be National Park as the environmental services' beneficiary and forest owners and the Leo Keo community as providers.

Many lessons and best practices in environmental services rewards' schemes, which have been produced by RUPES and partners across Asia since 2002, are role models of improved forest, land and watershed management that put realistic, conditional, voluntary and pro-poor principles into play. To share these lessons and best practices from the 16 RUPES sites in Asia, in the last year of the project the World Agroforestry Centre has published this, the second RUPES sites book.

This book provides an introduction to the general issues and activities, the key findings and policies influenced by RUPES at national levels, as well as to specific issues at each site. The book provides site information at a glance, the environmental issues faced, types of environmental services and the people involved, the rewards scheme and the follow-up activities or exit strategy at each site.

RUPES Action Research and Learning Sites 2008 - 2012

China

Since 2002, China has implemented some of the largest schemes in the world that provide rewards for environmental services.

For example, the Sloping Farmland Conversion Program provided grain and cash payments to farmers and financial support to local forestry agencies to convert arable land on sloping land into forests. Following a ban on commercial logging in the upper reaches of the Yangtze River in 1998, the Natural Forest Protection Program has been financing the transition of state-owned forestry enterprises to forest conservation and supporting forest conservation activities in an area equivalent to around half of China's total natural forest area. Other market-based programs for watershed services have also been implemented locally and regionally.

The early work of RUPES in China focused on building the capacity of researchers and local forest departments in documenting and understanding the impact of forest-sector programs, identifying issues, developing innovative ways to address the issues, and supporting dialogue with policy makers at different levels. This included convening workshops, training in research methods, supporting field assessments and experiments and publishing information. More recent work has expanded from this early focus on forest resources to include assessment of the potential for rewards' schemes in watersheds and rangelands.

Schemes that involved recurring payments for improving land management practices in China:

- Sloping Farmland Conversion Program
  - Annual payments for afforesting or planting grass on degraded lands. Mostly central government funding with some minor funding from local governments
- Grassland Retirement Program (2005)
  - Grassland covered about 40% of China's land area

  - Overgrazing was the main issue
  - Annual payments for exclosure, seasonal or rotational grazing. Mostly central government funding with some minor funding from local governments
- Grassland Conservation Rewards Program
  - Annual payment per hectare for not exceeding stocking capacity of grasslands

Key findings

A review of payments for environmental services' schemes distinguished between four types of payments:

- Type 1: Provision of technical support for adoption of improved management practices
- Type 2: investments to support initial costs of improving grassland management but without enforcing links between payments and adoption of improved practices
- Type 3: Payments for land users that are conditional on adopting improved management practices but without tying payments to environmental outcomes
- Type 4: Payments to land users that are conditional on environmental services delivered

The Chinese Government implements a range of scheme types, such as government investment and extension support, but without strong monitoring of adoption (types 1 and 2) through schemes that make incentive payments for adoption of improved management practices (type 3). Payments conditional on delivery of measured environmental services are mostly limited to market-based schemes, such as voluntary carbon markets.

Some large-scale schemes, such as the Grassland Retirement Program, initiated in the early 2000s, sought to increase environmental services by targeting degraded grassland areas, but monitoring of activities beyond the initial investment phase has been limited. In 2009, the Tibet Autonomous Region began to pilot a scheme to reward herders for improved grazing practices on both degraded and non-degraded grassland. In 2011, this was expanded throughout China's grassland areas. The national Grassland Ecological Conservation Rewards Scheme makes payments on a per unit of land area basis for herders that maintain sustainable stocking levels on their land. New mechanisms for monitoring compliance are being developed.

Market-based investments, such as carbon sequestration projects, depend on monitoring of activities and methodologies that estimate the environmental services delivered. Monitoring mechanisms being developed in a pilot grassland carbon project may have lessons for government schemes.

Policy influenced

- Rewards for ecosystem services' schemes for grassland, State Council, 2008–2010
- Ecological land-use plan, Xishuangbanna Prefecture, 2010

Songhuaba

Province	Yunnan
District	Kunming
Area of watershed	630 000 hectare
Number of villages	325
Population	84 000 (2011)

The site

The Songhuaba watershed is located 16 km north of Kunming, the capital city of Yunnan province, China. The 629.80 km^2 watershed provides half the drinking water for the 3 million inhabitants of Kunming. Driven by growing demand for agricultural produce in the city, agriculture has intensified over the last few decades and water quality has dramatically deteriorated. The decline in water quality was noted since 2000 in Songhuaba Reservoir, when the overall assessment of water quality following the Chinese national standards was above level 2 but water quality declined to level 3. By 2005, the water quality was rated level 4, which is below the standard indicating minimum safe water quality (level 3). The quick decline in water quality threatened health and safety and affected the sustainable development of Kunming City.

The issues

Local governments relied on land-use planning regulations to address the threat to water quality. However, since most of the watershed was agricultural

land, non-point pollution associated with farming practices was ubiquitous. This could not be addressed through the regulations unless restrictions were put on farming, which would directly undermine local livelihoods.

At the same time, local governments had undertaken some 'top–down' environmental services' schemes. Although the schemes were intended to protect the environment, there were some problems: only a single source of funds with low compensation to farmers; a lack of evaluation and market valuation of ecological services; and a more general lack of market mechanisms.

RUPES explored the potential of using rewards for environmental services' schemes as a way to meet the demand for high quality water while also providing positive incentives for improved land management practices in the watershed. Negotiations between the supply and demand sides needed to be evidence-based, with negotiations conducted in an equitable manner. To achieve this, RUPES supported the collection, analysis and communication of evidence on the impact of land management practices on water quality and quantity in the watershed. To prepare for facilitating negotiations, the team supported studies of farmers' willingness to accept different forms and levels of rewards. RUPES analyzed the application of chemical fertilizers to different crops, the varying regional characteristics and evaluated the efficiency of schemes using the SWAT (Soil and Water Assessment Tools) model. Based on the findings, the team produced recommendations for solutions.

Environmental services and the people involved

Environmental services	Increased water quality for domestic and agricultural use
People who provide the services	40 farmers' groups with 256 members
People who benefit from the services	Urban residents
People who act as intermediaries between the providers and the beneficiaries	Water supply company

Environmental services identified by RUPES in Songhuaba watershed were water quality, water conservation and flood control. These were managed by different providers for different beneficiaries both locally and downstream in Kunming.

RUPES found that most pollutants of the watershed were chemical fertilizers that farmers used for vegetables, maize, tobacco and 'yacon'. The team had two practical suggestions for the local and Kunming governments: first, ban the planting of maize. Nitrogen fertilizer use on vegetables and maize accounts for 67% of nitrogenous pollutants in the watershed, however, the income from maize is the lowest among the products in the watershed: CNY 6270 (±USD 1009) per hectare. In this context, maize could be the 'low-hanging fruit' for eco-compensation implementation, that is, eliminating maize production could reduce by 30.4% the amount of nitrogenous pollutants; the economic loss of eradication of maize could be

covered through an environmental rewards' scheme. The second suggestion was that vegetables and maize could be replaced by other cash crops that required less fertilizer input and had higher market value. Investment in water purification technology to eliminate pollutants was CNY 23 million (±USD 3 701 000). According to the team's calculations, if maize and vegetables were replaced by other crops (tobacco was used for this case study), it would cost CNY 23.7 million (±USD 3 800 000), that is, CNY 700 000 (±USD 112 650) less, to compensate local farmers for restricting input of nitrogenous fertilizer and for the cost of labour.

The rewards

The research platform in the Songhuaba watershed allowed multiple stakeholders—from both up- and downstream—to meet to solve problems. The platform included stakeholders' workshops, at which the scientific evidence was discussed, and the initiation of a pilot rewards for environmental services' scheme to test improved land management practices. The result was a set of recommendations on preferred reward mechanisms for Kunming City and Yunnan Provincial government.

A case study was carried out to investigate rewards' mechanisms in Songhuaba watershed. The team assessed different methods of calculating payments, payment standards, ecosystem service functions, and efficiency of different rewards' scheme practices in the watershed.

The results showed that payment standards calculated using ecosystem services' value of CNY 26 900 (±USD 4330) per hectare can be used as the upper boundary in any scheme. Nevertheless, the standards calculated merely by opportunity cost were highly variable under the influence of market demands and thus too risky to be used directly as a reference standard. On the other hand, data obtained through questionnaires of farmers' willingness to accept rewards (CNY 12 800 (±USD 2060) per hectare) could serve as a reliable reference for determination of standards. A combination of these two methods could be useful for making better decisions about standards.

Figure 1. Typical landscape in Songhuaba watershed

Different practices had different efficiency. Among the proposed practices, adjustment of industry structure had the highest efficiency, followed by conversion of sloping croplands to forests, conversion of (flat) croplands to forests, and soil and water protection.

The results suggested that more attention should be paid to the selection of appropriate practices and assessment of their efficiency for a better implementation of rewards for environmental services' schemes.

Follow-up

Changes in the water quantity and quality of the watershed through a rewards' mechanism: according to the team's calculations, suitable compensation should go directly to local farmers who sacrifice their own economic gain by providing ecosystem services. To achieve this, beneficiaries and providers need to be more closely linked and the role of government should be clarified and enhanced.

The rewards' mechanisms need to be refined, especially, the amount of compensation for market-based ecosystem services. The team has identified potential providers and beneficiaries of services in the watershed and further work is needed to link them together.

Changes in local farmers' incomes and livelihoods should be mapped through a further survey, along with the 'willingness to accept' of farmers and the sustainability of funding.

The partners

- World Agroforestry Centre China and East Asia Node
- Center for Mountain Ecosystem Studies, Kunming Institute of Botany, Chinese Academy of Science

  The World Agroforestry Centre's China office has developed strong partnerships with local research institutes, NGOs, and government agencies. Foremost among these is a partnership with the Chinese Academy of Sciences to establish a Center for Mountain Ecosystem Studies, which provides a platform for national and international research, development, and donor organizations to bring resources to bear on upland issues in China.

- Yunnan University

  Yunnan University is one of the largest and most prestigious universities in Yunnan province, China. Its main campuses are located in the provincial capital city of Kunming. It is the only National Key University in the province, having trained over 17 000 specialist professionals in various fields.

Contact

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Tibetan Plateau

Province	Tibet Autonomous Region and Qinghai province
Area of watershed	58 146 000 hectare
Population	15.41 million (2001)

The site

The Tibetan Plateau is the world's largest and topographically most complex high elevation plateau, with an average elevation over 4000 masl, and average annual temperatures of less than 2 ^{0}C. The Plateau covers the provinces of Tibet Autonomous Region and Qinghai, as well as parts of Gansu, northwestern Sichuan and northwestern Yunnan.

The unique geographical conditions of the Plateau make it home to a rich and rare biodiversity of global significance. The Plateau's grasslands are essential to the survival of a large number of rare and endangered wildlife. Grassland vegetation is also essential to the maintenance of the region's critical hydrological services. Grasslands with higher vegetation cover regulate the storage and run-off of water, abating soil erosion and flash floods. Soils of grasslands on the Plateau contain about 23% of China's total soil carbon. Grassland-dependent livestock rising is the primary source of cash and non-cash income for the majority of the Plateau's 5 million inhabitants.

The issues

The Plateau's grasslands play important roles in regulating environmental processes through the effects of vegetation cover on surface energy reflection, wind drag, evaporation and soil moisture, and provide significant carbon storage, water regulation and soil conservation and biodiversity services.

Degradation of the Plateau's grasslands has in recent years been a major concern for national policy makers. China has initiated several mega-projects aiming to conserve the Plateau's ecology. A grassland payments for ecosystem services program is under design, with the first pilots initiated in 2009 in the Tibet Autonomous Region.

While there is a growing body of evidence on the impacts of grazing on various ecosystem services, other aspects related to the development of environmental services' schemes are much less well understood. There has been some experience with schemes in China's grasslands but lessons have not been systematically collated nor analyzed. Economic analysis of grazing systems in the region is also very sparse, which presents difficulties for estimating the impacts of different rewards' options on household welfare. Insufficient evidence when designing an environmental services rewards' scheme would hinder its effectiveness in improving land management and delivering enhanced services.

Environmental services and the people involved

Environmental services	Multiple ecosystem services, for example, water, biodiversity, carbon sequestration, sandstorm abatement, cultural and amenity values
People who provide the environmental services	Grassland users
People who benefit from the environmental services	Grassland users, downstream populations
People who act as intermediaries between the providers and the beneficiaries	National and local governments

Environmental services provided by grasslands can be summarized as aesthetic beauty, carbon sequestration, biodiversity, clean water and food production. As a key link in the ecosystem, grasslands are also the source of food for animal husbandry on the Plateau, providing income and protein for farmers. Converting degraded grasslands into productive ones through a reward for environmental services scheme would not only recover degraded ecosystem functions but also increase local households' income. Equally importantly, co-investments in infrastructure and technology adoption

to increase livestock productivity have been found to be very important in supporting households to improve grassland management while also enhancing their livelihoods.

The rewards

Some past grassland programs focused on paying compensation for prohibiting grazing on degraded areas. But these schemes did not systematically address how to enhance livestock production and may have displaced grazing pressure to areas outside the prohibited area. The first pilot of a rewards scheme for improved grassland management began in 2009 in the Tibetan Autonomous Region. The scheme rewards households for adopting sustainable stocking rates on both degraded and non-degraded lands. RUPES helped a policy research institute of the Ministry of Agriculture document the region's pilot scheme, draw on lessons from other schemes and make recommendations for developing a voluntary, conditional and effective scheme for China's grasslands.

Follow-up

In 2011, with support from the Ministry of Finance, the Ministry of Agriculture began to implement a rewards' scheme throughout China's grassland areas. In a departure from previous grassland rewards' schemes, many design elements in the new scheme were decided at the provincial level, providing greater flexibility to implementing agencies to design incentives that fitted with local conditions. The scheme also allows provinces to add locally relevant technical support to promote improvements in livestock management that complement grassland management.

Figure 2. Grassland area with grazing activity on the Tibetan Plateau

RUPES has been building on emerging markets for greenhouse gas emission reductions in China to design a grassland carbon finance project that will support implementation of the Government's grassland programs by strengthening targeting, planning and monitoring. The initiation of seven provincial pilot emissions trading schemes in 2012 indicates high potential support for development of complementary approaches between government- and market-funded rewards for environmental services' schemes.

The partners

- World Agroforestry Centre China and East Asia Node
- Research Center for Rural Economy (RCRE) of the Ministry of Agriculture
- International Centre for Integrated Mountain Development (ICIMOD)

RUPES partnered with ICIMOD to support RCRE to undertake surveys of the emerging pilot rewards' schemes in Tibet Autonomous Region and to deliver policy messages to the relevant agencies of the Ministry of Agriculture. This work also informed ICIMOD's wider efforts to support schemes in rangelands in other parts of the Himalayan region.

Contact

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Xishuangbanna

Province	Yunnan
District	Xishuangbanna
Population	1.13 million (2011)

The site

Xishuangbanna is located in southwestern China, bordering Laos and Myanmar. It is one of the few tropical areas in China. With only 0.2% of the landmass it harbours nearly 20% of the wildlife and plant species of China. Monoculture rubber plantations have expanded beyond the rubber growing-limit to very high elevations, occupying 22% of Xishuangbanna. This has dramatically reduced biodiversity and threatens other ecosystem services. Local incomes come mainly from rubber revenue, placing the inhabitants in a vulnerable situation given the fluctuations of the natural rubber market.

The issues

Rubber monoculture expansion has placed great pressure on sustainable land use. The local government, in collaboration with scientists from Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences, has been exploring policy mechanisms to control forest conversion and provide economic incentives for forest restoration. The Government of Yunnan approved the 'Regulation and administration of nature rubber growing in Xishuangbanna' in 2011, which includes a regional environmental

rewards' mechanism, making it one of the most important regulations in Xishuangbanna. According to the regulation, developing a regional, market-based rewards' scheme will be an opportunity for Xishuangbanna to bring back natural forests.

The concepts of 'green rubber' and 'environmentally friendly rubber plantations' were proposed by local governments to try and stop plantation expansion to higher elevations and bring biodiversity back to existing plantations through some kind of environmental services rewards' scheme. A successful scheme would minimize the 'opportunity cost' of foregoing expansion of plantations and also increase biodiversity and other ecosystem services. Optimal landscape design to alleviate poverty and also protect the environment was absent when RUPES was investigating the area.

To begin to address this, RUPES used spatially explicit modelling to find protected areas and also the best locations for rubber. RUPES also acted as an intermediary between local governments, central government agencies and scientific research teams by holding technical workshops, which allowed government officials and researchers to discuss the validation of research results and possible policies for efficiently solving problems.

Environmental services and the people involved

Environmental services	Improved landscape and biodiversity
People who provide the services	Farmers' groups
People who benefit from the services	Plantation owners and local households
People who act as intermediaries between the providers and the beneficiaries	Environmental Protection Agency

Local residents were both providers and beneficiaries of environmental services. An optimal landscape design and rewards' scheme would have to bridge the providers and beneficiaries to find a balance between maintaining livelihoods and improving environmental quality.

A five-year plan for bio-industries has been created by Dr Yi and other colleagues from the Xishuangbanna Tropical Botanical Garden. A 'green', environmentally friendly rubber plantation was proposed as an important concept for government implementation. According to the plan, two study sites of green rubber plantations have been established in Xishuangbanna, lead by the Botanical Garden and RUPES teams. Experiments at the two sites included introducing high market value tree species, cash crops and natural forest recovery rewards for environmental services' schemes.

The rewards

RUPES in Xishuangbanna identified green rubber plantations, carbon sequestration for global markets and hydrological conservation for the local market, as potential activities that could provide suitable incentives to encourage local people to protect the environment.

There were several main findings related to rewards' schemes.

1. Rubber productivity in Xishuangbanna is affected by environmental conditions, bioclimatic variables and soil conditions in the plantations. Even though productivity is heterogeneous across landscapes, elevation, slope and rubber tree age are the main factors affecting productivity in Xishuangbanna. Productivity varies between two different management methods: state farms and smallholdings. The productivity of the state farms was 25% higher than smallholdings. Local governments have been identified as an intermediary between the larger and smaller enterprises, through encouraging smallholders to learn from the state farms.
2. Rubber monoculture plantations have expanded up to 1400 masl, with a negative effect on environmental protection and socio-economic development. Plantations situated above 900 masl or with a slope greater than 24^0 were never profitable and a conversion ban should be enforced.
3. Two land-use scenarios were identified: 1) 'Business-as-usual', in which rubber expands up to 1400 masl with current rate of plantation establishment; and 2) 'Conservation', in which reforestation occur along a biodiversity corridor and in low-profit rubber plantations. The finding was: the short-term irrationally monoculture rubber expansion, by Business-as-usual scenario, would bring higher opportunity cost of protecting environment in Xishuangbanna compared to Conservation scenarios.
4. The results of the Distributed GIS-based Hydrological Model showed that low elevation areas where rubber plantations have established will be drier compared to other places in Xishuangbanna. Water is easier to be polluted in lowlands. To conserve and purify water will incur enormous costs over the next 25 years.

Figure 3. Xishuangbanna farmer carrying harvested products

5. Based on projected income from carbon finance and water markets, 51% (approximately 9700 km^2) of Xishuangbanna can be protected.
6. The Government of Xishuangbanna must pay more attention to market-based rewards' schemes, which can mitigate local financial burdens. More detailed laws should be developed to ensure the diversity and sustainable sources of rewards' schemes.

RUPES continues to play an important role in linking multiple stakeholders and enhancing communications between policy-makers and researchers.

Follow-up

Awareness of the importance of environmental protection among local stakeholders who are involved in any rewards' scheme should be evaluated through a further survey.

The 'willingness to accept reforestation' of farmers should be investigated and the proportion of land devoted to monoculture rubber plantations and the associated reforestation rate should be monitored.

The partners

- Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences
- Xishuangbanna Prefecture Government
- Kunming Institute of Botany, Chinese Academy of Sciences

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India

India is bestowed with rich biodiversity and ecosystem services, which form the basis of the nation's ecological and economic security.

The National Environment Policy 2006 focuses on the nexus of environmental degradation with poverty in its many dimensions and, hence, economic growth. The dominant theme of the policy is that while conservation of environmental resources is necessary to secure the livelihoods and wellbeing of all, the most secure base for conservation is to ensure that people dependent on resources obtain better livelihoods from conservation rather than degradation of the resource.

The regulatory frameworks for conservation of natural resources have evolved over the years, with the most recent being the Coastal Regulation Zone Notification 2010 (providing a framework for regulating development in the coastal zone based on hazard vulnerability and ecosystem services) and Wetland (Conservation and Management) Rules 2010 (creating a regulatory regime for wetlands).

The national environmental policy strongly emphasizes the role of economic instruments in various forms to achieve sustainable development. Achieving economic efficiency in natural resource use is one of the core principles of the policy. The role of economic instruments, which aim to rationalize incentive structures and promote sustainable use of natural resources, is also emphasized.

Despite this, environmental services rewards schemes are still in their early stages. There are some watershed-scale applications, which highlight various challenges in environmental services' descriptions, measuring additionality, maintaining conditionality and accounting for transaction costs.

A capacity-assessment survey for implementation of environmental services' schemes to repair land degradation showed that while an understanding of environmental services does exist, there is insufficient capacity to value incremental change, which limits the application of any such schemes.

In 2012, the Ministry of Environment and Forests launched an assessment of the economics of ecosystem services and biodiversity (TEEB India) along the lines of international TEEB, focusing on the roles ecosystem services and biodiversity play in sustaining economic development and the means of ensuring their inclusion in developmental planning and decision making.

As a pilot, the focus was on three ecosystem types: forests, inland waters and coastal and marine waters. The project was expected to lead to specific evidence from ecosystem services and the means of capturing these in economic decision-making processes.

Key findings

RUPES India focused on an incentive system for Lake Loktak with the objective of promoting sustainable water management for ecological restoration and sustaining livelihoods.

Loktak and its associated wetlands, located within the northeastern state of Manipur, are multifunctional systems providing food and water security for the entire region. Sustained provision of ecosystem services derived from the wetlands is critically linked to hydrological regimes. At the core of lake degradation is a lack of integration of ecosystem services into developmental planning processes leading to over-provisioning of tangible ecosystem services while severely undermining relatively intangible regulating, cultural and supporting services of the wetlands ecosystems.

The following are the key findings of the project.

The annual benefits from Lake Loktak (2006–2007 prices) totalled Rs 600 million (± USD 11 300 000), which is equivalent to nearly 2% of the state's gross domestic product. Direct benefits through provisioning of fisheries, water for hydropower generation and vegetation for use as fuel, food, fodder and raw material for handicrafts accounted for 48% of the overall benefits. Water use for hydropower generated 74% of the direct benefits accrued. Fisheries and vegetation accounted for 18% and 8% of the benefits respectively. Indirect benefits based on regulating, supporting and cultural features accounted for 52% of the overall benefits derived from the lake. The nutrient-retention functions of the 'phumdis' (unique floating islands of vegetation) formed the basis of 12% of non-use benefits. As more than half of the total benefits derived from Lake Loktak do not have marked-based prices, there is a significant underestimation of the overall contribution of the water body to the regional economy and a dominance of the more tangible uses of lake resources, that is, for hydropower generation.

While water used for hydropower is the source of the maximum benefit, there are also costs owing to the present form of water management, such as the degradation of biodiverse habitats, loss of fisheries, proliferation of phumdi, inundation of peripheral areas and sedimentation of link channels, all of which ultimately have an impact on the livelihoods of wetland communities and the overall sustainability of ecosystem services. The hydropower pricing mechanism in place at present does not account for lake water as an input to production processes. Current water management practices, by not properly accounting for environmental impacts, subsidize an environmentally inefficient process and shift the impacts onto wetlands-dependent communities.

Water management at Lake Loktak needs to address nine objectives apart from hydropower generation. Ecological needs—such as maintenance of biodiversity habitats, management of aquatic vegetation and fisheries—are aligned to the natural regime of water that existed prior to construction of the Ithai barrage. But the human demand for water must be met by a regulated water regime. It is impossible to meet all the objectives of water management under the current scenario. In particular, there are trade-offs between water allocation for hydropower generation and maintenance of habitats in the national park (which covers part of the lake area) in drier seasons.

Based on scenario evaluations and existing water regimes, it is possible to reduce the trade-offs and ecological impacts by changing the current barrage operation rules and integrating the need for reducing water levels during drier seasons. The impacts of these changes would need to be monitored and alterations made accordingly. As the current levels of water resources would be insufficient to meet all water management objectives, and that with each passing day the scenario worsens, demand and supply

Figure 4. Community around Lake Loktak harvesting phumdi

management has assumed a critical role in determining availability of water. On the demand side, opportunities include enhancing efficiency of water use for hydropower generation and managing phumdis to reduce water losses. Supply side options include enhancing connectivity between the wetlands complex and optimizing water use upstream through better management of water storage structures.

Application of a payments-based instrument linked to water management could help fund maintenance of wetlands ecosystem services. Linked to the hydropower pricing mechanism, such a scheme would ensure that adequate components of revenues realized from sale of hydropower were reinvested into wetland management while ensuring that the water allocation system ensured sustainability of wetlands ecosystem processes.

Policy influenced

RUPES supported development of a water allocation policy for Lake Loktak, balancing human needs with ecological requirements. The policy has been endorsed by the Steering Committee of the Loktak Development Authority and modalities are being worked out for its implementation in participation with various stakeholder agencies. In conjunction with restoration efforts undertaken so far under the Short Term Action Plan for Conservation of Loktak Lake, the authority, with support of Wetlands International South Asia, is working for removal of the wetlands from the Montreaux Record of the Ramsar Convention, which is a list of wetlands undergoing or having undergone negative changes in ecological character and requiring priority action by the Government. The lake is no longer considered necessary for listing as a site of high degradation with no response mechanism in place.

Lake Loktak, Manipur

Province	Manipur
District	Bishnupur
Area of watershed	Loktak Wetland: ~287 km^2 768.50 masl Catchment area: 980 km^2
Number of villages	53
Population	279 935 (2001)

The site

The Lake Loktak complex (comprising the lakes of Loktak, Pumlen, Ikop, Kharung, Khoidum and others) forms an extensive floodplain system linked with the Manipur River. These floodplain wetlands produce fish and vegetables, moderate floods, support rich biodiversity and are inextricably linked to the Manipuri culture. They extend to 469 km^2, with Loktak being the largest wetland of the basin, accounting for over 60% of the wetland regimes. A characteristic feature of the wetland ecosystem is the presence of masses of floating vegetation locally called 'phumdi'. A single 40 km^2 chunk of phumdi in the southern part of the lake forms the Keibul Lamjao National Park, which is a habitat of the globally rare and endangered ungulate species, Rucervus eldii. In 1990, considering its rich biodiversity and socioeconomic importance, Loktak was designated by the Government of India as a Wetland of International Importance under the Ramsar Convention.

The issues

The diverse range of ecosystem services derived from the Lake Loktak is under stress owing to lopsided developmental planning within the basin. Water resources development projects for flood mitigation, agriculture and hydropower generation have led to modification of hydrological regimes, seriously affecting the processes, functions and attributes of the wetlands. In particular, the construction of Ithai barrage downstream of Loktak in 1984 led to regulation of lake levels for hydropower generation.

Rapid growth of population in the adjoining hills has led to expansion of the area under shifting cultivation, which has increased lake siltation and led to the loss of flood attenuation capacity. High levels of urbanization with inadequate sewerage have led to dumping of untreated sewage into the lake, leading to a decline in water quality. The declining resource base with increasing population pressure has forced the spread of harmful fishing practices. However, at the core of lake degradation is a lack of integration of ecosystem services into developmental planning processes.

Environmental services and the people involved

Environmental services	Water
People who provide the services	Loktak Development Authority
People who benefit from the services	Park management; state departments of wildlife, fisheries, public health; National Hydropower Corporation
People who act as intermediaries between the providers and the beneficiaries	Government of Manipur with technical support from Wetlands International

Loktak and associated lakes form the basis of food and water security for the state of Manipur as well as the entire northeastern region of the country. Lake Loktak is the largest fishery resource in Manipur, accounting for over half of its fish producing area. More than one-third of the lakeshore population derive their livelihoods from fisheries, with annual production ranging 1200–1600 tonne during 1999–2003.

The lake also has over 132 plant species associated with the phumdi that are used by the people as food, fodder, fuel, thatch, fencing material, medicines, raw material for handicrafts, and for religious and cultural purposes.

Phumdi play an important role in maintenance of overall water quality through filtering of mineral nutrients. An estimated 478.60 tonne of nitrogen, 39.60 tonne of phosphorous and 157.20 tonne of potassium are annually accumulated within the phumdi of the northern zone. This huge amount of pollutants are brought in by the rivers, particularly the Nambul and Nambol and, if not absorbed by the phumdi, would have been available in the water thereby leading to further degradation making the lake unfit for fisheries and other aquatic life. They are a source of a range of ecosystem services including providing fish, vegetables and water; moderating floods; improving water quality; and are inextricably linked with cultural and social life.

Lake Loktak is of immense cultural importance to the communities living in and around it. It is commonly referred to in local folklore as 'Loktak Ima' meaning 'mother goddess'. The lake has been an important centre for cultural events, including Loktak Day, on which boat races are organized on the lake, which is the only venue for water sports in Manipur.

The regulation of Lake Loktak through the Ithai barrage has led to the wetland becoming the source of another ecosystem service, that of providing water for generation of 105 MW of hydropower by the National Hydropower Corporation Ltd.

The rewards

Conservation and management of Lake Loktak mandates a strategic shift in water management, balancing human needs with the multiple values of the lake, through adopting a stakeholder-driven process. Under the ambit of the RUPES project, Wetlands International South Asia and Loktak Development Authority, the government agency for lake management, developed a water allocation policy that takes into account the various ecosystem requirements as well as human needs.

A range of water management objectives were identified by the stakeholders: maintenance of the national park's habitats, waterbird habitats, flushing of sediments, management of phumdis, and capture fisheries. These ecological concerns needed to be addressed through better management. At the same time, availability of water for hydropower generation, reduction in flooding in peripheral areas and supporting culture fisheries were human demands that could not be ignored. The ecological needs were aligned to the natural regime of water that existed prior to construction of Ithai barrage. Under the current scenario, it was apparently impossible to meet all the management objectives. In particular, there were trade-offs between water allocation for hydropower generation and maintenance of the national park's habitat in the lean seasons.

Figure 5. Typical landscape in Lake Loktak

Based on the assessment of water regimes and needs of stakeholders, three water allocation scenarios—'business as usual', 'mimicking natural regimes' and 'addressing multiple objectives'—were developed and assessed. The multiple objective scenarios, which allows for maintenance of the national park's habitats, flood moderation, fisheries and sustainability of ecosystem processes, along with hydropower generation, was endorsed by the steering committee. During drier seasons, this would mean lowering hydropower production in favour of maintaining lake biodiversity and ecosystem processes. Building on the revision of water allocation policy, a rewards for environmental services' scheme has been designed that will allow reinvestment of benefits from hydropower into lake conservation.

Follow-up

The steering committee recommended implementation of the revised water allocation policy. Based on the outcomes, an integrated wetland inventory and assessment initiative has been launched that will enable integration of ecosystem services with management planning, in particular, identifying conservation–development trade-offs. Under the ambit of the forthcoming five-year plan, the management of the associated wetlands of Loktak is also being integrated into river basin management, which, amongst other outcomes, is also expected to contribute to enhanced water availability within the system as well as improve hydrological connectivity. Payments for ecosystem services are being integrated into the institutional design as a means of sustaining financing for wetland management.

The partners

- Loktak Development Authority

  Loktak Development Authority is the nodal agency of the Government of Manipur for conservation and sustainable management of Lake Loktak. It functions under the aegis of the Department of Forests and Environment, Government of Manipur.

- Wetlands International South Asia

  Wetlands International South Asia is part of the global organization dedicated to conservation and wise use of wetlands, providing scientific and technical support to national governments, wetland authorities, non-governmental agencies and the private sector for wetland management planning and implementation of restoration programs.

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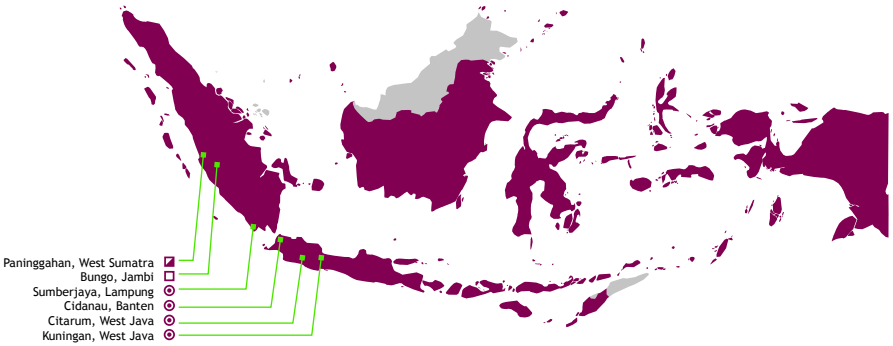

The environmental services debate in Indonesia gained more attention after the RUPES project organized a national seminar in February 2004. Conducted at the office of the National Development and Planning Agency (Badan Pembangunan dan Perencanaan Nasional/Bappenas), the seminar was attended by environmental services' practitioners from many parts of the country. At the end of the seminar, the participants agreed to form a national-level network (Community of Interest to Empower Environmental Services/ COMMITTEES) to encourage design and application of environmental rewards' schemes to protect the environment and improve the welfare of poor farmers in upstream areas. The COMMITTEES members worked with a number of parties to pass a regulation on environmental services in Indonesia. At the national level, members organized regular meetings with several key government agencies, such as the Presidential Advisory Council, Ministry of Environment, Ministry of Forestry, Coordinating Ministry for Economic Affairs, Bappenas and other government agencies at district and province levels. COMMITTEES also consistently supported the Ministry of Environment in drafting an environmental services law and its regulations that can be used as an umbrella regulation for all such initiatives, through several seminars and a workshop.

At the field level, a number of new partners and collaborators from non-governmental organizations have been carrying out pilot environmental services rewards' projects, such as the Institute for Research, Education and Economic and Social Affairs (Lembaga Penelitian, Pendidikan dan Penerangan Ekonomi dan Sosial/LP3ES) (in West Java province), Kanopi (in Kuningan district) and Rekonvasi Bhumi (in Banten province), together with existing RUPES Indonesia partners since phase 1: Forum Komunikasi Kelompok Tani Hutan Kemasyarakat Lampung Barat (West Lampung Community Forestry Farmers' Groups' Communications Forum/FKKT HKm) (in West Lampung), Yayasan Danau Singkarak (in West Sumatra) and the World Agroforestry

Centre's Bungo, Sumatra, office. They helped local water users and upstream farmers at each site reach agreement to protect the watershed.

During 2003–2012, RUPES Indonesia conducted six action-research projects at a number of sites.

1. Bungo (Jambi province): examined the possibility of eco-certification of rubber from agroforestry systems managed by smallholders.
2. Singkarak (West Sumatra province): established better management of Lake Singkarak and its watershed, a voluntary carbon scheme, an environmental education centre and revitalized the coffee 'ulu' plantation.
3. Sumberjaya (Lampung province): community forestry schemes and a 'river care' program.
4. Cidanau (Banten province): cash transactions for reforestation schemes on farmers' private land.
5. Lembang (West Java province): established payments for environmental services' transactions between intensive-agriculture farmers and the state-owned drinking water company to change their commodity crop to coffee agroforestry as well as facilitating the establishment of a provincial environmental services' working group for Citarum watershed.
6. Kuningan (West Java province): developed multi-stakeholders' forum for Mt Ciremai National Park as the intermediary for the water services' transaction between the drinking water company and the national park as well as piloted cash transactions for water services between upstream and downstream parties at village level.

The Cidanau team successfully renegotiated another five-year contract with PT Krakatau Tirta Industri, a drinking water company. The Sumberjaya team also successfully renegotiated the contract with PT PLN, a state-owned hydropower company, to continue and improve the 'River Care' program. The Sumberjaya team also established an agreement with 'Strengthening Community-based Forest and Watershed Management', a project funded by the United Nations Development Program and the Global Environment Facility, to develop a community action plan for watershed management which was in line with the RUPES project. And the second phase of contracts for a voluntary carbon market in Singkarak are, at the time of writing, still under negotiation and awaiting the monitoring, reporting and validating phase.

In Citarum, two mechanisms for innovative watershed management were identified: 1) encouraging the private sector to undertake 'green' businesses; and 2) reallocating some of the existing budget of the Integrated Citarum Water Resources Management and Investment project for rehabilitation of the catchments using environmental services' scheme principles, with a pilot site selected. These mechanisms were triggered by meetings, a seminar and a workshop about Citarum watershed that were conducted by LP3ES with representatives from many different sectors to seek support to save Citarum.

Other activities included establishing a working group on payments for environmental services for Citarum and West Java as an alternative vehicle to promote and maintain availability of environmental services. At site level,

another village was identified as a model for payments for environmental services' replication in Citarum.

The Kuningan team identified three villages as pilots for implementation and conducted a series of meetings and facilitation events with them. The team also conducted preliminary research on rapid hydrological appraisal as well as research on the economic valuation of water and the socio-economics of land use. Documentary films were also produced.

The RUPES partner, FKKt HKm Lampung Barat, facilitated a series of meetings to strengthen the institutional capacity of other community forestry groups. They also sought ways of collaborating with other potential partners on Way Besai watershed management. The voluntary carbon market program in Singkarak received a lot of appreciation and support from both national and local governments.

Today, environmental services in Indonesia play an increasingly significant role in national discourse, as witnessed by the increasing number of collaborative programs—both pilots and full implementation—involving various stakeholders, including the government (especially the Ministry of Forestry), local NGOs, and national and international research and development agencies.

Key findings

Case studies of rewards for environmental services' schemes (RES) in many places in Indonesia demonstrated us that it is can support to the development of RES regulations at the higher level, such as national or provincial regulations. PES scheme have to be in harmony with regulatory approaches to better manage the environment and alleviate poverty. In Cidanau, with support from their local government through Governor Decree, the current RES initiatives have possibilities to be expanding to the wider coverage of area and participants. It is also help to ensuring the other potential ES buyer to have willingness to join with the scheme in the particular area. In many cases, some substantial amounts of public funds are currently allocated to reforestation in Indonesia. These programs mostly do not generally meet their objectives since it mostly derived from the top-down mechanism. Therefore, such funds could be more effectively deployed in flexible RES schemes in order to ensure its effectiveness and efficiency by integrating the local knowledge into rehabilitation/conservation program. This will increases the chances of contract accomplishment. Governments should set the optimal level of acceptable environmental services' protection as a baseline within their regulations that allow voluntary actions to improve environmental qualities. Strong political will from them is important to ensure expansion of schemes.

Beyond that, establishing an intermediary's role as an 'honest and trusted intermediary' is one of the key factors for an established scheme. The involvement of the community in participatory environmental services' monitoring also needed to increase the accountability of the results and reduces potential conflicts in the future.

Policy influenced

COMMITTEES, which consisted of voluntary members from government, universities, practitioners and non-governmental organizations who had an interest in rewards for environmental services' schemes, helped mainstream and institutionalize rewards for environmental services in Indonesia through several programs, such as:

- improving the commitment and capacity building of activists in environmental services;
- strengthening understanding of environmental services from different points of view and scientific disciplines;
- building the capacity of stakeholders in developing rewards' mechanisms for environmental services; and
- implementing dissemination and advocating strategies at local, national and global levels to develop sensible transactions for environmental services.

To contribute to the development and improvement of policy frameworks for rewards' schemes at local and national levels, the RUPES team and partners in Indonesia were actively involved in developing national and local regulations. At the national level, RUPES actively participated in the drafting the government regulation on environmental services, Law No. 32/2009. This regulation had three broad categories for economic instruments in environmental conservation: a) planning for environmentally friendly development and economic activities; b) funding for environmental management; and c) incentives and/or disincentives for conservation. At local level, the RUPES team facilitated the development of the Province of Banten Governor's Regulation on Integrated Watershed Management based on the rewards' scheme implemented in Cidanau watershed. At the time of writing, the draft is waiting for final approval before it can be implemented.

The team also disseminated information about environmental services and rewards' schemes at local, national and international events and made recommendations to government policy makers on developing regulations for, and implementing, such schemes.

Bungo, Jambi

Province	Jambi
District	Muara Bungo
Area of watershed	7160 km^2
Number of villages	124
Population	264 389 (2008)

The site

Bungo district in the Batang Hari watershed is located in the western part of Jambi province on the island of Sumatra. Jambi is the third-largest rubber-producing province in Indonesia. The district lies between 1°08′ and 1°15′ latitude and 101°27′ and 102°30′ longitude. The region is relatively flat, with an altitude of less than 500 masl. Approximately 50% of the land is covered by rubber-based systems, of which 15% is in the form of old rubber agroforests or 'jungle rubber', which is becoming an increasingly important reservoir of forest diversity and other environmental services provided by natural forests.

The issues

In Jambi province, where rubber is the major source of income, the economic level of the inhabitants depends on the world market price. Low rubber prices over past years have brought a substantial part of the province below the official poverty line, while a decade ago Jambi was better off and was an attractive destination for migrants.

In recent years, the enormous increase of oil palm plantations has led to a reduction in the number of jungle rubber areas in Jambi. Oil palm plantations provide more income per unit of land with less labour than rubber, thus, forming a threat to both environmental services and diversified livelihoods. Unless farmers are rewarded for the environmental services provided by rubber agroforests, these biodiverse areas will soon be replaced by largely monoculture oil palm plantations.

Environmental services and the people involved

Environmental services	Maintaining old rubber agroforests for diversity of animal and plants
People who provide the services	79 rubber farmers from Lubuk Beringin village
People who benefit from the services	Bridgestone, rubber industries
People who act as intermediaries between the providers and the beneficiaries	World Agroforestry Centre

The main 'service' that differentiates rubber agroforests from other 'tree crop' production systems is the diversity of plants and animals. With rubber trees typically at or below 50% of the total tree basal area, the diversity of forest trees, epiphytes, birds, insects and mammals is estimated to be 50–70% of that of a similar area of natural forest. Initial concerns that the landscape-level diversity (relative to that of forest) would be substantially less than the relative diversity of plot-level observations are not supported by current data (although the landscape context of the historical diversity remains to be further clarified by more research). These agroforests may provide one of the best examples of an 'integrated' approach to ecological agriculture, combining biodiversity and income-generating opportunities.

The communities of Letung, Sangi, Mengkuang Besar, Mengkuang Kecil and Lubuk Beringin villages agreed to retain their complex rubber agroforests (total of about 2500 hectare) if incentives were provided. The incentives local people requested included support to establish microhydropower plants, setting up rubber nurseries and demonstration plots of improved rubber agroforests, and clonal plants of high-yielding rubber trees for intensively managed rubber gardens.

Conservation agreements were signed by these four villages in 2006. The incentives provided at the time were seen only as interim while a more permanent reward mechanism was being developed.

In addition, Bridgestone (an international tyre company based in Japan) expressed interest in supporting jungle-rubber farmers to improve the quality of their rubber. The company appreciated the rich biodiversity of rubber agroforestry in Bungo, which was maintained by smallholders.

A team of experts from Bridgestone visited Bungo and conducted two 'train the trainer' sessions to improve the quality of the rubber sourced from agroforests. It was expected that the training would trigger a wider distribution of knowledge in rubber-quality improvement. To motivate farmers, the company paid for the cost of transportation for the first two loads by sending their trucks to pick up rubber slabs from farmers who had produced good quality rubber.

RUPES also investigated an eco-certification scheme for the complex rubber agroforests that would lead to a price premium for the natural rubber from the 'jungle' that would be sold in niche markets, such as for 'green' car and bicycle tyres. RUPES and the World Agroforestry Centre, supported by

Indonesia Ecolabelling Institute (Lembaga Ekolabel Indonesia/LEI), conducted a study on eco-certification schemes to assess the community's readiness to participate.

The rewards

Marketing chains for rubber agroforests

The RUPES team identified a number of obstacles in the smallholders' rubber marketing chain. In particular, the product quality and processing of the 'jungle rubber' provided a link to the least 'eco-sensitive' segment of the rubber market.

In the short term, RUPES expected that the buyers would respond positively to a proposal that would provide direct support to village communities that agreed to protect a substantial area of old rubber agroforest. But more research is needed to clarify the issues and find solutions.

Eco-certified natural rubber from sustainable rubber agroforests

RUPES conducted some research on profitability and environmental quality, focusing on carbon stock and biodiversity, of traditional and intensive rubber production systems in Indonesia. One of the outcomes of this work was recognition of the environmental quality of rubber production systems through special product lines.

Ensuring a sustainable mechanism

RUPES contributed to some changes in Bungo's communities, ranging from the establishment of farmers' groups through to increasing the awareness of local officials on the environmental consequences of monoculture plantations.

In order to maintain the positive processes, and to respond to future situations, local communities needed to learn to adapt to change wisely. Local and national institutions are expected to provide support in building the farmers' capacities, as well as playing the role of intermediary between the communities and international buyers.

Figure 6. Exploring the benefits and impact of a rewards' scheme in Lubuk Beringin village, Muara Bungo district

Follow-up

At the end of the project, RUPES and LEI conducted a workshop, 'Land-use-change dynamics', that involved local stakeholders who were interested in sustainable forest management, such as the forestry agency, members of parliament, business people, university staff and students, NGOs and community representatives. One recommendation was that everyone agree to establish a task force to support sustainable forest management in Bungo district. This task force is expected to become a centre that can support the capacity-building process towards eco-labelling certification in agroforests by the communities, inside (village forest, customary forest etc) or outside forest areas (community forests, farming).

The partners

- Lembaga Ekolabel Indonesia (LEI)

  The Indonesian Ecolabelling Institute is a non-profit, constituent-based organization that develops forest certification systems to promote their mission of just and sustainable forest resources management in Indonesia. As a constituent-based organization LEI retains independence and transparency, both of which are necessary for the credibility of forestry certification (http://www.lei.or.id).

- Warung Konservasi (WARSI)

  WARSI is an organizational network established in January 1992, with membership made up of twelve NGOs from four provinces in Sumatra (South Sumatra, West Sumatra, Bengkulu and Jambi), whose focus is biodiversity conservation and community development. WARSI cooperates and maintains a dialogue with a number of different parties connected with conservation and development in the four southern Sumatran provinces, including the Regional Planning Authority (Bappeda), the Nature Conservation Agency (PHPA), institutions of higher learning, private agencies and other concerned groups. WARSI is also not limited to NGOs but is open to professionals and teachers as well as other groups who are interested in being involved in its activities (http://www.warsi.or.id/).

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Cidanau, Banten

Province	Banten
Districts	Serang and Pandeglang
Area of watershed	22 260 hectare
Number of villages	60
Population	133 213 (2011)

The site

Cidanau is an important watershed for the supply of domestic and industrial water as well as protecting biodiversity. It covers 22 260 hectare and is located in both Serang and Padeglang districts in Banten province. Included in the watershed is Rawa Danau Reserve, a 4200 hectare nature reserve that contains the last lowland swamp forest in Java that is home to 131 endemic species. The reserve also plays an important role as a catchment for the Cidanau River.

For almost the last two decades, as an impact of rapid growth population Cidanau watershed has experienced rapid land-use change from forestland into agriculture. The number of people living and illegally practising farming in the upstream of the protected area has increased from around 600 in the late 1990s to an estimated 1500 in 2007. As a result, Rawa Danau Reserve has also experienced a decrease of flora and fauna diversity.

The issues

Numerous efforts have been made to overcome problems in Cidanau watershed, including a forced transmigration program for the communities living in Rawa Danau Reserve, reforestation and land rehabilitation. However, lack of consultation and planning among key stakeholders, as well as lack of attention to social outcomes, has only led to failures.

These failures triggered the establishment of the Forum Komunikasi DAS Cidanau (FKDC/Communication Forum of Cidanau Watershed) in 1998, which aimed to increase public and local government awareness of the environmental problems in the watershed and to lead concerted efforts for conservation. In 2002, the forum received boarder recognition from Banten provincial government and gained legal status through a governor's decree.

Environmental services and the people involved

Environmental services	Watershed conservation management
People who provide the services	Six farmers' groups with 368 members
People who benefit from the services	PT Krakatau Tirta Industri, a state-owned water company, Government of Banten province
People who act as intermediaries between the providers and the beneficiaries	Forum Komunikasi DAS Cidanau, a communication forum for Cidanau watershed

Four farming communities in the upstream areas of Cidanau watershed were selected as the service providers. They were chosen based on the critical aspect of their land, including steep slopes prone to erosion. The state-owned water company (PT Krakatau Tirta Industri/KTI), providing water to the Cilegon industrial area, Perusahaan Daerah Air Minum (PDAM/state-owned drinking water company) and PT Perusahaan Listrik Negara (PLN/State Power Company, acted as the buyers for the service. FKDC played the role of the intermediary, not only to assist the farmers but also to be actively involved in administration and to monitor the rehabilitation process. At the time of writing, FKDC and KTI are trying to persuade another potential buyer to join the scheme.

The rewards

The price was decided through negotiations with the buyer (KTI), the intermediary (FKDC) and the sellers (farmers' groups from four villages). In 2004, KTI signed an agreement with FKDC to provide USD 95 000 in total to pay for the environmental services that the watershed provided for five years. The payment was distributed in instalments: USD 35 000 for phase 1 in 2005–2007 and USD 40 000 for phase 2 in 2007–2009. The third payment in the fifth year was USD 20 000. The agreed price was then formalized in the form of a memorandum of agreement between KTI and FKDC, with representation from the Governor of Banten province). A 175 hectare agreement was later developed between FKDC and the farmers' groups. Upon satisfactory results from the previous contract, KTI extended their cooperation with FKDC, increasing the total payment from USD 95 000 in the first five years to nearly USD 125 000 for another five years (2010–2014). They will pay USD 25 000 per year to cover conservation activities on 150 hectare.

Of the total money received, 80% went to the communities, of which 95% was used for rehabilitation and the remaining 5% for local business investment. Meanwhile, 14% of the total money was allocated for transaction costs and managed by FKDC. The transaction costs included capacity-building activities, finding potential buyers, and monitoring and verification processes. The remaining 6% of the total money was for government taxes.

Figure 7. Recognition from Government of Indonesia for efforts in improving and protecting the Cidanau watershed through payments for environmental services: President of the Republic of Indonesia, Susilo Bambang Yudhoyono, awarding the Kalpataru Award, the highest award in Indonesia for environmental practitioners, to Mr Rahadian, the Executive Director of Rekonvasi Bhumi

Follow-up

After the RUPES project ended, development of payments schemes in Cidanau continue, as can be seen in the FKDC workplan for 2010–2014 where they committed to rehabilitate a further 300 hectare through a rewards' contract as well as developing and strengthening the economy and livelihoods' aspects of the surrounding community. Some programs were ready to be launched, such as a multistakeholder program on sanitation and clean water funded by the national government (Ministry of Public Works); Green Village program, which consisted of several activities (freshwater fish farming, organic farming, 'jabon' (*Anthocepalus* sp) nursery, biogas and microhydropower). This program was funded by PLN's Unit Pelayanan Jaringan (UPJ/Network Service Unit) Banten Utara. Last but not least, FKDC planned to continue to seek support from other water users (companies, communities) in order to increase the environmental services fund and expand the rehabilitation area.

The partners

- Rekonvasi Bhumi

  Rekonvasi Bhumi is a non-governmental organization that has the vision of creating a better social order in Banten province. The organization sees itself as playing a balancing role, which is critical in view of the problems that exist in society, especially for the people of Serang district, and taking concrete steps to find solutions to these problems. In addition, Rekonvasi Bhumi also has particular concerns about the importance of the environment. Currently, Rekonvasi Bhumi is the leader of conservation initiatives in Cidanau watershed through developing environmental services' schemes with support from governments and companies.

- Forum Komunikasi DAS Cidanau (FKDC)

  FKDC is a communication forum consisting of government and non-government entities. It is an independent body with the main task of leading activities to protect Cidanau watershed. The objective of the forum is to establish integrated management based on one river, one plan and one river basin in Cidanau watershed. Stakeholders include representatives from the governments, communities and businesses of Banten province and the districts of Serang and Pandeglang and Cilegon.

Contact

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Citarum, West Java

Province	West Java
District	West Bandung
Area of watershed	38.70 hectare
Number of villages	165
Population	1.5 million (2008)

The site

Citarum watershed covers 11 600 km^2 and plays an important role not only in the surrounding areas but also for many regions in West Java and Jakarta provinces. The 350 km-long Citarum River distributes water for various purposes, including agriculture, fishery, urban commerce and industry. The river is also a source for three reservoirs—Saguling, Cirata and Jatiluhur in West Java—that supply water for electricity, agriculture, and domestic and industrial consumption for most parts of West Java and Jakarta provinces.

The river (and its watersheds in general) was facing serious problems related to quality degradation, uncontrolled flood patterns, landslides, water shortages, and pollution. Despite the existence of two conservation areas—Tangkuban Perahu National Park and Juanda Grand Forest Park—which cover almost 30% of the total watershed, the number of settlements and rapid development of industries has been increasing, which, coupled with poor agricultural practices, were believed to aggravate environmental degradation. In addition, it was reported that sedimentation in the river, irrigation canals and reservoirs had doubled in volume from 1.18 million tonne in 1993 to 2.15 million tonne in 2003.

Research at the RUPES project sites in Lembang, North Bandung (Cikole and Sunten Jaya villages), showed that land in the catchment had been occupied by outsiders (mostly from urban areas), with almost 80%

uncultivated. In contrast, many local people still remained landless without any certain livelihood or source of income. They were living in poverty, focusing only on crops without considering conservation, and the majority had low education and income levels (below IDR 15 000 (±USD 1.50) per day), poor quality housing, and inadequate public infrastructure, including for water, sanitation and health.

Along with the increase of population, it was not surprising that the pressure on land also increased. Poor agricultural practices in the form of seasonal crop systems had increased soil erosion and enlarged marginal lands, with an accompanying use of chemical fertilizers and pesticides that was counterproductive to soil fertility. Another problem was the large amount of dairy farming that increased the number of cattle grazing areas. Since hardly any land was available, the improved dairy production was accompanied by the loss of forested areas. In Cikole village, for example, 70% of Perhutani's (state-owned forestry company) forest area was grazing land. This reduced water availability in the area as many springs were hard to find. Moreover, dairy waste decreased the river's water quality.

An integrated approach was required to solve the problems in Citarum watershed. A single, physical approach such as infrastructure development, for example, would most likely only contribute to already-inefficient watershed management. Provision of assistance to local communities to help them conserve the environment, however, as had occurred in many developments aid programs, would create dependency on outside sources. Therefore, any conservation program should require a high level of active participation from local people, encouraged by well-crafted, innovative programs.

The issues

For years, the district and provincial governments had collected taxes for water, including a water charge that had been collected by Jasa Tirta II Public Corporation (PJT II/Citarum river basin corporation). However, the allocation of funds was not sufficient to pay for the needed conservation activities in the watershed.

LP3ES and RUPES designed a program called Compensation for Watershed Protection Services (WPS), an innovative mechanism to overcome the complex problems in Citarum and provide better watershed management. The approach taken was to establish pilot demonstration activities in two villages in the upstream of Citarum watershed.

Service scarcity drives competition amongst users and creates opportunities for a compensation scheme market. Any such scheme should, in principle, at least consist of 1) a beneficiary who benefits from watershed services and who will compensate the provider; 2) a provider who is compensated for the service provided; and 3) conditionality or the requirements of providing environmental services.

In summary, the successful implementation of the scheme depends on three integrated factors, that is, 1) human resources and organizational development; 2) legal and policy support; and 3) an umbrella institution to manage the environmental services mechanism.

The pilot demonstration activities are still at the initial stage, thus, an initiative from the government is required to guide the adoption and institutionalization process of the WPS scheme in Citarum. Moreover, a better understanding by stakeholders of the compensation mechanisms is another pre-requisite along with encouraging the beneficiaries to commit to providing compensation.

Environmental services and the people involved

Environmental services	Land rehabilitation and spring protection at Cikapundung sub-watershed, total area 55 ha
People who provide the services	Syurga Air farmers' group at Sunten Jaya and Giri Putri farmers' group at Cikole
People who benefit from the services	PT Aetra Air Jakarta, Pusat Standardisasi Lingkungan, PT Indonesia Power, Perusahaan Negara Pengelola Air (Perum Jasa Tirta/PJT-II), industries and governments
People who act as intermediaries between the providers and the beneficiaries	Direct transactions in Sunten Jaya and transactions through Yayasan Peduli Citarum as the intermediary

There are two model of transaction in payments for environmental services' mechanisms in Citarum. First, 'direct transactions', where the beneficiaries directly compensate the providers; and, second, 'intermediary transactions', where the beneficiaries use an intermediary for compensating the providers. These two mechanisms were adopted at each site: Syurga Air farmers' group in Sunten Jaya had an agreement to use direct transactions with their buyer, PT Aetra Air Jakarta; Giri Putri farmers' group chose to use an intermediary to receive payments from their buyer, Pusat Standardisasi Lingkungan (Environmental Standards Centre) in Jakarta.

The rewards

Transactions between Syurga Air farmers' group and PT Aetra Air Jakarta

Syurga Air farmers' group and PT Aetra Air Jakarta agreed to conserve an area of 22 hectare under an agroforestry system model. PT Aetra was to provide compensation to the farmers' group of USD 5000, with three stages of payment, each with the following conditions: first stage paid at 50% of the agreed value, after the agreement is signed and all tillage has been completed by the farmers' group; stage two paid at 25% of the agreed value three months after the signing of the agreement and farmers' group had established land for conservation and cultivation of crops on private land (crops planted had grown well); third stage paid at 25% of the agreed value six months after the signing of the agreement. Farmers could harvest the timber after at least seven years but had to replant with the same type of tree and the same amount or more. Besides planting timber, the farmers also planted coffee and intercropped vegetables.

Transaction between Giri Putri farmers' group and Environmental Standards Centre of the Ministry of Forestry

The agreement between Giri Putri farmers' group in Cikole and the Environmental Standards Centre was for an amount of USD 4050 to conserve approximately 33 hectare, paid through Citarum Care Foundation (Yayasan Peduli Citarum/YPC) as the local intermediary.

There were several reasons why the Centre chose to distribute the payments through an intermediary: 1) the farmers' group did not have a legal authority, so it would have been difficult, if not impossible, for it to open a bank account; 2) YPC could assist the farmers' group to prepare the required reports of activities for both parties.

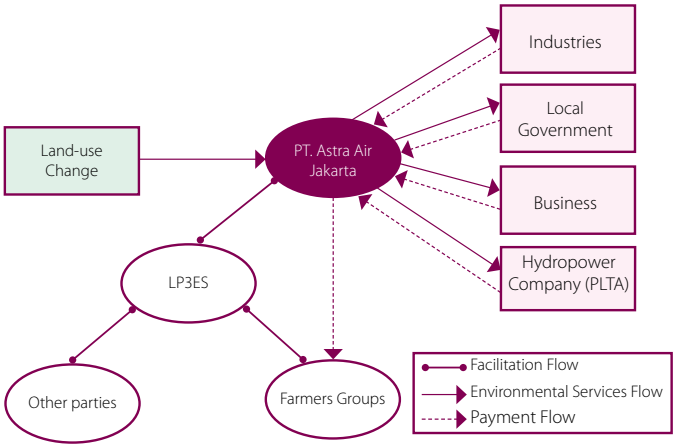

Figure 8. Diagram of the scheme in Sunten Jaya

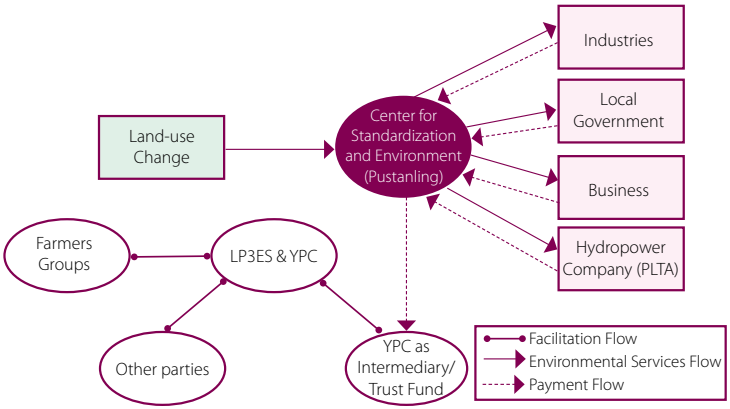

Figure 9. Diagram of the scheme in Cikole

Follow-up

The process is still continuing and has provided many important lessons, both to improve the future mechanism and to be replicated in other places. Below are some follow-up actions for after RUPES.

1. A social engagement process and building awareness of the concept of compensation schemes needs to be carried out at the beginning of any scheme.
2. Better facilitation and lobbying of stakeholders, in particular, the leading government line agency, would improve participation.
3. A community-driven approach is strongly advised for the implementation of environment conservation programs that link to local people's livelihoods.
4. Strong partnerships are needed with a strong local authority that is able to influence other stakeholders to support the initiative. In this case, the West Java Environmental Management Agency (Badan Pengelolaan Lingkungan Hidup Daerah Jawa Barat/BPLHD) played an important role in regular public meetings.
5. Adoption of a compensation mechanism for watershed protection services is important for community empowerment. A successful conservation program also depends on the social and economic aspects of the local community.

The partners

- Lembaga Penelitian, Pendidikan dan Penerangan Ekonomi dan Sosial (LP3ES)

  LP3ES is one of the oldest NGOs in Indonesia, with experience and competence in producing activities, publications, research and education in the fields of socio-economics and politics. LP3ES is involved in policy studies and action research, especially in relation to grassroots communities. LP3ES conducts various activities, such as research into the informal sector, the environment, cooperatives, small industry and handicrafts, traditional educational institutions, non-formal education, participation of farmers, maternal and child health, and public relations and the state (www.lp3es.or.id).

- Yayasan Peduli Citarum (YPC)

  YPC is a non-governmental organization that is active in facilitating the process of developing a payments for environmental services' mechanism for upstream and downstream communities in Citarum watershed in West Bandung district. Some of the activities include building the upland community's knowledge and skills for developing environmentally friendly farming systems through applying agricultural models for mixed gardens to ensure the economic sustainability of farmers and also water conservation.

Contacts

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Kuningan , West Java

Province	West Java
District	Kuningan
Area of watershed	73 hectare
Number of villages	376
Population	1.1 million (2008)

The site

On 19 October 2004, the Government of Indonesia changed the function of Ciremai Mountain Protected Forest Area in Kuningan and Majalengka districts of West Java (approximately 15 500 hectare) into a national park. Under the national park management system, the area should be better protected, ensuring that Mt Ciremai's natural resources and ecosystem can be optimally utilized to improve the welfare of society.

Mt Ciremai National Park (Taman Nasional Gunung Ciremai/TNGC) functions as a water catchment for surrounding districts, including Cirebon, Indramayu, Majalengka and Kuningan. It is an important water reserve for domestic, industrial, agricultural and fisheries use.

The issues

The forest in the national park had been disturbed owing to land grabbing for agricultural purposes and also because of fire, which resulted in more marginal land. This has had a direct impact on surrounding areas, including the decrease of water discharge and spring water, in particular, during the dry season.

Previously, the forest area's status was split between 'protection forest' and 'production forest' (under PT Perhutani). At that time, the Government of Kuningan district, located upstream, cooperated with the governments and companies of Cirebon district and Cirebon city, located downstream.

The cooperation took the form of a variation of a payments for environmental services' scheme where the Cirebon governments and companies paid compensation to Kuningan district for the water they used. This generated additional income for Kuningan district.

However, the transaction process was not transparent and the need to implement conservation practices as well as development of communities around the park was not clear since the money was bundled with other income sources when allocated to villages.

Environmental services and the people involved

Environmental services	Spring water sourced from inside and outside of TNGC
People who provide the services	National park, Government of Kuningan district and Seda and Trijaya villages (which consist of 20 farmers' groups totalling around 415 members)
People who benefit from the services	Companies (PT Indocement, PT Pertamina, CV Tirta Mekar Kuningan, PDAMs of Cirebon and Kuningan districts); farmers and communities in villages of Kertawinangun , Seda, Trijaya, as well as villages in surrounding area of TNGC who use the water for drinking and farming.
People who act as intermediaries between the providers and the beneficiaries	Mount Ciremai Partnership Forum

The cooperative use of the environmental service of water from Mt Ciremai area started in 1993 when PT Indocement signed a cooperation agreement with PT Perhutani. In 2005, it changed into an agreement with the Government of Kuningan district and then the government made a new agreement with PT Perhutani regarding the distribution of compensation funds.

In addition to PT Indocement, the Government of Kuningan district also developed a water services cooperation agreement with the state-owned oil company, PT Pertamina, and the state-owned drinking water companies (Perusahaan Daerah Air Minum/PDAM) of Cirebon and Kuningan districts. At village level, a local NGO, Kanopi, together with the sub-district government of Mandirancan, facilitated cooperation between two upstream villages, Seda and Trijaya, with a downstream village, Kertawinangun.

After it was declared a national park, management required every water user to form an agreement with the park. Under such agreements, the water users were required to clarify programs of activities for the protection of water resources and to empower poor communities in the uplands. The activities were to be implemented through Forum Kemitraan Pengelolaan Kawasan Lindung Gunung Ciremai (FK-PKLGC/Mount Ciremai Protected Area Partnership Forum), which had been established as a framework for service providers and users. At the beginning of 2012, there were four entities that had signed agreements with TNGC: PDAM Cirebon city, PDAM Cirebon district, PDAM Kuningan district and CV Tirta Mekar Kuningan.

The rewards

RUPES aimed to clarify the basic concept of rewards for environmental services in relation to those provided by the Mt Ciremai National Park and to support collaboration among stakeholders at the district and provincial levels.

On 13 February 2012, FK-PKLGC was established as an intermediary agency to develop an environmental services cooperation process as well as programs to coordinate the activities of the various parties for the protection of Mount Ciremai and to empower the rural communities surrounding it.

Several activities have been initiated, including focus group discussions, workshops and information dissemination series for stakeholders at district and provincial levels and cross-visits to Cidanau Watershed Forum in Banten and Water Care Forum at Gunung Gede Pangrango National Park.

Figure 10. Workshop to develop a common understanding of payments for environmental services, involving Seda, Trijaya and Kertawinangun villages, national park staff and FK-PKLGC

Follow-up

At the time of writing, FK-PKLGC had not fully embraced all of the neighbouring districts. Its membership was only derived from Kuningan and Cirebon districts. Therefore, FK-PKLGC planned to expand the scope of its territory to Majalengka and Indramayu districts and develop a strategic plan for 3–5 years to gain the support of the four regions up to the provincial level (West Java province). In addition, FK-PKLGC planned to design an environmental services cooperation mechanism that was more in accordance with the conditions of Mt Ciremai.

The mechanism was expected to improve environmental services' scheme cooperation between users and service providers in the future, both for existing procurement agreements and those still being developed. In

addition, it was also expected to show how an environmental services' scheme can be applied between villages, that is, at a relatively non-commercial level, as well as to show the bigger mechanism at district level with commercial users.

The mechanisms are intended to further build awareness among the users and providers of environmental services, including policy makers from the governments, of the importance of preserving natural resources while also improving the livelihoods of communities.

The partner

Kanopi Kuningan

Kanopi is a non-governmental organization, established in September 1999, located in Kuningan district, West Java. The vision of the organization is the realization of fair and sustainable management of natural resources beneficial to the prosperity and independence of the people. Their missions is to develop collaborative, community-based, natural resources' management, improve the knowledge and quality of human resources, encourage economic development through community-based natural resources management, promote the practice of sustainable management of natural resources by the community, and develop a network of partnerships with other stakeholders. Strategies undertaken to realize the vision and mission are multistakeholder engagement and community empowerment.

Contact

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Paninggahan, West Sumatra

Province	West Sumatra
Districts	Solok and Tanah Datar
Area of watershed	129 000 hectare
Number of villages	13 nagari
Population	400 000 (2002)

The site

Lake Singkarak, approximately 21 km long and 7 km wide, is located between the cities of Padang Panjang and Solok in West Sumatra province. The water in Lake Singkarak comes mostly from five main rivers. Total catchment area is about 58 460 hectare. About 32% of the area surrounding the lake (18 664 hectare) is critical land (mostly covered by imperata grassland), while rice paddy (21%), upland crops (17%) and other uses (30%) make up the rest.

The system of governance in West Sumatra has been changed from 'village' into 'nagari' as part of the decentralization process. The nagari system recognizes the traditional effectiveness of local communities in managing natural resources. About 400 000 people (approximately 205 people per km^2) live in the surrounding area in 13 'nagari'. The main sources of income are agriculture and fisheries (76.5%), indicating that local people depend on the natural ecosystem for their livelihoods.

In 2002, the National Strategy Studies on Clean Development Mechanism conducted by the Ministry of Environment identified the Singkarak watershed as a potential site for implementing a national reforestation carbon project.

The issues

Logging activity in the past created thousands of hectare of bare land, most of which has not recovered. Agricultural activities in the uplands also helped create 'alang-alang' (Imperata cylindrica) land in some parts.

Previously, some scientists pointed to erosion around Lake Singkarak as the major problem and grassland reforestation as the main way to enhance environmental services, particularly to increase water supply. However, a RUPES study revealed that reforestation might not be the only solution.

We found that the change of inflow to Lake Singkarak was also caused by the rainfall pattern and a hydropower plant.

Environmental services and the people involved

Environmental services	Watershed services through reforestation program
People who provide the services	Five farmers' groups with a total membership of 80
People who benefit from the services	CO^2 Operate BV, PLTA Singkarak
People who act as intermediaries between the providers and the beneficiaries	Yayasan Danau Singkarak

During the first phase, RUPES was more focused on building the capacity of local communities, institutions and government agencies in Singkarak watershed.

In the second phase, RUPES worked to engage stakeholders in pro-poor environmental services' schemes, including buyers, investors and intermediary agencies, such as CO^2 Operate BV, Andalas University, the government's Forestry Service and Pembangkit Listrik Tenaga Air (PLTA/ hydropower company).

A voluntary carbon market was established, where Paninggahan communities as service providers, rehabilitated degraded land to generating carbon credits. CO^2 Operate BV was the buyer of the service. Yayasan Danau Singkarak (YADAS) and Nagari Paninggahan played the role of intermediaries, not only to assist farmers but also to be actively involved in administration and to monitor the rehabilitation process. The contract period is about 10 years with monitoring and evaluation each year. The community receive USD 1000 per hectare per year to provide sequestration of 4050 tonne of carbon-dioxide equivalent, produced from seven types of trees that have been planted on 25 hectare in the upper Singkarak watershed.

The rewards

Flowing money to upland communities

Together with PLTA and local communities, RUPES established a scheme to distribute royalties. This not only benefited the communities through improvement of their economic condition but also had advantages for electricity production. In 2005, Nagari Paninggahan received almost USD 40 000 from the hydropower company, or USD 1 per person per year.

This system offers an example for application elsewhere since it included compensation for damage caused to livelihoods (in the nagaris bordering the lake) and also for relatively poor nagaris. The funds were intended to provide an incentive to maintain environmental conditions. The amount of payment depended on the amount of electricity produced, thus, the stakeholders in return had a strong interest in supporting the better performance of the hydropower company.

Rehabilitation of grassland into agroforests through a voluntary carbon market

The voluntary carbon market project was located on grassed and cleared upland areas in the foothills surrounding Paninggahan. The aim was to involve farmers in a tree-planting scheme on grassland around Lake Singkarak in order to offset carbon emissions by the investor, as well as ensure that the farmers and the local communities benefited from the scheme through RUPES' rewards.

The main stakeholders were described as 'buyers' and 'sellers', that is, the buyer was the carbon trader and the sellers the farmers. A contract was negotiated between the service buyer, which was a company domiciled in the Netherlands (CO^2 Operate BV), with the service seller, which was the community of Paninggahan, represented by the 'wali nagari' (village leader). The leaders of the nagari signed the agreement and the farmers then implemented it, utilizing 28 hectare of communal land, with the aim of creating 4090 tonne of carbon over a period of 10 years. There were 43 farmers involved as sellers, mostly male but some female, all from the village or the surrounding area of Paninggahan. The carbon dioxide absorption and/or storage contract took effect from 1 September 2009. There were four organizations represented in the contract, namely, CO^2 Operate BV (buyer), World Agroforestry Centre (facilitator), the nagari of Paninggahan (seller), and YADAS (verifier).

The most important point in the contract was regarding payments that would be made to farmers, along with the terms (the 'conditionality'). Payment stages were divided into four: 1) 60% of the total payment upon contract signing; 2) 15% three months after the first payment; 3) 20% at the end of the fifth year (contract mid-period); and 4) 5% at the end of the contract period (in the tenth year). The contract value amounted to IDR 10 000 000 (±USD 1090) per hectare for each farmer, the total varying depending on the amount of land owned. The management board from the nagari of the villages (voluntary carbon market management board) received a fee of 12.5% of the total contract for services such as administration, supervision and program management in their nagari for a work period of 10 years.

The period of the contract was from 2009 to 2018. Species to be planted at a minimum of 1100 seedlings per hectare included clove (*Eugenia aromatica*), chocolate (*Cocoa*), avocado (*Persea americana*), durian (*Durio zibertinus*), mahogany (*Swietenia mahogany*), 'surian' (*Caeseria grewiaefolia*) and nut (*Pentace* sp). The planting was carried out in December 2009. The agreement with the buyers also included an obligation by the service providers to attend training in land preparation and tree maintenance.

Most of the farmers planted the trees on their land, with some already grown to the treatment stage. Funding for treatment was highly anticipated by the farmers considering the various needs for fertilizers, pest and disease control, and other cash requirements to ensure plants' growth.

At the time of writing, there have been varying reports of success from the farmers, with only 40% of the target amount of trees successfully planted, thus, already the scheme was behind on the ten-year plan. The buyer withheld payment until further progress was achieved.

Rehabilitation of 'ulu' coffee garden

Nagari Paninggahan was revitalizing its old coffee plantation, which took up 100 hectare out of the over 1050 hectare of their customary forest. They used 'organic' coffee production rules, benefiting from 50 years of no fertilizer input, to maintain clean water flow into Lake Singkarak. RUPES established a pilot plot that maintained environmental protection and optimized community income. The beginning stages of the project involved comprehensive community consultation with Paninggahan village.

In 2006, a number of local leaders involved in the RUPES project started to revitalize the kopi ulu area. The revitalization included a needs assessment, mapping land ownership, identifying coffee production techniques, developing a master plan, and searching for funding. In the next year, in collaboration with the Indonesian Coffee and Cocoa Research Center, RUPES and the community began the coffee revitalization program through two approaches: increasing the productivity of robusta coffee; and adding value to organic robusta coffee.

However, some problems needed to be solved. One of them was related to the land's status. The previous status was 'enclave', which recently had been changed by the district government into 'protection forest'.

Providing comprehensive scientific information about the rehabilitation of the coffee garden, in relation to biodiversity, water quality, and landscape as a whole, was needed to gain acceptance from local government and the communities.

Figure 11. Kopi ulu, a genuine robusta coffee species and an example of germplasm richness in Paninggahan

Development of environmental education centre and integrated clean lake program

In order to integrate RUPES' projects in Singkarak, and to support comprehensive and sustainable action to protect Lake Singkarak, an initiative to establish an environmental education centre emerged. The centre was expected to be a hub of knowledge as well as form part of a strategy to provide better environmental education that is closer to, and integrated with, the communities' daily lives. RUPES believed that environmental education was required for the younger generation, as they will be the main actors in the future management of their own natural resources.

In addition, the centre would provide information regarding ecotourism in Singkarak and the cultures of the Minangkabau societies. The World Agroforestry Centre is acting as a facilitator in establishing the centre. At the time of writing, the project was at model stage and seeking investors. The aims are to educate visitors and the local communities about the impacts of their activities on the environment, and about environmental issues in general.

Another project was integrated lake management. The aims were to bring more tourism, investment and prosperity to the area, all with environmental considerations at heart. To begin work on this, we brought together all stakeholders involved in management of Lake Singkarak to agree on efforts to improve the lake's condition. Later, four local governments (Solok district, Solok city, Tanah Datar district and Padang Panjang city) committed to cleaning the lake. This opened opportunities to expand the project nationally through the Lake Priority Program conducted by the Ministry of Environment. The communities also established working groups, which had as one of their aims providing extension programs about the importance of a clean lake for their lives and for those of other communities around it.

Follow-up

The completion of the RUPES project in West Sumatra was marked by a one-day seminar. The workshop examined a variety of research studies and results produced by the World Agroforestry Centre and its partners in West Sumatra, including recommendations for further action. The event ended with a handover of the final research reports to provincial forestry services, symbolizing the transfer of responsibility for further implementation of environmental services' schemes to the Government of West Sumatra. It was agreed that each program would continue, led by stakeholders such as Andalas University, Singkarak Lake Managemen Body, Forestry Services, and the Planning and Development Agency of Solok district.

The partners

- Yayasan Danau Singkarak (YADAS)

  YADAS is a local organization formed by members of the Paninggahan community who live in other parts of Indonesia, with the aim of supporting the community in Nagari Paninggahan by providing educational opportunities, village development through raising funds from other 'expatriate' village members and creating opportunities for cooperation by linking outsiders (investors, governments, local/international projects etc) with the nagari.

- Nagari Paninggahan, Solok, West Sumatra

  Nagari Paninggahan is one of 12 nagari around Lake Singkarak, in Solok, West Sumatra province. Paninggahan is 400–600 masl, with a temperature range of 19–28 ^{0}C throughout the year. The average temperature is 22 ^{0}C with average humidity of 83%.

- CO^2 Operate BV

  CO^2 Operate BV is a for-profit company working in the area of pro-poor emission reduction projects. The objectives of CO^2 Operate BV are not limited to the reduction of greenhouse gases but also extend to— in cooperation with industry—providing opportunities for local entrepreneurship, productive agriculture instead of degraded agriculture, enhancing biodiversity in the agricultural sector, and also planting trees to increase environmental functions and livelihoods. The company wants to contribute to a sustainable economy by combating climate change, reducing degradation of global biodiversity, and improving the sustainability of production chains and the socio-economic position of producers in Asia through innovative concepts. Customers are mainly from the printing industry but are rapidly expanding to all other sectors, ranging from advertising agencies to textile companies (http://www.co2operate.nl).

- Andalas University

  University Andalas was established in 1956 in Padang. It is the fourth oldest university in Indonesia and the oldest university outside Java. It consists of 11 faculties, most of them located at the main campus building, Limau Manis, 12 km from the centre of Padang, West Sumatra province. Webometrics placed Andalas in the 100 best universities in ASEAN (rank 26) with a ranking of 8 in Indonesia (best outside Java) in January 2011 (http://id.wikipedia.org/wiki/Universitas_Andalas).

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Sumberjaya, Lampung

Province	Lampung
District	West Lampung
Area of watershed	55 000 hectare
Number of villages	14
Population	42 000 (2000)

The site

Sumberjaya is a sub-district in the Bukit Barisan mountain range. These mountains span the west coast of Sumatra and form the upper watersheds of all major rivers on the island. The 55 000 hectare sub-district almost coincides with the Way Besai upper watershed between 720 and 1900 masl.

The population was approximately 87 350 people in 2004. At least 40% of the sub-district is classified as 'protection forest' and 10% as national park. Nevertheless, forest cover has declined from 60% in 1970 to 12% in 2000, leaving vast areas of deforested hillsides. Simultaneously, coffee farms have increased dramatically. Establishing and maintaining 'shade coffee' as part of the agroforestry systems has been considered to potentially slow erosion and a decline in water quality, as well as contributing to farmers' incomes. Coffee gardens now cover around 70% of the total area. The Way Besai watershed supplies a hydroelectric run-off dam of PLTA Way Besai. Electricity generation started in 2001 with a maximum capacity of 90 MW.

The issues

The Government's belief that uncontrolled deforestation and conversion to coffee on sloping land in Sumberjaya had led to a serious increase in erosion that threatened the operation of the newly constructed Way Besai hydropower dam and reduced water availability for irrigated paddy rice downstream resulted in the eviction of thousands of farmers from the forests between 1991 and 1996.

However, studies by the World Agroforestry Centre since 1998 showed that multistrata coffee farms provided livelihoods to people and also controlled erosion in a way similar to that of natural forest. Coffee farming and forest protection should not be set as two opposite practices.

Environmental services and the people involved

Environmental services	Improving the watershed function through community forestry and sediment reduction
People who provide the services	32 farmers' groups with 6400 members
People who benefit from the services	PLTA Besai, downstream communities
People who act as intermediaries between the providers and the beneficiaries	Community Forestry Farmers' Groups Communication Forum (FKKT-HKm)

The RUPES project studied three proposed rewards' mechanisms. First, a payment scheme involving a state-owned hydroelectric power company (PLTA), which, as a buyer, expects better water quality. Second, land tenure was the main reward proposed for watershed protection and carbon sequestration projects. The state forestry department was a potential provider of such a reward because it could issue permits for land uses. Local communities and the government began negotiations for legal rights to land, in exchange for better management of state forestland. The World Agroforestry Centre and local non-governmental organizations helped farmers develop community forestry schemes that envisioned land tenure for 25 years, after a 5-year trial period. Third, potential mechanisms began development to improve the quality of water for domestic uses at a local scale by introducing the possibility of direct payments.

The rewards

Community Forestry Program (Hutan Kemasyarakatan/HKm)

Since 2004, RUPES provided support to local communities to gain access to the Indonesian Government's Community Forestry Program (Hutan Kemasyarakatan/HKm). The HKm program provides farmers with conditional land tenure to cultivate protection forest. In exchange, farmers adopt environmentally friendly farming practices and protect the remaining natural forest, thus, ensuring that the land will continue producing watershed protection benefits. The HKm program covered 70% of Sumberjaya's protection forest, involved nearly 6400 farmers and accounted for 13 000 hectare. RUPES interpreted the HKm program as a form of reward for farmers who provided environmental services. This approach is just one example of a shift toward a new paradigm of community-based forestry management. Where opportunities for productive land use exist, such rewards may offer sufficient inducement for residents to switch to environmentally friendly land-use practices. The HKm program has nonetheless shown that poor farmers can successfully rehabilitate degraded land, through establishment of coffee-based agroforestry. This result strengthens the argument for rewarding land rights to poor farmers who provide environmental services, as a pro-poor policy of state land management.

River Care program

RUPES set up a pilot project with the community in one sub-catchment at Buluh Kapur village, as the sellers of the environmental service, and Perusahaan Listrik Negara Sektor Bandar Lampung (PLN-SBDL/National Power Company Bandar Lampung Sector), as the buyer, to develop a mechanism of payments for reducing sediment through a River Care program with reduction target was 30% from initial baseline. At the end of the program, the community had implemented the contract with an 86% activity success rate and can reduce sediment concentration up to 20% from the initial baseline. Even though the reduction target was not achieved, PLN-SBDL very much appreciated the community's efforts in reducing the sediment concentration in the Air Ringkih River and gave a micro-hydropower unit as a reward, regardless of the results. The appreciation showed by PLN-SBDL had a big impact on the community's role in improving the maintenance of their environment, in particular, their watershed.

PLN-SBDL were keen to continue their participation so the RUPES team facilitated two-years agreement (2011–2013) between PLN-SBDL and West Lampung Community Forestry Farmers' Group Communication Forum (FKKT-HKm) and a community contract for implementing River Care phase 2 in Talang Anyar village. The design of the program was a replication of the previous River Care phase 1, with activities mostly combining soil and water conservation with development activities as the rewards, such as goat breeding, nursery development, rattan planting, farmers' training in home industry and a coffee plantation demonstration plot.

Figure 12. Measuring water quality using a Secchi disk during water monitoring training for farmers in Sumberjaya conducted by the World Agroforestry Centre

Soil conservation program

This program's aim was the reduction of sediment through water and soil conservation activities on farmers' land, including terracing, sediment pits and weeding strip techniques.

The activities were monitored four times a year: in the third month after contract signing; at the sixth month; at the ninth month; and at the end of the contract. The farmers, as the service providers, received payment in cash to the amount of IDR 1 600 000 (USD 160) per hectare per year of the contract period.

Follow-up

Post-project action will focus on continuing the work that had been developed by the World Agroforestry Centre and RUPES over the last 10 years in Sumberjaya. The FKKT-HKm has demonstrated their ability to be an effective local institution that can act as an intermediary for environmental services' schemes. They successfully built mutual trust among the parties in Sumberjaya, providing a strong basis for them to become a centre of environmental activities in the future. To maintain this will need substantial commitment from their members. In anticipation of the potential challenges in coming years, the FKKT HKm has broadened its collaboration with several other partners, at district, provincial and national levels.

The Partners

- Forum Komunikasi Kelompok Tani Hutan Kemasyarakatan Lampung Barat (FKKT-HKm/West Lampung Community Forestry Farmers' Group Communication Forum)

  The FKKT-HKm in West Lampung is a membership-based organization representing 30 community forestry groups, which include roughly 7000 households, of which approximately 20% are headed by women. It was established in 2008 with support from RUPES. The Forum provides technical support to its member groups and seed funding for communal investments in livelihoods-enhancing activities. Within the Forum, the women's group is a strong sub-group, which provides its own technical guidance and micro-lending program.

- Perusahaan Listrik Negara Sektor Bandar Lampung-National Power Company Sector Bandar Lampung (PT PLN-SBDL)

  PT PLN-SBDL is one of the seven sectors under the management of PT PLN (Persero) Generation and Transmission, Southern Sumatra, which is responsible for generating electricity in the central and southern parts of Sumatra Island. PT PLN-SBDL is responsible for supplying electricity to the Lampung System (with peak load 350–400 MW). The sector coordinates five diesel power plants and two hydropower plants, including PLTA Besai, located in Sumberjaya district with a capacity of 2 x 45 MW. This is the largest provider of electricity in Lampung province, making up almost 60% of total supply.

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Nepal

The ecosystems in the Hindu-Kush Himalaya (HKH) region are endowed with rich biodiversity, immense and unique beauty; and are important watersheds and sinks of carbon. The services provided by these ecosystems are important and can be linked to provision of food, energy and other essential services for the wellbeing of humans and nature both upstream and downstream. The 'Himalayan water tower', as it's known, is a lifeline to nearly 1.3 billion people. The people living in these mountains protect watersheds, biodiversity and forests. However, there are limited economic and institutional incentives to the local communities who manage these important ecosystems. Policies that are required to mainstream environmental rewards' schemes in resources management and development initiatives are almost non-existent among all the HKH countries (Afghanistan, Pakistan, India, Nepal, Bhutan, China, Bangladesh, Myanmar) where RUPES' partner the International Centre for Integrated Mountain Development (ICIMOD) operates.

In the early days, in collaboration with Winrock International, RUPES implemented a project in Kulekhani watershed. It set out to develop an appropriate rewards' mechanism for the communities living in the catchment to support their environmental service of reducing siltation in the reservoir of the Kulekhani hydropower plant and increasing dry season flows in streams. Different awareness-enhancing and community-mobilization activities led to successful negotiations with the government for using some of the hydropower royalty money as an incentive for upland communities. An environmental management special fund was established under the Makwanpur District Development Committee that facilitates the allocation of a higher proportion of the royalty budget for the upstream villages. National policies related to hydropower revenue were reviewed and the perspectives of the local people about payments for environmental services (PES) mechanisms were also explored.

In Sundarijal catchment of Shivapuri Nagarjun National Park in Kathmandu valley, an assessment of the socio-economic situation of the

villagers residing inside the park, land-use changes and potential PES mechanisms was carried out. The results showed the high value of water services to state-owned companies (public water company and hydropower plant) and the cost of the national park's existence being borne by the villagers. Based on the review, a framework of a potential mechanism was developed. This framework proposes incentives to local communities for their role in conservation and the revenue is collected through state-owned companies, private companies and national park visitors into a local environment fund to be used for poverty-alleviating activities and local financing mechanism of national park management. An assessment of the national buffer zone policy indicates potential for integrating environmental services' principles into policy on protected areas. The current buffer zone policy allows benefit sharing from protected areas with local and surrounding communities.

Key findings

- Working through appropriate government agencies in pilot programs can lead to developing policies favourable to the implementation of PES mechanisms.
- Existing policies can be improved to make them pro-payments for environmental services.
- Local politics and conflict between groups can constrain proper implementation of environmental services' schemes.
- It is necessary to increase awareness among all stakeholders (local people, government officials, hydropower companies and community-based organizations) for effective implementation.
- Local institutions can be used to manage funding from environmental services' schemes and to determine community activities to support them.
- In the context of poor governance and local politics, there is a big risk of environmental services' money being diverted to fund activities that can reduce ecosystem services.
- The strategy of building pressure from the bottom up is good for raising awareness and developing a consensus about ecosystem services.
- In the context of environmental services' schemes in protected areas, there is potential for conflict between national park authorities and local communities.
- Lack of policies about ecosystem services and payment mechanisms severely hampers efforts to develop schemes.

Policy influenced

Based on the work of RUPES in Kulekhani, the Hydropower Royalty Distribution and Use Directive (2005) was issued by Makwanpur District Development Committee, allocating 50% of royalties it receives from the central government to the Village Development Committee where the hydropower plant is located. A significant portion of this money is provided to villages in the upstream area for conservation activities. This directive was circulated to all districts in the country to adopt a similar approach of paying a higher proportion of hydropower royalties to upstream communities.

Kulekhani

District	Makawanpur (2426 km^2)
Area of watershed	124.97 km^2
Number of villages	8
Population	478 000 (2011)

The site

Kulekhani watershed is located 50 km southwest of Kathmandu. It is the source for the Kulekhani reservoir that supplies water to hydropower plants downstream. The 92 MW Kulekhani hydropower plant is the only storage-based plant in the country, providing about 17% of the total hydroelectricity generated in Nepal. A third stage, currently under construction, will generate 45 MW in the near future. There are about 8000 households with over 45 000 residents in eight villages in the catchment. Most households depend on agriculture and livestock. Intensive agriculture for commercial vegetable production and paddy rice is increasing. Community forests in the watershed are well protected and forest cover has increased over the last two decades.

The issues

The reservoir depends on water from the 12 500 hectare watershed. The four months of monsoon account for around 80% of annual precipitation. Within the watershed there are settlements and a mosaic of different land uses. The upstream land-use pattern directly affects the water storage capacity of the reservoir. Sedimentation, caused by intensive agriculture and land

disturbance, is the main problem for hydropower plants in Nepal. Kulekhani hydropower plant also faces the problems of high sedimentation in the rivers and low dry season flow. Economic losses associated with siltation in the reservoir are very high. While many check-dams were built along rivers to reduce siltation in the reservoir there had been no program to encourage upland communities to practice more conservation-oriented farming and there were no incentives provided by the hydropower plant to the community forest users for improving the forests.

Legislation mandates all hydropower plants to pay royalties to the central government. Twelve percent of the royalties are returned to the district that houses the power plant. However, there was no acknowledgement of the role of upland communities and forests in providing hydrological services.

Environmental services and the people involved

Environmental services	Decreased sedimentation in the lake and increased dry season flow in the rivers
People who provide the services	8599 households of 46 197 people in the catchment area
People who benefit from the services	Nepal Electricity Authority
People who act as intermediaries between the providers and the beneficiaries	Winrock Nepal

The amount of water in the lake determines the amount of electricity that can be produced. Siltation not only reduces the volume of water in the lake, thereby affecting power generation, but the cost of regular de-siltation is also significant. Most of the sedimentation comes from agricultural land in the catchment. The protection of forests by community forest users contributes to reducing siltation.

The dry season is very long, about 8 months, and hence hydropower generation is at its lowest before the rainy season that starts in mid-June. If water flow can be increased during the dry season there will be higher power output, too. Protection of forests and carrying out less intensive agriculture (that is, with less soil disturbance) by upstream people can help achieve these two increases.

The rewards

In 2003, RUPES started to work with upland communities and the Kulekhani hydropower company to foster a win-win situation based on an environmental services' mechanism. Programs were implemented to enhance awareness about environmental services among the local communities and other stakeholders and to promote conservation farming in the uplands. The Kulekhani Watershed Conservation and Development Forum was established to facilitate communication between different stakeholders and to promote

conservation. The forum succeeded in developing an environmental services payments' mechanism based on the Local Self-Governance Act 1999 and the Decentralization Act 1992.

At district level, for the first time in Nepal, a Hydropower Royalty Distribution and Use Directive (2005) was issued by Makwanpur District Development Committee, allocating 50% of royalties it received from the central government to 12 hydropower-plant-affected villages (eight in the uplands, two surrounding the lake and two downstream). An Environment Management Special Fund (EMSF) was established under the Makwanpur District Development Committee that oversaw the distribution and allocation of the royalties for the villages. Continuing work includes a review of national policy on royalties from hydropower plants; and a review of the role, responsibility and involvement of major stakeholders (sellers and buyers of environmental services). At the time of writing, a national policy workshop was being planned.

Figure 13. Forests on hill slopes and better agricultural practices can help reduce sedimentation in the rivers and lake downstream

Follow-up

Ensuring the proper use of reward money is a challenge compounded by political instability and conflict at local level.

While there was a need for continued support as requested by Makwanpur District Development Committee, the project was halted owing to funding problems. A post-scheme study revealed that the momentum developed during development was waning and the environmental services' scheme money was being diverted to other activities (mainly construction

of new roads) that lead to further degradation in the catchment. However, the payment for environmental services' initiative in Kulekhani has become a learning site for many national and international visitors.

The partner

International Centre for Integrated Mountain Development

A regional intergovernmental learning and knowledge sharing centre serving the eight regional member countries of the Hindu Kush Himalaya region (Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan), based in Kathmandu, Nepal, which aims to assist mountain people to understand changes, adapt to them, and make the most of new opportunities, while addressing upstream–downstream issues.

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Shivapuri

District	Kathmandu (395 km^2)
Area of watershed	Sundarijal catchment (15.76 km^2)
Number of villages	3 (inside the national park)
Population	1667 (2007)

The site

Shivapuri Nagarjun National Park is situated in the north of Kathmandu valley and is the nearest national park to the capital city, Kathmandu. The park lies between 1350 and 2732 masl and is spread over Kathmandu, Nuwakot and Sindhupalchwok districts of central Nepal. It is rich in biodiversity, with more than 2000 plant species, 21 mammals and 180 birds, and also has cultural and livelihoods' importance for local communities. Sundarijal catchment inside the park provides up to one-third of the piped water of Kathmandu Valley. Water from the catchment is also used for generating hydroelectricity, irrigating paddy fields, bottled water, and the soft drink industry. The catchment is also an important site for both domestic and international visitors who come to enjoy its natural beauty.

The issues

The park manager is facing difficulty in its management. Deforestation for agricultural cultivation and harvest of forest products coupled with human–wildlife conflict were serious issues. The local people's livelihoods depended on access to forest resources and continued cultivation for those living inside the park. Limited budget for park management made it difficult to effectively

control deforestation. This was compounded by the fact that local people had no interest in upland conservation because they did not receive tangible incentives. However, upland watershed conservation was of significant economic value to the downstream population, with water services provided at low or zero cost to users, and at low or zero reward or compensation for the upland conservation efforts of the locals and the park authority.

The park is also a story of quintessential conservation at the cost of local livelihoods. There are people living in the villages located within the park boundary who have literally been fenced in and are subjected to 'command and control'. The condition of the land and ecosystem of the catchment improved significantly while the local people's status remains difficult, with many households living in poverty especially through human–wildlife conflict, lack of infrastructure and development. The International Union for the Conservation of Nature's biophysical-economic-livelihoods assessment of conservation inside the park indicated that even though conservation makes economic sense, continuing to expect catchment land and resource managers to cover the costs for downstream water users will further marginalise the local people.

Environmental services and the people involved

Environmental services	Regular supply of clean water for domestic use and hydropower generation, biodiversity, recreation and religious significance
People who provide the services	National Park Authority and local communities (320 households of 1667 people)
People who benefit from the services	Water users in Kathmandu valley, farmers downstream, water company, industries, visitors and tourism
People who act as intermediaries between the providers and the beneficiaries	Nepal Environment and Tourism Initiative Foundation

The park protects a vital catchment of the Bagmati, Bishnumati and Yashomati rivers. The watershed is one of the main sources of drinking water for Kathmandu. Everyday about 30 million litre (about one-third of the demand) is tapped from the rivers as well as several other smaller streams. The downstream users include the hydropower plant, drinking water processing centres, and farmers (irrigation). The water company, Kathmandu Upatyaka Khanepani Limited (KUKL), is the key beneficiary (on behalf of water users). Some hydropower is also generated by the state-owned Nepal Electricity Authority. Tourism is a significant income-generating sector for the government. A number of industries downstream rely on water from the upstream catchment.

The Rewards

Potential for a payment for environmental services mechanism

While all evidence points to the need for a rewards mechanism for enhancing conservation and local livelihoods, there is little clarity on how such a mechanism could be designed and what the policy issues are. There are multiple stakeholders: Department of National Parks and Wildlife Conservation, local communities living in and around the park, Nepal Army guarding the park, KUKL representing the water users in Kathmandu and local communities living downstream.

Continuing work and future plans

The feasibility study of 2010 established the rationale for initiating an environmental services rewards' scheme in Sundarijal watershed, identified major stakeholders, recommended a potential framework for the scheme and made a number of suggestions.

In 2011, numerous activities were implemented to enhance local stakeholders' awareness about ecosystem services and improve their negotiation skills in order to negotiate with the beneficiaries of the services. A local stakeholder forum was established to co-ordinate progress. A 13-member Sundarijal Environment Committee was also established and remains active in pursuing government agencies and ecosystem services' beneficiary groups. Eco-clubs at local schools, established to promote conservation awareness have been mobilised in collaboration with local university students and local clubs.

Figure 14. Clean water for domestic use is expected to be available for consumers in Kathmandu valley through a rewards for environmental services' scheme

The field-level activities were led by the Nepal Environment and Tourism Initiative Foundation. Dialogues with various stakeholders (ecosystem services' beneficiaries) and relevant government agencies continue to engage them in the development and implementation of a feasible rewards' scheme. Significant progress has been made. Research support was provided by Forest Action and ICIMOD. Analysis of national policies—in particular those related to land-use changes and their drivers, and buffer zone management—in order to develop recommendations for pro-rewards national policies in the country. Efforts are underway to secure funding for local activities to complement rewards' schemes initiatives. Consultations with the key stakeholders are being held with the local Sundarijal Environment Committee taking the leading role.

Follow-up

No rewards' scheme has yet been developed although a framework for a feasible scheme has been proposed based on a series of studies. The locally formed Sundarijal Environment Committee with support from Nepal Environment and Tourism Initiative Foundation and ICIMOD is taking a proactive role in approaching various ecosystem beneficiary groups and government agencies to implement the scheme. The progress is relatively slow, mainly due to the unstable political situation, unclear intentions and confidence of key beneficiary groups.

The partners

- International Centre for Integrated Mountain Development

  A regional intergovernmental learning and knowledge sharing centre serving the eight regional member countries of the Hindu Kush Himalayas (Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan) and based in Kathmandu, Nepal, which aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues.

- Nepal Environment and Tourism Initiative Foundation

  A local NGO promoting conservation and responsible tourism in Shivapuri and other tourist destinations around Kathmandu.

- Forest Action Nepal

  A local NGO active in policy and action research in the field of natural resource management and livelihoods.

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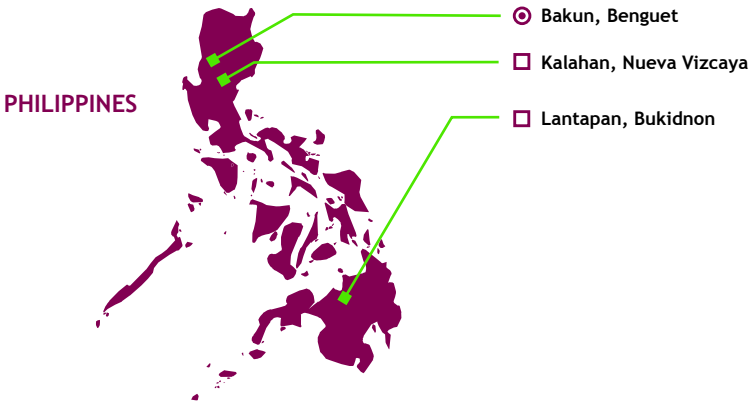
Philippines



The Philippines has severely degraded natural resources. The situation has adversely affected the environmental services they provide. In the early 1900s, it was estimated that 70% of the country was covered with 21 million hectare of forests. However, only 6 million hectare remained as of 2004. Thus, in the last century alone, the Philippines lost almost 15 million hectare of tropical forests.

Since the early 1970s, when extensive reforestation efforts began in the Philippines, various incentive schemes have been implemented to encourage people to plant trees on private and public land. However, after more than three decades of support, reforestation efforts in the Philippines have largely been ineffective partly because the incentives provided were either inappropriate or did not consider the long-term nature of reforestation.

Partly in response to the limited success of government-initiated programs, a number of local governments, research organizations and NGOs in the Philippines began testing various environmental services rewards' schemes as a way of reversing environmental degradation.

The RUPES Philippines project was designed to test water (RUPES Bakun and Lantapan) and carbon sequestration (RUPES Kalahan) environmental services' schemes. In 2003, Kalahan was selected as an action research site in the country to develop a carbon sequestration payments mechanism; while in 2004, Bakun was selected to test the mechanism for watershed payments. In 2006, Lantapan was identified as a RUPES associate site and later became an action research site for watershed services' payments in 2008. Through these sites, we hoped to establish rewards mechanisms to encourage people's participation in protecting and conserving the environment and improving their livelihoods.

Key findings

At all RUPES' sites, the project worked with community-based organizations as the main stakeholders, who were themselves identified as local resources managers and providers or sellers of environmental services. Community support was highly important in the proper implementation of the project. Aside from that, the initiative of the community was vital for the sustainability of the project's goals as they were the ones who would ensure the continuity of what RUPES had started once the project ended.

There are existing national and local policies and legal frameworks which could be utilized to enable mechanisms locally. However, these legal frameworks could only help if the local government units (LGU) or communities opted to allow them to work in favour of establishing a rewards mechanism for conservation and poverty alleviation. The LGUs are mandated by national law to protect and nurture the natural resources under their jurisdiction for the benefit of present and future constituents and, thus, are capable of exercising actions accordingly. But due to lack of political will they were unable to do so.

Policy influenced

- RUPES Philippines organized the Payments for Environmental Services Technical Working Group, which consisted of members from government and non-governmental organizations intent on advocating payments for environmental services. The working group aimed to mainstream and institutionalize payments for environmental services' schemes in the Philippines by conducting research and documenting and disseminating results; advocating policy to support implementation in the country; establishing networks with national and international organizations; and supporting workshops, training and capacity building activities; as well as mobilizing resources.
- RUPES Philippines contributed to the formulation of the Philippine REDD+ Strategy, which included environmental services' schemes as one of the financial mechanisms to be used in the implementation of REDD+ in the country.
- RUPES provided the framework for localized RES initiatives in the Lantapan municipality by supporting the enactment of Lantapan's Municipal Ordinance 114, 'Incentive support system for farmers adopting or investing in sustainable farming systems'.

Bakun

Province	Benguet
District	Lone Congressional District of Benguet
Area of watershed	21 129 hectare (91% in Bakun municipality; 9% in two Ilocos Sur municipalities)
Number of villages	7 villages/barangays
Population	12 137 (2007)

The site

The Municipality of Bakun is situated at the northwestern tip of the Province of Benguet, Cordillera Administrative Region, Philippines. Bakun, which is about 31 000 hectare of rugged mountains, was the first in the country to be awarded a Certificate of Ancestral Domain Title (CADT). Bakun has a population of 12 137 (2007) in 2346 households predominantly of the Kankanaey-Bago tribe. The tribe's indigenous way of life governs how they relate with their natural ecosystems and among themselves. They have indigenous knowledge, systems and practices that govern the management and utilization of their ancestral domain.

The Bakun watershed has a total drainage area of 29 300 hectare, consisting of four big rivers and several tributaries. The Bakun and Gambang rivers support the hydroelectric power operations of two mini-hydro companies, Hedcor Inc and the Luzon Hydropower Corporation, which provide benefits to the municipality and LGU.

The issues

Deforestation and water pollution were among the main problems of Bakun watershed identified during a hydrological assessment conducted in 2004. Deforestation was said to be caused by the occurrence of forest fires, the existence of logging and small-scale mining industries, and the expansion of commercial vegetable production that was driven by the increasing demand of a growing population. With the decrease of forest, siltation naturally occurred, which was further aggravated by road widening activities of the hydroelectric companies. The increase in silt load accumulation was estimated to cost the power plants about PHP 30–40 million (USD 729 000–971 000) worth of repairs and maintenance of turbines and other facilities annually. Water pollution, on the other hand, was caused by chemical waste from agricultural inputs and oil from vehicles. The existence of these problems could be seen in the decline of the quantity and quality of water.

The indigenous people living in the watershed were predominantly poor, with about 87% living below the poverty threshold. The municipality of Bakun had been receiving monetary remuneration from statutory, negotiated and voluntary benefits, paid in cash and kind by the power plants since their establishment. These benefits and financial assistance would have been ideal to alleviate the livelihood of the indigenous people. However, it was within the discretion of the LGUs to utilize the benefits according to their own municipal development priorities, with no or very little direct assistance given to those who were directly responsible for the stewardship of the watersheds. Based on the 2005 assessment of benefits provided by the two hydroelectric companies, most of the benefits went to infrastructure development. Very little had been aligned to livelihoods' development and watershed conservation.

Environmental services	Water for domestic, agricultural and industrial purposes
People who provide the services	The upland Kankanaey-Bago tribe
People who benefit from the services	Luzon Hydropower Corporation, Hedcor, lowland communities
People who act as intermediaries between the providers and the beneficiaries	Bakun Indigenous Tribes Organization, LGU

Environmental services and the people involved

The Bakun watershed supplies water to the community for domestic, agricultural and industrial purposes. The community relies heavily on the watershed for sustained stream flow, good water quality, and a generally stable environment, particularly since the main source of livelihoods is farming and the hydropower companies rely on it to produce electricity.

Some of the essential environmental services' scheme components were already in place prior to the choosing of Bakun as a RUPES site. For one, the possible sellers and buyers were easily identified. The upland Kankanaey-Bago tribe served as the provider and seller. The indigenous people had been maintaining the watershed for generations. However, it was not enough to just protect it, as economic necessities and population increase had overwhelmed the need for conservation. The hydropower companies operating in the area were identified as major environmental services' beneficiaries of sustainable water supply. Traditionally, water had been used for domestic and agricultural purposes. But since the establishment of hydroelectric companies in 1991, water became essential for the production of electricity, paving the way for the electrification of some communities in the municipality as well as the construction of roads in the 'barangays' (smallest government units) where the plants were located.

Second, the optimal policy and legal frameworks were already in place through the Energy Act 1992 and the Electric Power Industry Reform Act 2001, which required hydroelectric companies to pay a specific amount that should benefit host communities. Aside from that, there was a memorandum of agreement between the power companies and the LGU, strengthening the relationship and increasing financial benefits received by the municipality of Bakun. It seemed that it was only a matter of seeing to it that the funds were directed to preserving the watershed and improving the livelihoods of the upland communities, which, before, were not primary concerns of the LGU nor the communities.

The Bakun Indigenous Tribal Organization (BITO), as the representative of the indigenous people, and the LGU of Bakun acted as the intermediary between the hydropower companies and the indigenous people, particularly in the upstream areas. RUPES, together with the Department of Agriculture Cordillera Highlands Agricultural Resource Management (DA-CHARM), provided assistance to the indigenous people by supporting capacity-building activities that were vital in enabling them and the intermediaries to negotiate with the hydropower companies and handle the rewards' mechanism.

The rewards

The existing mechanisms of the hydropower companies were assessed for their efficacy regarding the twin objectives of poverty alleviation and resource sustainability. Since the hydropower companies were providing other benefits that could be given directly to the Bakun people, RUPES helped them to design proposals for watershed conservation programs that could reduce sedimentation.

RUPES in Bakun also increased the awareness of the community regarding the importance of environmental services and the need to conserve them for continuous benefits. Capacity-building interventions were conducted based on an assessment of the capacities of Bakun stakeholders to implement and sustain RUPES' activities in Bakun.

A RUPES Technical Advisory Group composed of representatives from line agencies of government and non-governmental organizations in the region was formed. From that group, a technical working group was established to formulate the Bakun Integrated Watershed Development and Management Plan. In 2008, the plan was finalized with the intention of being jointly implemented by BITO and the Bakun LGU.

The plan's activities would benefit the operations of the hydropower companies, thus, they needed to reward the indigenous people for their work. The rewards included incentives to villages for reducing the incidence of forest fires and rewards to upland farmers for protecting their private woodlots instead of converting them into vegetable gardens.

In order to prepare RUPES' partners, particularly the LGU and the community, a proposal-writing workshop and a negotiation skills training course were conducted to enable them to negotiate properly with the two hydropower companies in Bakun to fund conservation and rehabilitation activities.

Follow-up

Post-RUPES, the World Agroforestry Centre will follow up on the implementation of the plan, as well as the proposals made for the hydropower companies, and support further negotiations. The Centre will also continue to promote environmental services' mechanisms in the development of watershed programs in Bakun.

The partners

- Cordillera Highlands Agricultural Resource Management project

  The Cordillera Highlands Agricultural Resource Management Project (CHARMP) is a long-term loan project under the Department of Agriculture funded by the International Fund for Agricultural Development, Asian Development Bank and OPEC Fund for International Development. The goal of the project is to reduce poverty and improve the quality of life of rural highland indigenous peoples in the Cordillera Administrative Region. The project is currently in its second phase.

- Bakun Indigenous Tribes Organization

  The Bakun Indigenous Tribes Organization is a municipal-wide grassroots people's organization established in 1998 with the main objective of promoting social and human development, economic growth, cultural development, a quality environmental and sustainable use of resources.

- Bakun Local Government Unit

  The municipality of Bakun has supported RUPES through its creation of the RUPES Bakun Technical Working Group, which consists of representatives from the different local government divisions and other stakeholders, such as CHARMP, the Bakun Indigenous Tribes Organization and RUPES.

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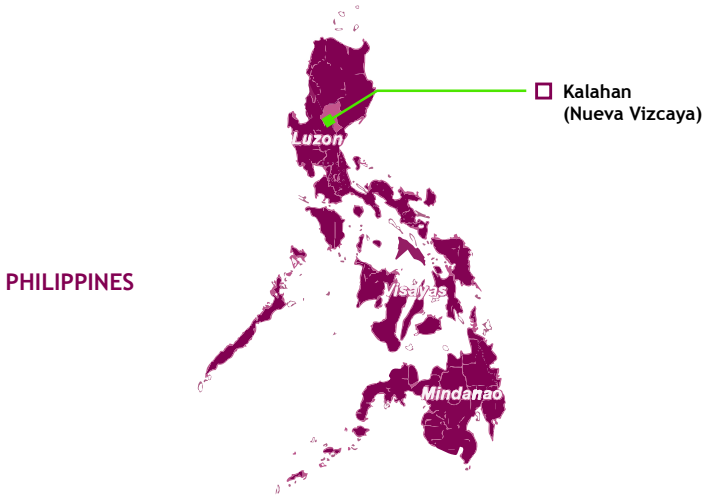
Kalahan



Province	Nueva Vizcaya
District	Lone district of Nueva Vizcaya
Area of watershed	14 730 hectare
Number of villages/barangays	6 (among the 16 barangays of Santa Fe that are within the Kalahan Forest Reserve)
Population	13 427 (2007)

The site

The site is known as the Ikalahan Ancestral Domain, which covers 38 000 hectare in Nueva Vizcaya plus about 10 000 hectare in Nueva Ecija. The entire area is mountainous. It is located approximately at latitude 11° N and longitude 122° E, with elevation of 600–1717 masl, with average rainfall recorded at over 4000 mm per year and temperatures ranging 8–24 ^{0}C. Rainfall ranges 3000–5000 mm per year. Much of the area is forested, mostly with Dipterocarp species although the western edge is largely pine. Some of the forests are primary but most are secondary. Broad areas in the east are barren because of logging by people from outside the region several decades ago.

About 90% of the population are from the Ikalahan tribe. Five percent are from other indigenous tribes, primarily Ifugao, Ibaloi and Kankana-ey, while the rest are Ilocano and Tagalog. Interrelations are good. Most families practise subsistence swidden farming although a few have begun to plant commercial, high-value vegetables.

The Kalahan Educational Foundation (KEF) is a community-based organization established in 1973 by the Ikalahan tribal elders to protect the communities from possible eviction by land grabbers. The foundation

was used as an instrument to rally the indigenous people to protect their rights. KEF's goals were to promote education, protect the environment of the Ikalahan people and their ancestral domain, provide sustainable forest-based livelihoods, and improve watersheds and biodiversity. Through a memorandum of agreement signed by the KEF and the Bureau of Forest Development, the forest government agency in the 1970s, the ancestral domain rights claim of the Ikalahan over 48 000 hectare was recognized and nearly 15 000 hectare within the ancestral domain was designated as the Kalahan Forest Reserve. In 1999, through the Indigenous People's Rights Act 1997, the Ikalahan were able to strengthen their claim. On 21 April 2006, the Certificate of Ancestral Domain Title was finally presented to the Ikalahan.

The issues

In the past, each family was allowed to cultivate anywhere, especially in forests where the soil was still very fertile. This resulted in widespread burning and conversion of forested areas to farmlands. Although the Ikalahan were observing fallow periods to regain soil fertility, the time needed for successful rotation was 15–18 years or even longer. As the Ikalahan population increased, the traditional farming system required more land for cultivation, resulting in continuous reduction of the forested area. As well, encroachment by non-Ikalahan owing to intermarriage and selling of CADT rights threatened the stability of the Ikalahan culture and conservation efforts.

The Ikalahan ancestral domain is an ecologically sensitive area with rich biodiversity. It is also a very important watershed for three important river systems. The Kalahan forests recharge the aquifers which benefit downstream farmers but the Ikalahan caretakers of those forests were not even able to recover their costs in protecting and maintaining the source of these services. The Kalahan forests also sequester huge amounts of carbon from the atmosphere.

Environmental services and the people involved

Environmental services	Carbon, water, biodiversity
People who provide the services	Ikalahan indigenous people
People who benefit from the services	Voluntary carbon market, REDD+, hydroelectric companies
People who act as intermediaries between the providers and the beneficiaries	Kalahan Educational Foundation

The Ikalahan Ancestral Domain is an important watershed, a rich biodiversity sanctuary, and a source of various environmental services to its immediate and lowland communities. Within the Domain are three important river systems that are important irrigation and drinking water sources for downstream communities. The Kalahan Forest Reserve within the Domain has high flora and fauna diversity. It has the potential to serve as a corridor between important protected areas and critical watersheds of Talavera and

Pantabangan-Carrangalan to the southeast, and the Lower and Upper Agno river basin to the northwest. Its strategically located, high floral diversity could serve as a corridor for migrating and endemic birds.

A key environmental service the Kalahan Educational Foundation was examining was the Kalahan's potential for carbon storage and sequestration. The Foundation collaborated with various bodies, such as RUPES, University of the Philippines Los Baños and the German Federal Ministry for Economic Cooperation and Development, in order to prepare the community to engage in the carbon market. The community required additional support for protecting their forest and, at the same time, in providing for their livelihoods, as these two activities tended to contradict one another.

The Foundation mediated between the community and various organizations conducting projects within the Domain, including RUPES. The RUPES team, along with other agencies, were able to help the community towards their goal of conserving the forest by training them in the skills needed to manage the forest themselves.

The Foundation aimed to enter the forest reserve into the carbon market by preparing and collecting data to meet the rigorous requirements of the Clean Development Mechanism (CDM). However, based on the results of the rapid carbon stock appraisal that RUPES conducted for the reserve in 2010, the RUPES team recommended that the Foundation focus instead on entry into the voluntary carbon market.

Water quantity and quality were also very valuable environmental services that the Kalahan could offer. Negotiations with a hydroelectric company to build a power plant in the Kalahan began in the first half of 2012.

The rewards

RUPES focussed on the development of a carbon sequestration payments mechanism for the Domain, helping the communities surrounding the Kalahan Forest Reserve to prepare to enter the international carbon market, particularly, through training and searching for potential buyers.

Potential buyers included bird-watching groups, churches, students, foreign tourists and public and private organizations. The rewards' mechanisms would operate through the people's organizations within the Domain, which already provided educational, medical and other services plus employment.

In 2012, a project idea note was developed for presentation to carbon buyers. It was created through the 'Connecting Ikalahan to the Voluntary Carbon Market' project, funded by the Food and Agriculture Organization of the United Nations (FAO). The note was distributed at the National Environmental Services Market Fair on 12 April 2012, an event jointly conducted by the FAO project and RUPES.

During the fair, the Foundation met with a hydroelectric company interested in building a power plant in the Kalahan. Negotiations about the project and payment mechanisms are underway.

The Kalahan is also considered eligible to enter into programs based on the 'Reducing emissions from deforestation, forest degradation, conservation,

Figure 15. Community mapping, RUPES Philippines

sustainable management, and enhancement of forest stock' concept (REDD+), which could cover the whole Domain rather than just the forest reserve.

Other schemes covering watershed services and biodiversity are also being developed.

Follow-up

The World Agroforestry Centre will continue to assist the Foundation to search for buyers for their environmental services, particularly for the carbon. The project idea note can be presented at national and international forums. Dialogue between the Foundation and the hydroelectricity company will also be supported.

The partner

Kalahan Educational Foundation

The Kalahan Education Foundation is a people's organization founded by the Ikalahan tribal elders in 1973 to protect the community from possible eviction from their forest land. It promotes the economic, physical, mental, social, good governance, moral and spiritual development of the indigenous people within the Ikalahan community.

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Lantapan

Province	Bukidnon
Area of watershed	35 465 hectare (Lantapan part)
Number of villages	14
Population	51 406 (2007)

The site

The Municipality of Lantapan is in a river valley located between the biodiversity-rich Mt Kitanglad Range Natural Park on its northern side and the Manupali River to the south.

The Park is one of the world's 25 biodiversity hotspots. Mt Dulang-dulang, the country's second highest peak, is sacred to the indigenous people. It is also a favourite peak for mountain climbers and birdwatchers.

In 2010, the Park was awarded the highest recognition for protected areas in the Heritage Parks list of the Association of South East Asian Nations (ASEAN) because of its unique, diverse and outstanding ecological, economic and cultural values.

Several rivers and creeks flow from the Park through intensively cultivated agricultural areas to the Manupali River, which runs into a network of irrigation canals constructed by the National Irrigation Administration, currently operated by the Bukidnon Irrigation Management Office. The whole system ultimately drains into the Pulangui Reservoir and supports the biggest hydropower plant in Mindanao, operated by the National Power Corporation (NPC-Pulangui IV).

The issues

Lantapan's rich natural resources and favourable climatic conditions attracted migrant farmers and agribusinesses. The majority of the people are dependent on farming for their livelihoods. However, agribusinesses started to dominate the agricultural landscape in 2000. Corporate banana farms and, recently, pineapple, and swine and poultry production stimulated economic growth and were key drivers of land-use change in the last ten years.

The shift to commercial agriculture by corporations and large landholders pushed smallholders onto smaller plots in less productive and more environmentally fragile areas. This pattern of agricultural expansion involved the replacement of forest and permanent crops by annual crops and the spread of annual crops even in high altitude and steeply sloping areas. This increased soil erosion rates, causing further land degradation. The irrigation system is now unable to reach its intended service area owing to water shortages, especially during the dry months, caused either by low stream flow or low storage capacity due to high silt deposits. Similarly, the NPC has over the years, experienced a power generation crisis owing to the poor condition of the Pulangui Reservoir. The extent of silt deposit is enormous, making the plant inefficient, unable to produce the expected energy output and resulting in a shorter life span for the dam. Sustaining the volume of water demanded by different stakeholders has become problematic. Water competition not only lead to scarcity and depletion of underground and surface water but also aggravated conflict stemming from overlapping water rights and poor benefit-sharing.

Environmental services and the people involved

Environmental services	Water Others: Eco-tourism, biodiversity, carbon sequestration
People who provide the services	Smallholders in 7 upland villages
People who benefit from the services	LGU's water system Agribusiness sector Rice irrigators Hydroelectricity company
People who act as intermediaries between the providers and the beneficiaries	LGU Lantapan Bukidnon Environment and Natural Resources Office Deparwment of Environment and Natural Resources

Water is the main environmental service in Lantapan. The four rivers emanating from the Park are the major sources of water for both smallholding farmers and the agribusiness sector. They are also the source for potable water distributed by the LGU through its municipal water system, and for irrigation through a network of canals now operated by the Bukidnon Irrigation Management Office, with a service area of 4395 hectare of rice fields in Lantapan and

neighbouring cities of Malaybalay and Valencia. Further south, the whole system drains into the Pulangui Reservoir in Maramag.

Additionally, Lantapan plays a significant role in biodiversity conservation. The natural forests in the Park, the tree plantations and smallholders' agroforests also provide carbon storage and sequestration services. Parts of seven villages are within the Park, and eco-tourism provides villagers with additional income as guides and porters to mountain climbers and birdwatchers.

Members of the Lantapan LandCare Association, among others, have adopted various soil and water conservation technologies. The World Agroforestry Centre's database (2002) showed that 13% of the total farm households (5500 in 2001) had adopted conservation technologies. The total area using conservation technologies was almost 1230 hectare, representing 11% of the total farmed area. If conservation technologies is practised expansively there is potential for the farming system to become stable, with accrued environmental benefits including soil erosion control, maintenance of water quality and quantity, increased carbon storage and sequestration, biodiversity protection and landscape aesthetics.

The rewards

Several incentive policies at the national level existed in Lantapan, such as 'usufructury' rights in the Integrated Social Forestry and the Community-Based Forest Management programs run by the Department of Environment and Natural Resources. The Municipal Government of Lantapan established a policy in 2001 that provided incentives to farmers adopting contour farming.

With RUPES' support, the Government further established Ordinance No. 114 in 2009 (guided by a five-year Sustainable Farming System Investment Plan), an incentive-based policy under which, various forms of support are provided to farmers and farmers' organizations as rewards. The ordinance encourages the adoption of, and investment in, sustainable farming and stabilises the provision of environmental services in the watershed.

Figure 16. A government staff discussing the current condition of Manupali watershed in Lantapan with a tribal leader

Using this policy as the framework, negotiations with NPC to implement a rewards' mechanism for watershed services has been completed in 2012 through a Memorandum of Understanding. The company is being asked to fund the rehabilitation, reforestation and protection of the Alanib sub-watershed through a 'family approach' that provides farming communities with livelihoods and ensures watershed services at the same time.

In the eco-tourism sector, climbers and birdwatchers pay entrance fees to the Department of Environment and Natural Resources and obtain consent from the indigenous community. Negotiations are underway for the Department to share a portion of the fees with the communities near the entrances to the Park as an incentive for maintaining landscape beauty.

Through the Department, which is a member of the RUPES Working Group in Region X, the Holcim Philippines Manufacturing Corporation is funding the establishment of rainforestation and agroforestry in the Park until 2017. This is an incentive in the form of employment for the Kitanglad Guard Volunteers as well as ensuring sources of non-timber forest products in the future.

Follow-up

Farming communities have been trained to develop project proposals as well as negotiate these with potential buyers. The Working Group in Region X will continue to facilitate negotiations that are already underway as well as support the integration of environmental services rewards' schemes in land-use programs in the region. The group expects that integration with the implementing rules and regulations of the Bukidnon Environment Code and Bukidnon Watershed Framework Plan will lead to watershed-wide collective action for co-investment in environmental services and equitable and fair benefit-sharing.

Collective action and property rights in the context of the allocation of water rights will be further explored as a prelude for effective coordination between water management institutions and complementary policies.

Partners

- Municipal Government of Lantapan
- Bukidnon Environment and Natural Resources Office, Provincial Government of Bukidnon
- Ecosystems Research and Development Services, Mt Kitanglad Range Natural Park, Department of Environment and Natural Resources
- National Irrigation Administration, Department of Agriculture
- National Economic and Development Authority
- Central Mindanao University
- Misamis Oriental State College of Agriculture and Technology
- National Power Corporation Pulangui IV

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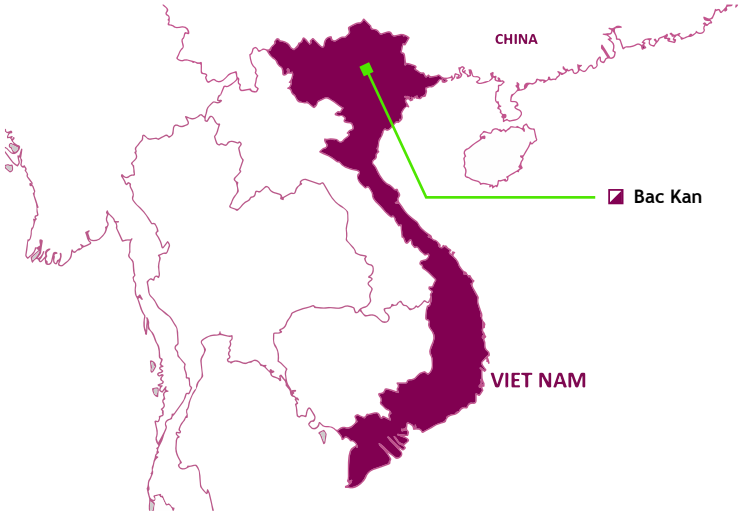
Viet Nam



Viet Nam was the first country in Southeast Asia to integrate payments for environmental services into national strategies and policies. In 2008, the Government of Viet Nam started a pilot program (under Decision 380 QD-TTg) for Payment for Forest Environmental Services, with full implementation in the whole country starting in January 2011 through the issuing of Decree 99. Decree 99 laid the legal foundation for provinces to ask hydropower plants, water companies and tourism businesses to pay a certain percentage of their income to relevant environmental services' providers, that is, landowners and forest protectors. Services explicitly recognized by the policy are 'water provision', 'aesthetic landscape', 'forest products', 'genetic resources', 'biodiversity' and 'prevention of erosion and flooding'.

The World Agroforestry Centre had significant field presence in the province, including a technical collaboration with the 3PAD project, funded by IFAD, and action research sites under RUPES.

RUPES assessed the potential for schemes in Bac Kan province, compiled lessons learnt in Son La and Lam Dong, analysed eco-tourism in Viet Nam's northern highlands, and evaluated carbon stock in Bac Kan province. As well, RUPES supported the 3PAD project by facilitating the development of a community contract between Ba Be National Park as the environmental services beneficiary and forest owners and Leo Keo community as providers. The community contract is expected to be signed in 2012 and has already become a model for the 3PAD project. Further, Decision 99 and its guiding circulars were reviewed and applied to three sites coordinated by 3PAD, including RUPES' action research sites in Bac Kan province.

Learning from the research sites

RUPES and its partners, such as the People, Resources and Conservation Foundation, gathered conservation case studies from the uplands of Northern Viet Nam, particularly in Bac Kan province. The studies were a starting point for the development of an system for forest protection incorporating rewards and/or payments for carbon environmental services. The team produced several recommendations on how to build on successful conservation models for developing such a scheme. The links between buyers and sellers of carbon environmental services was explored.

Developing environmental services rewards mechanisms in communities

RUPES and its local partners at provincial, district, commune and village levels, and especially Ba Be National Park and Kim Hy Natural Reserve Area in Bac Kan province, designed a payments for environmental services' scheme. The team facilitated the development of a community contract between Ba Be National Park as user/forest owner and Leo Keo community as provider. A pilot scheme was developed and provided input to the guidelines of Decree 99. RUPES also facilitated a series of capacity-building and awareness-raising activities at provincial level and with the districts of Ba Be, Pac Nam and Na Ri.

Measuring carbon environmental services provided by agroforestry

Carbon storage in two agroforestry systems—home and forest gardens—was assessed. This enabled a comparison of carbon storage in shifting cultivation and forest systems. The findings will be used to negotiate rewards for carbon storage provided by agroforestry farmers. The work was carried out in collaboration with Seoul University, Korea, Michigan State University, USA and Thai Nguyen University of Agriculture and Forestry, Viet Nam.

Figure 17. Lake Ba Be, Bac Kan

Key findings

- In line with designing a RES scheme, it is necessary to have detailed guidelines on PFES implementation, which is most needed at the local level.
- PFES schemes need to be designed in a participatory manner, in ways that generate greater support and commitment amongst stakeholders. In addition, PFES must be supplemented by continuous education, training and awareness-building by governmental and non-governmental organizations and the private sector.
- Compliance with conditionality is a challenge. PFES needs to be directly linked to service delivery and will require monitoring of criteria and indicators.
- Collective action in schemes has lower transaction costs than individual payments.
- The amount paid to a single ES is not economically attractive; there is a strong demand for bundling ES payments.
- Payment should be in cash and non-cash forms. However, non-cash payments through public works or public social investments will better include the poor and landless people in the payment scheme. 'Voluntary' is a necessary factor ensuring people's commitment to participate in any scheme.
- People's and farmers' associations should obtain legal identities, for example, a 'cooperative', to be able to transact business with buyers.
- PFES planners/designers need to be reflexive to effectively address rapidly changing local realities. Top–down PFES procedures also need to be linked with bottom–up approaches in designing PFES schemes.

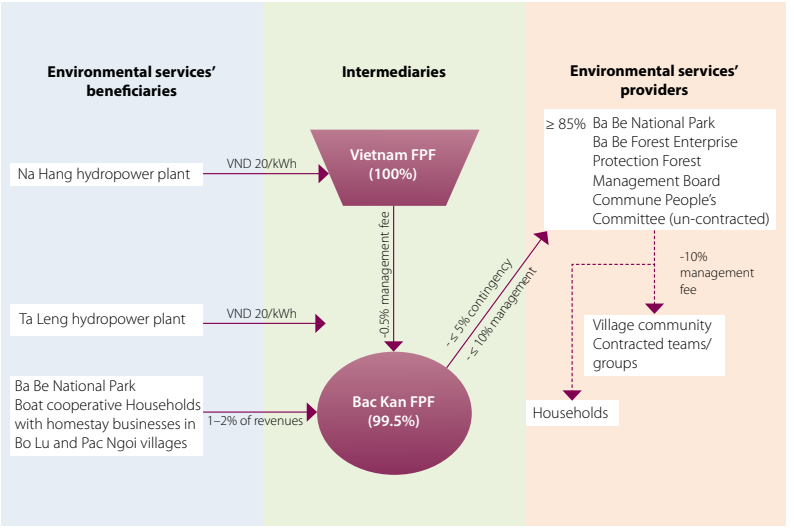


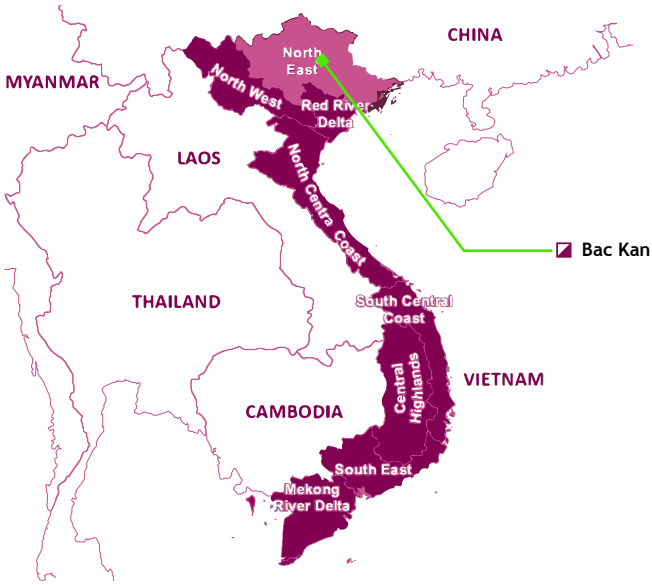
Figure 18. Fund management and uses of indirect PES payment

- Rewards for environmental services is a new concept and understanding it takes time. According to the results of stakeholders' workshops and consultations, we recommended indirect payments for Bac Kan province, as illustrated in the figure below.

Policy influenced

- RUPES contributed to national debates on rewards for environmental services' concepts and principles and analyzed the potential and challenges of REDD+ implementation in Viet Nam.
- Lessons were drawn from study of the payments for forest ecosystem services' scheme. The team and partners participated actively in several national workshops and meetings to share experiences related to rewards' scheme development in order to contribute to a better policy framework.
- Through active participation in advocating policy at local and national levels, and dissemination of lessons learnt and recommendations to national policy makers, the RUPES team and partners contributed to national policies that are increasingly conducive to realistic, conditional, voluntary and pro-poor approaches.
- Promoted schemes to potential public and private buyers.
- More than 600 people, including government officers, projects officers, village leaders and farmers, in Bac Kan were consulted and trained.

Bac Kan



Province	Bac Kan
District	7
Area of Nang watershed	75 000 hectare within Bac Kan province
Number of communes	122
Population	295 300 (2010)

The site

Bac Kan province is located in the centre of the Vietbac region, about 170 km to the north of Hanoi and about 200 km south of the border with China. The topography of Bac Kan province is complex with many valleys, hills and rocky mountains with average slope of 26°. The population of Bac Kan province (2009) was 295 300, with the main ethnic communities being Tay, Kinh and Dao. Agriculture and forestry were the main sources of livelihoods. Forest coverage was 56.6% compared to the country average of 39.1%. Bac Kan is one of the poorest provinces in Viet Nam (poverty rate of 36.6% compared to country average of 13.4%). It is also one of the potential candidates for the expansion of the UN-REDD program under phase 2.

The issues

The total forest area of the Nang River watershed is 96 602 hectare: Na Hang (19 936 hectare), Ba Be (40 158 hectare), Pac Nam (17 239 hectare), Ngan Son (9826 hectare) and Cho Don (9442 hectare). Local people were heavily dependent on forest resources.

The RUPES action research site at Ba Be covered 57 693.63 hectare of forestland and 5947.78 hectare of agricultural land. Some of the management practices were unsustainable because they would potentially degrade forest and forestland in the long term. These were slash and burn agriculture, illegal logging, agriculture on slopping land and forestland, mono-cropping of maize, and cattle grazing.

Dominated by forest and agroforest upland terraces around Ba Be Lake, the Bac Kan provincial landscape provided four major environmental services: watershed functions, carbon sequestration, landscape beauty and biodiversity conservation. On the basis of lessons learnt from rewards for environmental services' cases in Viet Nam, it seemed that the most successful schemes relevant to Bac Kan might be watershed functions and carbon sequestration. The assessment of the potential and constraints in Bac Kan was therefore focused on these two kinds of service.

Environmental services and the people involved

Environmental services	Water, carbon, landscape beauty
People who provide the services	Owners (households, communities, organizations), contracted forest protectors, Ba Be National Park
People who benefit from the services	Na Hang and Ta Lang hydropower plants Ba Be National Park (tourist entrance fee, boat cooperatives) Voluntary carbon market
People who act as intermediaries between the providers and the beneficiaries	RUPES, World Agroforestry Centre, 3PAD, government line agencies at central, provincial, district and commune levels

Environmental services' providers and users in Nang and Leng river basins

- The Nang River rises in Pac Nam district in the northwest of Bac Kan province and runs through Ba Be Lake in Ba Be district before feeding into the Na Hang hydropower dam in Tuyen Quang province. The Nang watershed includes about 38 communes in four districts of Bac Kan (Pac Nam, Ba Be, Ngan Son and Cho Don).
- The Leng River, upstream of Ba Be Lake, flows through the Quang Khe and Dong Phuc communes. The river basin is located within Ba Be district, with two communes in the core zone (Nam Mau commune) and the buffer zone (Quang Khe commune). Within Bang Phuc commune, the Ta Lang hydropower dam will cover 38 km^2 and provide 4.5 MW per hour, which is small compared with Na Hang's 342 MW per hour .

To sum up, the environmental services' scheme potential of Ba Be district includes 1) the water supply to Na Hang and Ta Leng hydropower plants; 2) eco-tourism businesses (by state-owned and private small-scale enterprises) surrounding Ba Be Lake, such as Ba Be National Park and homestays in Pac Ngoi and Bo Lu villages; and 3) REDD+ payments for carbon-stock sequestration through improved forest protection and management.

The rewards

The goal in Bac Kan was to achieve sustainable and equitable poverty reduction and improved livelihoods among the rural poor in Bac Kan through a framework for sustainable and profitable agroforestry development.

There were three components: 1) sustainable and equitable forestland management; 2) generating income opportunities for the rural poor; and 3) innovative environmental opportunities. Under component 3, forage-based conservation, sustainable land-use management, bio-energy development and other innovative options were to be assessed and promoted. Options for rewards for environmental services' schemes were to be assessed through pilot projects including integrated watershed management, a CDM (energy) project and conservation funds for soil and water resources management. Pro-poor ecotourism was also to be promoted.

A model for piloting a rewards for environmental services' scheme in the area was developed, aiming at 1) maintaining the forests' environmental services (water supply, landscape beauty and carbon sequestration) in Nang and Ta Leng river basins; and 2) enhancing forest protection and management and aboveground carbon-stock absorption and storage, that is, REDD+.

The mechanism for bundling environmental services for water supply, carbon sequestration and landscape beauty in Leo Keo village, Quang Khe Commune, Ba Be district, was developed using a participatory method. This was a pilot model that could be expanded to district level.

Figure 19. First stakeholder consultation workshop in Bac Kan province

Follow-up

To sustain the environmental services' schemes initiated by RUPES, the World Agroforestry Centre Viet Nam will continue to provide technical assistance to the 3PAD project in piloting environmental services' schemes in the districts of Ba Be and Na Ri. Payments from environmental services will also fund development of best practices in agroforestry systems, forest plantations and cooking stove improvement. The people's committee of Bac Kan province has approved the PFES pilot proposal for implementation.

The partners

- Bac Kan Department of Agriculture and Rural Development

  The Department is a technical body and under the management of the Provincial People's Committee (PPC), which supports the PPC in implementing State management of agriculture, forestry, aquaculture, irrigation and rural development and also performs other functions in providing the public service provision system for agriculture and rural development under the mandates of the PPC and State law.

- Bac Kan Pro-poor Partnership for Agroforestry Development (3PAD) project

  3PAD is a project funded by the International Fund for Agricultural Development. The goal of the project is to reduce poverty and improve living conditions of rural poor people in Bac Kan through improving forestland management.

- Forest Science Institute of Viet Nam

  The Institute is a State special research body, supporting State management of agriculture and rural development. It is part of the Ministry of Agriculture and Rural Development. Its function is to implement scientific research, transfer technology, maintain international relations, train post-graduate students and provide consultancy services to the forestry sector.

- Xuan Mai University, Thai Nguyen University of Agriculture and Forestry, Hue University of Agriculture and Forestry and Ha Noi Agricultural University

  Key aims of these universities are to provide higher education programs in agriculture, forestry and related fields in agricultural and forestry science and other academic training programs; and research and transfer advanced agricultural and forestry science and practices in order to contribute to rural development in Viet Nam.

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The RUPES Project

RUPES worked with both potential users and producers of environmental services to find conditions for positive incentives that were voluntary (within the existing regulatory framework), realistic (aligned with real opportunity costs and real benefits) and conditional (linked to actual effects on environmental services), while reducing important dimensions of poverty in upland areas. At each of the RUPES sites, local institutions partnered with the World Agroforestry Centre to implement action research aimed at developing effective reward mechanisms in the local context. Sites included Songhuaba, Tibetan Plateau and Xishuangbanna in China; Lake Loktak in India; Bungo, Cidanau, Citarum, Kuningan, Paninggahan and Sumberjaya, in Indonesia; Kulekhani and Shivapuri in Nepal; Bakun, Kalahan and Lantapan in the Philippines; Bac Kan in Viet Nam. RUPES was financially supported by the International Fund for Agricultural Development and various other donors.

RUPES Program

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