Co-investment in protecting watershed functions of Sumberjaya, Way Besai, Indonesia

The River Care is a PES scheme initiated by the Rewards for, Use of and shared Investment in Pro-poor Environmental Services (RUPES Phase 1 and 2 - Box 1) project of the World Agroforestry Centre (ICRAF). The scheme provides either cash payment or microhydro for communities in two villages in Sumberjaya, Way Besai watershed based on their performance in reducing soil sedimentation that benefitting a downstream hydroelectric power (HEP – PLTA Way Besai) company.

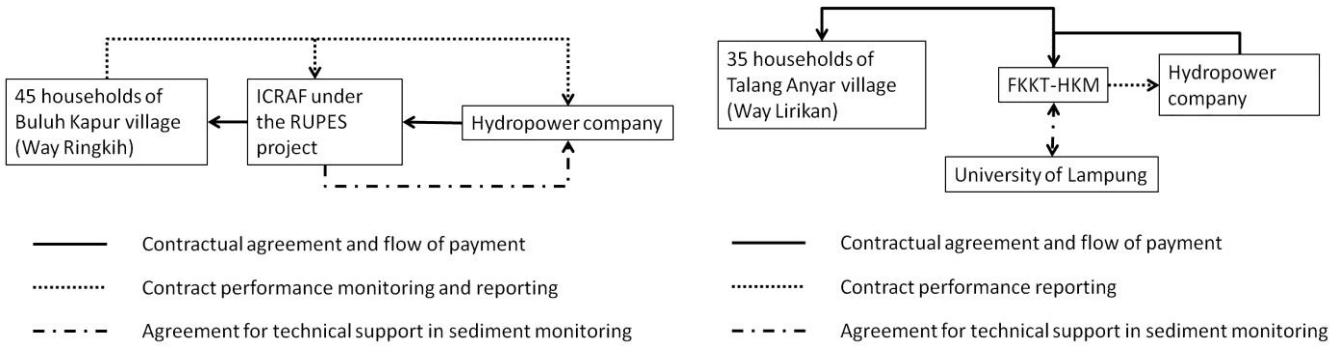
Overview

The World Agroforestry Centre (ICRAF) coordinated the RUPES programme to integrate rewards for environmental services into development programs to alleviate rural poverty and protect the natural environment. Sumberjaya, Way Besai is one of its action research sites, where the RUPES established the River Care scheme in three phases. Firstly, in Gunung Sari village, ICRAF acted as an ES buyer in 2006-2007 providing performance-based cash payment for reducing sedimentation. Further, the project facilitated a negotiation between the Hydropower Company and communities in Buluh Kapur village of Way Besai in 2008-2009 and expanded in another village of Talang Anyar in 2011-2013.

The RUPES project has started way in advance compared to regulatory and policy environment for payment for environmental services and been considered as a pilot site for establishing the regulations on PES in Indonesia. Through the newly promulgated Law number 32 in 2009, the Indonesian government is intends to scale up the numerous local initiatives of payment for environmental services in the country. This regulation mentions "payment for environmental services" and "compensation or rewards for environmental services" (CRES) as alternatives economic instrument for environmental management. Interestingly, the terms refer to two different mechanisms. PES refers to schemes involving private (individuals and companies) to private, or private to governments and vice versa. CRES instead specifically targets government to government ES transactions, such as PES scheme from a downstream district to an upstream one.

The project started in 2006 funded by the International Fund for Agriculture Development (IFAD) under the RUPES Phase 1, continued in 2007-2011 under the RUPES Phase 2. The RUPES project was completed in 2012, the scheme is now being directly funded entirely? by the PLTA Way Besai – the hydropower company with the Community Forestry Farmers' Groups Communication Forum (FKKT HKm) as the intermediary.

Figure 1. Schematic representation of the key players in the River Care agreements implemented in Buluh Kapur (2008-09) [left] and Talang Anyar (2011-13) [right]



Background

Box 1. Overview of the RUPES project phases 1 and 2

The Rewards for, Use of, and Shared Investment in, Pro-poor Environmental Services (RUPES) project, phase 1 (2002-2007) and 2 (2008–12), coordinated by the World Agroforestry Centre, introduced and tested the concept of rewarding people to protect or enhance environmental services that benefit businesses and the wider population.

The programme was designed to provide lessons learned and policy advocacy in Indonesia, the Philippines, Viet Nam, Nepal, India and China. The ultimate target group for the programme was indigenous forest dwellers and smallholding farmers in less productive environments that were vulnerable to environmental degradation and climate change.

Activities aimed at national policies and the 'buyer' and 'broker' part of the 'rewards for environmental services' (RES) value chain were aimed at long-term sustainability of benefits for the primary target group. RUPES 2 gave ample consideration to innovative approaches that targeted fair and efficient schemes for RES.
http://asia.ifad.org/web/rupes

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 metre above sea level.

Conversion of forests to coffee plantations and other crops is the major cause of forest cover decrease in Sumberjaya, Way Besai particularly in the period of 1973-2000 influenced its watershed function (Ekadinata, 2001). The Way Besay watershed feeds the Tulang Bawang River that is one of Lampung Province's three major rivers.

The Way Besay also supplies a hydroelectric run-off dam with the capacity of 90 MW started in 2001 owned by the PLTN-SBD – a state electricity company. The PLTA Way Besai hydro plant was originally conceived in the 1960s providing electricity to two provinces in Sumatra: Lampung and Riau, at which time sedimentation levels were reportedly significantly lower than now, commonly attributed to land use changes over the last decades. This is causing rapid accumulation of sediments in the reservoir, threatening the plant's operation[1]. With the assumption that most of the sub-watershed covered by semi-matured coffee garden, the sediment yield can reach about 1100 m^3 annually. The River Care scheme is part of ICRAF's initiative to engage multi-stakeholder in increasing the watershed function.

Long before the RUPES project commenced in Sumberjaya, stringent conflicts existed between the communities in the upstream of the watershed and external stakeholders such as the Forestry Services and the hydropower company. The communities were blamed as the ones who deforested and degraded the watershed causing major problems for the hydropower company. The ICRAF scientists provided scientific analysis on how to reduce sedimentation collaboratively with the local communities, such as planting vegetative strips, constructing simple sediment pits and bamboo check dam, and applied this to PES agreements between communities and the downstream hydropower company. The PES in Sumberjaya is not only an incentive scheme to involve local communities in providing ecosystem services, but also a conflict resolution tool for watershed management.

[1] The research on soil erosion in Sumberjaya's sub-watershed showed that the erosion level was various depending on the land cover of the watershed. The sediment yield of 11 year old coffee was between 4 and 6 Mg/ha/year and of the coffee with younger age (year 2 to 5), it peaked of up to 16.5 Mg/ha/year.

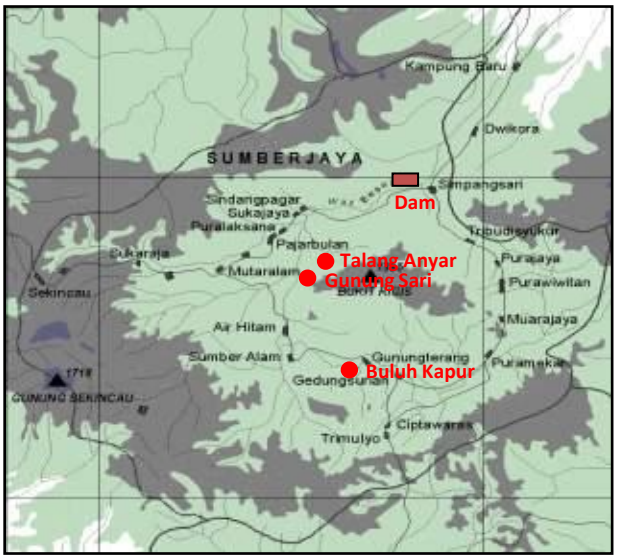


Figure 2. Locations of River Care schemes in Sumberjaya

The Providers of Environmental Services

The River Care was set up in the community of Buluh Kapur in the Way Ringkih sub-basin (669.53 hectares or about 1.22 percent of the overall watershed), one of the tributaries of Way Besai with one of the highest levels of erosion. The community, consisting of about 45 households, was also selected partly because it had good leadership from a local farmer champion and didn't have access to electricity. Facilitated by RUPES, the company and the community signed a contract for a 1-year program. RUPES also provided support as a neutral intermediary and for the monitoring of sedimentation levels. PLTA Way Besai provided a budget of around US$1,100 (50% upon signing, 50% after 3 months), with which the community undertook a number of activities such as:

- Construction and maintenance of check dams to retain sediments from the river;
- Diversion of waterways and construction of ridging and sediment pits;
- Planting of grass strips along potential landslide hotspots;
- Weekly removal of sediment from the check dam.

From the results of activity performance evaluation, the percentage at the mid-year evaluation was 81% and the final evaluation was 86%. The evaluating team was satisfied with River Care Forum's performance. However, the erosion measurements after the 1-year period showed that sediment concentration had been reduced by 20%. According to the contract this meant that the community was entitled to a payment of US$ 550 only. Nevertheless, PLTA Way Besai highly appreciated the effort made by the community and decided to reward the micro-hydro system anyway, as a long-term incentive for the community to continue erosion control activities. After the completion of the 1-year period contract, the villagers continue to remove the sediment accumulated at the check dam, roughly 10 m^3 per month. In return, PLTA voluntarily gives the community the equivalent amount as cement, which they use to pave the dirt track from the village to the main road (1.5 km long). In addition, the company looks after the hydro-electricity systems, as long as the community maintains the erosion measures. Since the introduction of electricity has been a major improvement in their lives, the villagers remain highly committed to erosion control.

The experience of the second program stimulated PLTA to undertake an additional program in a different community, Talang Anyar, located in Way Lirikan sub-catchment (737.28 hectares or about 1.34 percent of the overall watershed). This community consists of 35 households, of which mostly practice coffee farming. The contract was similar to the one conducted in Buluh Kapur, i.e. constructing check dam and removing its sediment, diverting waterways, planting grass strips. In Talang Anyar, the conservation awareness of the local communities was relatively higher compared to the Buluh Kapur's farmers. Most have already adopted practices to minimize erosion from the coffee plantation, such as terracing and planting vegetative/grass strips.

Learning from the previous experiences it was decided to extend the length of the commitment period to two years, giving the community more time to install and maintain erosion control measures. After the first year, a payment will be made depending on the amount of activities completed (Table 2). The funds will be used to establish livestock farming using goat and sheep. After completion of the second year, measurements of the sedimentation will be taken to establish the reward to be paid.
Instead of RUPES, the intermediary for this phase is Forum Komunikasi Kelompok Tani (FKKT or communication forum for farmers), previously initiated as a media and information centre about the community forestry programme in Way Besai watershed before the RUPES involved in this area. PLTA has provided FKKT with a budget of around US$ 26,000, including the rewards to the community and sediment monitoring. For the sediment monitoring, the FKKT hired the University of Lampung for technical support during the 2-year commitment period.


The river before the River Care scheme

Table 1. Conditional Reward for River Care program (2008-2009). Source: (Pasha et al, 2010)

Erosion reduction (conditionality)	**Reward**
≥ 30 % from baseline	5 kW micro-hydro system worth US$ 2,200
21% - 29%	US$ 775
11% - 20%	US$ 550
1% - 10%	US$ 275

Table 2. Conditional Reward for River Care program (2011-2013)

After Year 1 (2011-2012)	
Completion of activities > 76%	*US$ 1,100 for the purchase of goat and sheep*
Completion of activities 50% -75%	*US$ 550 for the purchase of goat and sheep*
After Year 2 (2012-2013)	
Decrease in sediment ≥ 21%	*5 kW Micro-hydro system*
Decrease in sediment 16% - 20%	*Cash payment of US$ 2,200*
Decrease in sediment 10% - 15%	*Cash payment of US$ 1,100*

Monitoring impacts

An ES outcome-based PES reflects a market-based mechanism, where the buyers pay the real delivery of ES.
Theoretically, it will enhance the efficiency in financing conservation measures; however, the River Care case demonstrates that this type of mechanism might pose challenges for its implementation in developing countries.

Firstly, the mechanism might cause the PES participants worse-off because they have to shoulder external risks, mostly coming from natural factors that might influence the quality of ES as stated in the contract.

Secondly, trust and respect that have been gradually built among stakeholders during the process dominated. In Buluh Kapur, the buyer kept rewarding the community the microhydro although they did not accomplish the contract.

Monitoring and evaluating the proxies for ES provisions, i.e. conservation activities are considered fair and sufficient by the buyer since the monitoring and evaluation team had witnessed communities' effort in accomplishing the conservation activities required by the contract. Even for the third phase in Talang Anyar, the buyer agreed to modify the contract and lengthen the period of the contract.

Measuring the Environmental Services

There were two types of monitoring and evaluation in the River Care scheme, that is, monitoring and evaluation of conservation activities and of sedimentation. The monitoring and evaluation of sedimentation was set as the program success indicator, while the result of the monitoring and evaluation of conservation activities was only used for recommendations for further implementation of the contract conducted every 6 months.

Four river observation locations were recommended by the ICRAF scientists at each sub-watershed and each location was monitored by two observers. The water sample was collected every rainfall time. The collected water samples were dried and the sediment were weighed and analyzed in a simple laboratory.

Innovative aspects of the PES scheme

Global schemes of payment for environmental services (PES) showed that the most of the cases targeted implicitly services generated by the watershed, such as watershed protection. Most of the cases were paid for the proxy of watershed service generated. These proxies ranged from forest conservation/restoration, best practices in dairy farming, agroforestry, and agricultural land retirement. Innovatively, the River Care scheme is testing how the performance of a PES scheme is based on measurable increment of ecosystem services (ES outcome-based, in short), in this River Care case, the reduction of sedimentation.

The River Care Phase 2 in Buluh Kapur showed that although the scheme had been supported by scientific evidence, uncertainty of how ES provision related to certain land use practices was still high. Even in the Phase 1 in Gunung Sari, landslide happened in the upper state-forest area of the watershed and shockingly increased the level of sedimentation in the river where the communities built the check dam. It is obvious that incontrollable external factors (such as natural disaster) causes the ES providers underperform the contract. This condition can degrade the morale of the participants and put them in high-risk when joining the PES scheme.

Role and Responsibilities

Type of actor	Stakeholder	Role
Environmental services provider	Community in Gunung Sari (Phase 1), Buluh Kapur (Phase 2) and Talang Anyar (Phase 3)	Participate in determining watershed problems and solutions, contract value and content Implement the conservation contract
Environmental services beneficiary	PLTA Besai coordinated by PLN-SDBL	Jointly develop the contract with the ES providers and intermediary; Provide operational fund and reward for the River Care; Join the monitoring and evaluation (M&E) team.
Intermediary Facilitator	World Agroforestry Centre (ICRAF) funded by IFAD	Support in framing the watershed problem and its scientific information; Facilitate negotiations between ES providers and beneficiaries Join the M&E team
	Community Forestry Farmers' Groups Communication Forum (FKKT HKm) as ICRAF partner	Facilitate negotiations between ES providers and beneficiaries; Manage the fund on behalf of the village community; Join the M&E team.
Monitoring and evaluation team	Village government Forestry Agency of Lampung Barat District	Lead the M&E team; Mediate the negotiation and conflict if existing.

Lessons learned

Incentives for communities of participating villages

The communities participating in the River Care schemes benefitted from improved access to electricity and knowledge, particularly in conservation technique and organizational skill. They mentioned about the increased productivity of their coffee gardens after applying the soil and water conservation techniques, and gained additional income from planting high economic-value trees (i.e. bamboo, bettle nut, sugar palm) along the riparian for local sale. The farmers also could practice the 'revolving cattle' system in which each participating household could breed a couple of goat from the collective contract payment and share one third of the numbers of the young goats from breeding to other households. They also could harvest the grass from the vegetative strips along the riparian and the ridging on their coffee gardens as the fodder for the cattle. As mentioned earlier, conflicts among stakeholders hindered collaborative watershed management in Sumberjaya. The River Care promotes stronger social relationship and collaboration between relevant stakeholders that are responsible in managing the watershed: the community, government and private sector.

Incentives

Negotiations with private sectors

The River Care has been progressing well in negotiating with the private sector, in this case, the hydropower company. The direct negotiation between the FKKT – the grass root organization – with the company was a proof of sustainability of the scheme after the RUPES project completed. The effort in involving and raising awareness to the private sector intensively started in 2006 by inviting them observing the River Care experiment in Gunung Sari (Phase 1). Implementing an experimental PES scheme, where the project becomes a stand-in buyer proves to be useful to show an example of best-practice to the potential buyer. The main challenge is that the current scheme is still part of the ad-hoc corporate social responsibility programme of the company. In this case, the hydropower unit manager has to propose and advocate the programme to the company board for joining the PES scheme after each PES contract completes. An improved internal company policy to internalize the cost for PES into its operational cost will enhance the financial sustainability of the programme. However, due to the strict financial rule of a state-owned company, this improvement in company accounting system is not possible. At the national level, ICRAF and its partner are advocating this issue to relevant Ministries, such as Ministry of Finance and Industry to enable internalizing environmental cost to the state-owned company's operational costs.

Negotiation

Monitoring and Evaluation

The River Care involved a simple but relatively rigorous measurement of sedimentation. The local communities were trained to collect the water sample. However some technical problems were encountered when collecting water samples. Water samples were less likely to represent sediment concentrations, especially during peak flow when observers were not able to collect them. This problem was a challenge to observers, especially when the peak flow occurred at night. The process of transporting samples from sampling locations to the laboratory led to leakage from several samples. Consequently, the water sample volume reduced and could not be processed. These activities require observers' commitment since they consume a lot of time. Often, water monitoring activities were prioritized over rest time and even working in the fields. It is advisable to consider a special team and budget allocation outside the operational budget of PES for water monitoring. This monitoring and evaluation budget might be part of negotiation with the buyer. For the River Care case, the PLTA set up their own water monitoring gauge with the cost almost three times compared to the reward itself. No data was collected by the local government or other institutions in this area.The River Case shows that ideally sedimentation monitoring requires longer period of time rather than the current period of annual contract. It even needs larger spatial scale thus the HEP can gain direct benefit from it.

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Future Outlook

Broaden the principle and concept of PES beyond the market-based mechanism will positively enhance the practice of PES. Learning from the Asian cases of PES, we recommended that comprehending the PES as phased strategies rather than only a single shoot tool for conservation. Instead, the PES scheme might evolve from broader conditionality as proxies towards more strict conditionality.

Four levels of PES conditionality is proposed: i ES contracts link tangible benefits for the ES providers to the actual enhanced delivery of ES (level I), and/or maintenance of agro-ecosystems in a desirable state (level II), and/or performance of agreed actions to enhance ES (level III), and/or development and implementation of management plans to enhance ES or respect for local sovereignty in managing the environment for local plus external benefits (level IV).

The River Care scheme also shows that at the landscape level, an individual PES contract may not effectively provide desired improvement of ecosystem services. ES provision might not only be limited to land ownership boundary but also cover public land, such as riparian. Collective action will become an important aspect of PES.

The riparian strip before the River Care

The riparian zone with coffee agroforestry after the River Care

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http://www.worldagroforestrycentre.org/regions/southeast_asia/projects/RUPES

References

Ekadinata, A., 2001. Deteksi perubahan lahan dengan menggunakan citra satelit multisensor di Sumberjaya, Lampung - Detecting land cover change using multisensory satellite image in Sumberjaya, Lampung. Faculty of Forestry. Bogor Agricultural University, Bogor, p. 52.

Verbist, B., 2008. Assessment of watershed functions to support negotiations in a catchment under land use conflict in Sumberjaya, Indonesia. Department of Earth and environmental Sciences. Katholieke Universiteit Leuven, Belgium, p. 210.

Pasha, R., Asmawan, T., Leimona, B., Setiawan, E., Irawadi, C., 2012. Commoditized or co-invested environmental services? Rewards for environmental services scheme: River Care program, Way Besai watershed, Lampung, Indonesia. Working paper nr 148. World Agroforestry Centre (ICRAF) Southeast Asia Regional Program, Bogor, Indonesia: p. 27.

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.

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